INTERNATIONAL STANDARD

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Safety of machinery — Guards — General requirements for the design and construction of fixed and movable guards

Sécurité des machines — Protecteurs — Prescriptions générales pour la conception et la construction des protecteurs fixes et mobiles

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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 14120:2002), which has been technically revised. The main changes from the previous edition are as follows.

— Definitions have been brought into line with ISO 12100. The figures showing examples of guards have been updated where appropriate.

— Clause 5 has been updated with new references to ISO 13855 and ISO 14119. Requirements on the removal of guards have been amended. Subclause 5.3.9 describes requirements for the removal of fixed guards only with a tool. In addition, there is a requirement that fixed guards be designed to prevent easy removal. The subclause about impact and ejection resistance (5.4) has been strengthened. Subclauses on Climbing (5.18), Retained fastenings (5.19), Warning signs (5.21), Colour (5.22) and Appearance (5.23) have been added.

— Clause 6 has been amended and updated to better include cover combinations of different guards or of guards with other devices. Selection of guards according to the number and size of the hazards (6.3) has been changed and updated. Subclause 6.4.4.2, where access is required during the working cycle, has been changed and updated.

— Clauses on verification and validation have been introduced (Clause 7). This includes a table which outlines the safety requirements and/or measures by subclause.

— The text of Clause 8 has been updated, including requirements for procedures for removal of guards (use of a tool and the safe working procedure). The subclause for removal of guards (8.5) has changed.

— Two new informative annexes on test methods, one on projectile tests and the other on impact tests, have been added.

— The Bibliography, which contains a list of International and European Standards published or in preparation that can be helpful in the design and commissioning of guards, has been updated.

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 all machinery;

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

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

   — type-B2 standards on safeguards (e.g. 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 International Standard is a type-B2 standard as stated in ISO 12100.

Guards provide a risk reduction for both protection against unintended access and against ejected parts and substances. The guarding can also give protection against others hazards, e.g. noise, fire, biological hazards, and radiation.

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 — Guards — General requirements for the design and construction of fixed and movable guards

1 Scope

This International Standard specifies general requirements for the design, construction, and selection of guards provided to protect persons from mechanical hazards.

This International Standard indicates other hazards that can influence the design and construction of guards.

This International Standard applies to guards for machinery which will be manufactured after it is published.

The requirements are applicable if fixed and movable guards are used. This International Standard does not cover interlocking devices. These are covered in ISO 14119.

This International Standard does not provide requirements for special systems relating specifically to mobility such as ROPS (rollover protective structures), FOPS (falling-object protective structures), and TOPS (tip over protective structures) or to the ability of machinery to lift loads.

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 13855, *Safety of machinery — Positioning of safeguards with respect to the approach speeds of parts of the human body*

ISO 13857, *Safety of machinery — Safety distances to prevent hazard zones being reached by upper and lower limbs*

ISO 14119, *Safety of machinery — Interlocking devices associated with guards — Principles for design and selection*

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

ISO 14159, *Safety of machinery — Hygiene requirements for the design of machinery*

IEC 60204-1:2005, *Safety of machinery — Electrical equipment of machines — Part 1: General requirements*

3 Terms and definitions

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

3.1
guard
physical barrier, designed as part of the machine, to provide protection

Note 1 to entry: A guard may act either