

# ANSI / ISO 12100-2:2007

AMERICAN NATIONAL ADOPTION  
of an INTERNATIONAL STANDARD

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

**Part 2: Technical principles**

Secretariat and Accredited Standards Developer:

**AMT – The Association For Manufacturing Technology**  
7901 Westpark Drive  
McLean, VA 22102

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**by The American National Standards Institute**



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This is a preview of "ANSI/ISO 12100-2-200...". [Click here to purchase the full version from the ANSI store.](#)

## Foreword

This American National Standard is an "identical" American national adoption of ISO 12100-2:2003 and differs from the original standard only in changing the clause 2 reference to IEC 60204 to its current version (from 1997 to 2005), and the addition of a note to the clause 2 reference to IEC 60204-1, as follows: *In the United States, ANSI / NFPA 79:2007 may be substituted for IEC 60204-1:2005*. There are also minor editorial revisions needed to make this adoption read as an 'Americanized' version.

This standard has been nationally adopted and approved through the auspices of the ANSI B11 Accredited Standards Committee which has as one of its Subcommittees, the U.S. Technical Advisory Group to ISO/TC 199 under which the original ISO standard was developed and approved.

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. Neither ISO, ANSI nor AMT shall be held responsible for identifying any or all such patent rights. ANSI / ISO 12100-2:2007 is an identical national adoption of ISO 12100-2:2003 by the B11 Accredited Standards Committee, after recommendation by the B11.TC199 Subcommittee (which also functions primarily as the U.S. Technical Advisory Group to ISO Technical Committee 199 under which this ISO standard was developed, adopted and approved).

ISO 12100-2:2003 was prepared by Technical Committee ISO/TC 199, *Safety of machinery*. That edition canceled and replaced ISO/TR 12100-2:1992, which had been technically revised.

ANSI / ISO 12100:2007 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 ANSI / 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 writers. 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 have the following structure:

- **Type-A standards** (basis standards) give basic concepts, principles for design, and general aspects that can be applied to machinery;
- **Type-B standards** (generic safety standards) deal with one or more safety aspects or one or more types of safeguards that can be used across a wide range of machinery:
  - Type-B1 standards are on particular safety aspects (e.g., safety distances, surface temperature, noise);
  - Type-B2 standards are on safeguards (e.g., two-hand controls, interlocking devices, pressure sensitive devices, guards);
- **Type-C standards** (machinery safety standards) deal with detailed safety requirements for a particular machine or group of machines.

This standard is a type-A standard. The subjects of numerous clauses or subclauses of this standard are also dealt with in a more detailed manner in other type-B standards, such as ANSI B11.GSR and ANSI B11.19. When a type-C standard deviates from one or more provisions dealt with by this standard, or by a type-B standard, the type-C standard takes precedence. 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 2: Technical principles

## 1 Scope

This standard defines technical principles to help designers in achieving safety in the design of machinery. ANSI / ISO 12100-2 is intended to be used together with ANSI / ISO 12100-1 when considering the solution to a specific problem. The two parts of ANSI / ISO 12100 can be used independently of other documents, or as a basis for the preparation of other type-A standards or type-B or type-C standards. 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.

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

NOTE: In the United States, ANSI / NFPA 79:2007 may be substituted for IEC 60204-1:2005.

ANSI / ISO 12100-1:2007, *Safety of machinery – Basic concepts, general principles for design – Basic terminology, methodology*.

## 3 Terms and definitions

For the purposes of this standard, the terms and definitions given in ANSI / ISO 12100-1:2007 apply.

## 4 Inherently safe design measures

### 4.1 General

Inherently safe design measures are the first and most important step in the risk reduction process because protective measures inherent to the characteristics of the machine are likely to remain effective, whereas experience has shown that even well-designed safeguarding may fail or be violated and information for use may not be followed.

Inherently safe design measures are achieved by avoiding hazards or reducing risks by a suitable choice of design features of the machine itself and/or interaction between the exposed persons and the machine.

NOTE: Clause 5 gives safeguarding and complementary measures to achieve the risk reduction objectives where inherently safe design measures are not sufficient (see 3-step method in ANSI / ISO 12100-1:2007, clause 5).

### 4.2 Consideration of geometrical factors and physical aspects

#### 4.2.1 Geometrical factors

Such factors can be, e.g.:

a) Designing the shape of machinery to maximize direct visibility of the working areas and hazard zones from the control position thereby reducing blind spots. Also, choosing and locating means of indirect vision where necessary (e.g., mirrors) so as to take into account the characteristics of human vision, particularly when safe operation requires permanent direct control by the operator, e.g.:

- the traveling and working area of mobile machines;
- the zone of movement of lifted loads or of the carrier of machinery for lifting persons;
- the area of contact of the tool of a hand-held or hand-guided machine with the material being worked.

The design of the machine shall be such that, from the main control position, the operator is able to ensure that there are no exposed persons in the danger zones.