
**Safety of machinery — Basic concepts,
general principles for design —**

**Part 1:
Basic terminology, methodology**

*Sécurité des machines — Notions fondamentales, principes généraux
de conception —*

Partie 1: Terminologie de base, méthodologie



PDF disclaimer

This PDF file may contain embedded typefaces. In accordance with Adobe's licensing policy, this file may be printed or viewed but shall not be edited unless the typefaces which are embedded are licensed to and installed on the computer performing the editing. In downloading this file, parties accept therein the responsibility of not infringing Adobe's licensing policy. The ISO Central Secretariat accepts no liability in this area.

Adobe is a trademark of Adobe Systems Incorporated.

Details of the software products used to create this PDF file can be found in the General Info relative to the file; the PDF-creation parameters were optimized for printing. Every care has been taken to ensure that the file is suitable for use by ISO member bodies. In the unlikely event that a problem relating to it is found, please inform the Central Secretariat at the address given below.

© ISO 2003

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office
Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
E-mail copyright@iso.org
Web www.iso.org

Published in Switzerland

Contents

Page

Foreword	iv
Introduction	v
1 Scope	1
2 Normative references	1
3 Terms and definitions	1
4 Hazards to be taken into account when designing machinery	8
4.1 General	8
4.2 Mechanical hazard	8
4.3 Electrical hazard	9
4.4 Thermal hazard	9
4.5 Hazard generated by noise	10
4.6 Hazards generated by vibration	10
4.7 Hazards generated by radiation	10
4.8 Hazards generated by materials and substances	10
4.9 Hazards generated by neglecting ergonomic principles in machine design	10
4.10 Slipping, tripping and falling hazards	11
4.11 Hazard combinations	11
4.12 Hazards associated with the environment in which the machine is used	11
5 Strategy for risk reduction	11
5.1 General provisions	11
5.2 Specification of the limits of the machine	12
5.3 Hazard identification, risk estimation and risk evaluation	12
5.4 Elimination of hazards or reduction of risk by protective measures	14
5.5 Achievement of risk reduction objectives	14
Annex A (informative) Schematic representation of a machine	17
Trilingual index	18
Bibliography	33

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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. 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.

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.

ISO 12100-1 was prepared by Technical Committee ISO/TC 199, *Safety of machinery*.

This edition cancels and replaces ISO/TR 12100-1:1992, which has been technically revised.

This standard results from the revision of EN 292:1991 / ISO/TR 12100:1992, carried out by a Special Working Group composed of experts from ISO, CEN, IEC and CENELEC.

ISO 12100 consists of the following parts, under the general title *Safety of machinery — Basic concepts, general principles for design*:

- *Part 1: Basic terminology, methodology*, expressing the basic overall methodology to be followed when designing machinery and when producing safety standards for machinery, together with the basic terminology related to the philosophy underlying this work;
- *Part 2: Technical principles*, giving advice on how this philosophy can be applied using available techniques.

Introduction

The primary purpose of ISO 12100 is to provide designers with an overall framework and guidance to enable them to produce machines that are safe for their intended use. It also provides a strategy for standard makers.

The concept of safety of machinery considers the ability of a machine to perform its intended function(s) during its lifecycle where risk has been adequately reduced.

This standard is the basis for a set of standards which has the following structure:

- **type-A standards** (basic safety standards) giving basic concepts, principles for design, and general aspects that can be applied to all machinery;
- **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 (e.g. safety distances, surface temperature, noise);
 - type-B2 standards on safeguards (e.g. two-hand controls, interlocking devices, pressure sensitive devices, guards);
- **type-C standards** (machine safety standards) dealing with detailed safety requirements for a particular machine or group of machines.

This standard is a type-A standard.

When a type-C standard deviates from one or more provisions dealt with by Part 2 of this standard or by a type-B standard, the type-C standard takes precedence.

It is recommended that this standard be incorporated in training courses and manuals to convey basic terminology and general design methods to designers.

ISO/IEC Guide 51 has been taken into account as far as practicable at the time of drafting of this standard.

Safety of machinery — Basic concepts, general principles for design — Part 1: Basic terminology, methodology

1 Scope

This standard defines basic terminology and methodology used in achieving safety of machinery.

The provisions stated in this standard are intended for the designer.

This standard does not deal with damage to domestic animals, property or the environment.

2 Normative references

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

ISO 12100-2:2003, *Safety of machinery – Basic concepts, general principles for design – Part 2: Technical principles*.

3 Terms and definitions

For the purposes of ISO 12100-1 and -2, the following terms and definitions apply.

3.1

machinery

machine

assembly of linked parts or components, at least one of which moves, with the appropriate machine actuators, control and power circuits, joined together for a specific application, in particular for the processing, treatment, moving or packaging of a material.

The terms "machinery" and "machine" also cover an assembly of machines which, in order to achieve the same end, are arranged and controlled so that they function as an integral whole.

NOTE Annex A provides a general schematic representation of a machine.

3.2

reliability (of a machine)

ability of a machine or its components or equipment, to perform a required function under specified conditions and for a given period of time without failing

3.3

maintainability (of a machine)

ability of a machine to be maintained in a state which enables it to fulfil its function under conditions of intended use, or restored into such a state, the necessary actions (maintenance) being carried out according to specified practices and using specified means