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Replacing GB/T 15706.1-2007, GB/T 15706.2-2007, GB/T 16856.1-2008

Safety of machinery - General principles for design - Risk assessment and risk reduction

机械安全 设计通则

风险评估与风险减小

(ISO 12100:2010, IDT)

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Foreword

This Standard is drafted in accordance with the rules given in GB/T 1.1-2009.

This Standard replaces GB/T 15706.1-2007 “Safety of machinery - Basic concepts, general principles for design - Part 1: Basic terminology, methodology”, GB/T 15706.2-2007 “Safety of machinery - Basic concepts, general principles for design - Part 2: Technical principles” and GB/T 16856.1-2008 “Safety of machinery - Risk assessment - Part 1: Principles”. This Standard integrates the technical contents of GB/T 15706.1-2007, GB/T 15706.2-2007 and GB/T 16856.1-2008. Compared with GB/T 15706.1-2007, GB/T 15706.2-2007 and GB/T 16856.1-2008, the main technical changes except editorial modifications are as follows:

- CHANGE the standard name TO “Safety of machinery - General principles for design - Risk assessment and risk reduction”;
- CHANGE the term “maintainability (of a machine)” TO “maintainability” (see 3.3 of this Standard, 3.3 of GB/T 15706.1-2007);
- CHANGE the term “residual risk” TO “residual risk” (see 3.13 of this Standard, 3.12 of GB/T 15706.1-2007 and 3.11 of GB/T 16856.1-2008);
[Translator’s note: This applies only to Chinese text.]
- CHANGE the term “risk estimation” TO “risk estimation” (see 3.14 of this Standard, 3.15 of GB/T 15706.1-2007 and 3.15 of GB/T 16856.1-2008);
[Translator’s note: This applies only to Chinese text.]
- CHANGE the term “risk evaluation” TO “risk evaluation” (see 3.16 of this Standard, 3.16 of GB/T 15706.1-2007 and 3.16 of GB/T 16856.1-2008);
[Translator’s note: This applies only to Chinese text.]
- CHANGE the term “risk assessment” TO “risk assessment” (see 3.17 of this Standard, 3.13 of GB/T 15706.1-2007 and 3.14 of GB/T 16856.1-2008);
[Translator’s note: This applies only to Chinese text.]
- CHANGE the term “reasonably foreseeable misuse” TO “reasonably foreseeable misuse” (see 3.24 of this Standard, 3.23 of GB/T 15706.1-2007 and 3.10 of GB/T 16856.1-2008; [Translator’s note: This applies only to Chinese text.]
- CHANGE the term “enabling device” TO “enabling device” (see 3.28.2 of this Standard, 3.26.2 of GB/T 15706.1-2007); [Translator’s note: This applies only to Chinese text.]
- CHANGE the term “hold-to-run control device” TO “hold-to-run control

device” (see 3.28.3 of this Standard, 3.26.3 of GB/T 15706.1-2007);
[Translator’s note: This applies only to Chinese text.]

- CHANGE the term “malfunction” TO “malfunction” (see 3.37 of this Standard, 3.8 of GB/T 16856.1-2008). [Translator’s note: This applies only to Chinese text.]

This Standard uses the translation method to be identical to ISO 12100:2010 “Safety of machinery - General principles for design - Risk assessment and risk reduction” (English version).

This Standard is identical to translating ISO 12100:2010. For ease of use, this Standard makes the following editorial modifications:

- MODIFY the expression of the terms in the scope and ADD the scope of the standard in accordance with the requirements of GB/T 1.1-2009;
- DELETE the French and German indexes in Appendix C, ADD Chinese indexes, and REORDER according to Chinese Pinyin.

This Standard was proposed and shall be under the jurisdiction of National Technical Committee on Safety of Machinery of Standardization Administration of China (SAC/TC 208).

Drafting organizations of this Standard: China Productivity Center for Machinery, Shenzhen Centre Testing International Group Co., Ltd., Xuzhou Heavy Machinery Co., Ltd., Nanjing Forestry University Optical and Electrical Instrument Engineering Research Institute, Omron Automation (China) Co., Ltd., Pilz Industrial Automation (Shanghai) Co., Ltd., Siemens (China) Co., Ltd. Shanghai Branch, Guangxi Liugong Machinery Co., Ltd., Rockwell Automation (China) Co., Ltd., Shandong Institute for Product Quality Inspection, China United Certification Center, National Machine Tool Product Quality Supervision and Inspection Center.

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The previous versions of the standards replaced by this Standard are:

- GB/T 15706.1-1995, GB/T 15706.1-2007;
- GB/T 15706.2-1995, GB/T 15706.2-2007;

- GB/T 16856-1997;
- GB/T 16856.1-2008.

Introduction

The primary purpose of this Standard is to provide designers with an overall framework and guidance for decisions during the development of machinery to enable them to design machines that are safe for their intended use. It also provides a strategy for standards developers and will assist in the preparation of consistent and appropriate type-B and type-C standards.

The concept of safety of machinery considers the ability of a machine to perform its intended function(s) during its life cycle 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 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 (for example, safety distances, surface temperature, noise);
 - type-B2 standards on safeguards (for example, 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 technical provisions dealt with by this Standard or by a type-B standard, the type-C standard takes precedence.

It is desirable that this Standard be referred to in training courses and manuals to convey basic terminology and general design methods to designers.

GB/T 20000.4 has been taken into account as far as practicable at the time of drafting of this Standard.

Safety of machinery - General principles for design - Risk assessment and risk reduction

1 Scope

This Standard specifies basic terminology, principles and a methodology for achieving safety in the design of machinery. It specifies principles of risk assessment and risk reduction to help designers in achieving this objective. These principles are based on knowledge and experience of the design, use, incidents, accidents and risks associated with machinery. Procedures are described for identifying hazards and estimating and evaluating risks during relevant phases of the machine life cycle, and for the elimination of hazards or the provision of sufficient risk reduction. Guidance is given on the documentation and verification of the risk assessment and risk reduction process.

This Standard applies to machinery defined in 3.1.

This Standard does not deal with risk and/or damage to domestic animals, property or the environment. This Standard is also intended to be used as a basis for the preparation of type-B or type-C safety standards.

NOTE 1: Annex B gives, in separate tables, examples of hazards, hazardous situations and hazardous events, in order to clarify these concepts and assist the designer in the process of hazard identification.

NOTE 2: The practical use of a number of methods for each stage of risk assessment is described in GB/T 16856.2-2008.

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.

GB 5226.1-2008 Safety of machinery - Electrical equipment of machines - Part 1: General requirements (IEC 60204-1:2005, IDT)

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