INTERNATIONAL STANDARD

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Safety of machinery — Reduction of risks to health resulting 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

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Foreword

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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 on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT) see the following URL: Foreword - Supplementary information

The committee responsible for this document is ISO/TC 199, *Safety of machinery*.

This second edition cancels and replaces the first edition (ISO 14123-2:1998), of which, by taking ISO 12100 into account, it constitutes a minor revision.

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

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

— *Part 2: Methodology leading to verification procedures*

Introduction

The structure of safety standards in the field of machinery is as follows:

a) **type-A standards** (basic safety standards) giving basic concepts, principles for design, and general aspects that can be applied to machinery;

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

   — type-B1 standards on particular safety aspects (for example, safety distances, surface temperature, noise);

   — type-B2 standards on safeguards (for example, two-hand controls, interlocking devices, pressure-sensitive devices, guards);

c) **type-C standards** (machine safety standards) dealing with detailed safety requirements for a particular machine or group of machines.

This document is a type-B1 standard as stated in ISO 12100. 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 can 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 in all phases of the machine life cycle (see ISO 12100:2010, 5.4 and ISO 14123-1:2015, Clause 4).

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

This document is of relevance, in particular, for the following stakeholder groups representing the market players with regard to machinery safety:

— machine manufacturers (small, medium and large enterprises);

— health and safety bodies (regulators, accident prevention organizations, market surveillance etc.);

Others can be affected by the level of machinery safety achieved with the means of the document by the above-mentioned stakeholder groups:

— machine users/employers (small, medium and large enterprises);

— machine users/employees (e.g. trade unions, organizations for people with special needs);

— service providers, e.g. for maintenance (small, medium and large enterprises);

— consumers (in case of machinery intended for use by consumers).

The above-mentioned stakeholder groups have been given the possibility to participate at the drafting process of this document.

The requirements of this document can be supplemented or modified by a type-C standard.

For machines that are covered by the scope of a type-C standard and that have been designed and built according to the requirements of that standard, the requirements of that type-C standard take precedence.

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

Part 2: Methodology leading to verification procedures

1 Scope

This part of ISO 14123 establishes a methodology that 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 ISO 14123-1:2015, Clause 8.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 12100:2010, *Safety of machinery — General principles for design — Risk assessment and risk reduction*

ISO 14123-1:2015, Safety *of machinery — Reduction of risks to health resulting from hazardous substances emitted by machinery — Part 1:Principlesand specifications for machinery manufacturers*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 12100 and ISO 14123-1 apply.

4 Methodology

4.1 General

This Clause specifies the steps that shall be taken to lead to a verification procedure. These steps are summarized in Annex A.

4.2 Identification of hazardous substances

4.2.1 Identify substances that can be emitted during the intended use of the machine (see ISO 12100 and ISO 14123-1:2015, Clause 4).

4.2.2 Determine which of these substances are hazardous to health and the nature of the hazard (see ISO 14123-1:2015, 3.2, Example).

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

4.3 Characterization of emissions

For all significant emissions of hazardous substances identified by 4.2.3, establish the following:

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

NOTE The amount of the emission can 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 (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, spread rate, temperature, pressure;

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

4.4 Identification of critical factors

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

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

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

4.5 Specification of indicative parameters

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

NOTE Examples are given in Annex C.

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

5 Verification

5.1 Verification shall be carried out by collection of data relating to the indicative parameters.

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

5.3 A number of general test methods, which may be used as part of verification, are described in ISO 29042. 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 shows the sequence of steps that shall be taken to lead to a verification procedure.

Table A.1 — Flow diagram of steps leading to verification procedure

Clause	Sequence of steps	Examples
4.2	Identification of hazardous substances ↓	— identification of phase of the machine life cycle; — identification of the hazardous properties.
4.3	Characterization of emissions ↓	— likely quantity or scale of the emission; — location and direction of the emission and likely position of persons ; — when the emission is likely to occur; — physical characteristics; phase (e.g. gas), temperature; — airborne emission or surface contamination.
4.4.1	Identification of relevant factors ↓	— materials: dustiness, usage rates, production rates; — energy used: type; — machine design: ergonomics; distances; automation; — performance: efficacy.
4.4.2	Selection of critical factors ↓	Factors that most influence the emission of hazardous substances; prioritise these to assist selection of indicative parameters.
4.5.1	Specification of indicative parameters ↓	— quantitative: obtained by measurements or calculations; — qualitative: information obtained by, e.g., visual inspection; visualisation techniques, design details.
4.5.2	Specification of parameter values, range of values, conditions or states ↓	Requirements to achieve performance that reduces emissions.
5	Specification of verification procedures	— specification of information that relates to the specified indicative parameters; — evidence from field/laboratory tests, measurements, visual inspections or calculations, technical construction files.