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Industrirobotar – Säkerhetskrav – Del 1: Robot (ISO 10218-1:2006, inklusive Cor 1:2007)

Robots for industrial environments – Safety requirements – Part 1: Robot (ISO 10218-1:2006, including Cor 1:2007)

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Europastandarden EN ISO 10218-1:2008 gäller som svensk standard. Detta dokument innehåller den officiella engelska versionen av EN ISO 10218-1:2008 med ISO 10218-1:2006/Cor 1:2007 inarbetad.

Denna standard ersätter SS-EN ISO 10218-1:2006, utgåva 1.

The European Standard EN ISO 10218-1:2008 has the status of a Swedish Standard. This document contains the official English version of EN ISO 10218-1:2008 with ISO 10218-1:2006/Cor 1:2007 incorporated.

This standard supersedes the Swedish Standard SS-EN ISO 10218-1:2006, edition 1.

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EUROPEAN STANDARD

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EUROPÄISCHE NORM

EN ISO 10218-1

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Supersedes EN ISO 10218-1:2006

English Version

Robots for industrial environments - Safety requirements - Part 1: Robot (ISO 10218-1:2006, including Cor 1:2007)

Robots pour environnements industriels - Exigences de sécurité - Partie 1: Robot (ISO 10218-1:2006, Cor 1:2007 inclus)

This European Standard was approved by CEN on 17 November 2008.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN Management Centre or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the CEN Management Centre has the same status as the official versions.

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Foreword

The text of ISO 10218-1:2006, including Cor 1:2007 has been prepared by Technical Committee ISO/TC 184 “Industrial automation systems and integration” of the International Organization for Standardization (ISO) and has been taken over as EN ISO 10218-1:2008 by Technical Committee CEN/TC 310 “Advanced Manufacturing Technologies” the secretariat of which is held by BSI.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by June 2009, and conflicting national standards shall be withdrawn at the latest by December 2009.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

This document supersedes EN ISO 10218-1:2006.

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of EC Directives.

For relationship with EC Directives, see informative Annex ZA and ZB, which is an integral part of this document.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and the United Kingdom.

Endorsement notice

The text of ISO 10218-1:2006, including Cor 1:2007 has been approved by CEN as a EN ISO 10218-1:2008 without any modification.

Introduction

ISO 10218 has been created in recognition of the particular hazards that are presented by industrial robots and industrial robot systems.

This document is a type C standard as stated in ISO 12100-1.

The machinery concerned and the extent to which hazards, hazardous situations and events are covered are indicated in the scope of this document.

When provisions of this type C standard are different from those which are stated in type A or B standards, the provisions of this type C standard take precedence over the provisions of the other standards for machines that have been designed and built according to the provisions of this type C standard.

Hazards associated with robots are well recognized, but the sources of the hazards are frequently unique to a particular robot system. The number and type(s) of hazard(s) are directly related to the nature of the automation process and the complexity of the installation. The risks associated with these hazards vary with the type of robot used and its purpose and the way in which it is installed, programmed, operated and maintained.

NOTE 1 Not all of the hazards identified by ISO 10218 apply to every robot and nor will the level of risk associated with a given hazardous situation be the same from robot to robot. Consequently the safety requirements and/or protective measures may vary from what is specified in ISO 10218. A risk assessment may be conducted to determine what the protective measures should be.

In recognition of the variable nature of hazards with different uses of industrial robots, ISO 10218 is divided into two parts; Part 1 provides guidance for the assurance of safety in design and construction of the robot. Since safety in the application of industrial robots is influenced by the design and application of the particular robot system integration, Part 2 will provide guidelines for the safeguarding of personnel during robot integration, installation, functional testing, programming, operation, maintenance and repair.

NOTE 2 While noise is generally considered a hazard associated with the industrial environment, the robot as defined in 3.18 cannot be considered the final machine, rather the robot system as defined in 3.20 is the machine for noise consideration. Therefore the hazard due to noise will be dealt with in ISO 10218-2.

ISO 10218 is not applicable to robots which were manufactured prior to its publication date.

Robots for industrial environments — Safety requirements —

Part 1:
Robot

1 Scope

This part of ISO 10218 specifies requirements and guidelines for the inherent safe design, protective measures and information for use of industrial robots, as defined in Clause 3. It describes basic hazards associated with robots and provides requirements to eliminate, or adequately reduce, the risks associated with these hazards.

Noise as a potential hazard is not dealt with in this part of ISO 10218, but will be fully covered in Part 2.

This part of ISO 10218 does not apply to non-industrial robots although the safety principles established in ISO 10218 may be utilized for these other robots. Examples of non-industrial robot applications include, but are not limited to: undersea, military and space robots, tele-operated manipulators, prosthetics and other aids for the physically impaired, micro-robots (displacement < 1 mm), surgery or healthcare, and service or consumer products.

NOTE 1 Requirements for robot systems, integration, and installation are covered in Part 2.

NOTE 2 Additional hazards may be created by specific applications (e.g. welding, laser cutting, machining). These hazards may need to be considered during robot design.

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 9283:1998, *Manipulating industrial robots — Performance criteria and related test methods*

ISO 12100-1:2003, *Safety of machinery — Basic concepts, general principles for design — Part 1: Basic terminology, methodology*

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

ISO 13849-1:1999, *Safety of machinery — Safety-related parts of control systems — Part 1: General principles for design*

ISO 13850, *Safety of machinery — Emergency stop — Principles for design*

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

ISO 14121:1999, *Safety of machinery — Principles for risk assessment*

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

IEC 61000-6-2, *Electromagnetic compatibility (EMC) — Part 6-2: Generic standards — Immunity for industrial environments*

IEC 61000-6-4, *Electromagnetic compatibility (EMC) — Part 6: Generic standards — Section 4: Emission standard for industrial environments*

3 Terms and definitions

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

3.1
actuating control
a) mechanical mechanism within a control device
EXAMPLE A rod which opens contacts.

b) device which initiates a (un)locking sequence
EXAMPLE Specialized key.

3.2
automatic mode
operating mode in which the robot control system operates in accordance with the task programme

[ISO 8373:1994, definition 5.3.8.1]

3.3
automatic operation
state in which the robot is executing its programmed task as intended

[ISO 8373:1994, definition 5.5]

3.4
collaborative operation
state in which purposely designed robots work in direct cooperation with a human within a defined workspace

3.5
collaborative workspace
workspace within the safeguarded space of the robot work cell, where the robot and a human can perform tasks simultaneously during production operation

3.6
coordinated motion
control wherein the axes of the robot arrive at their respective end points simultaneously, giving a smooth appearance to the motion and control wherein the motions of the axes are such that the tool centre point (TCP) moves along a prescribed path (line, circle, or other)

3.7
cycle
single execution of a task programme

[ISO 8373:1994, definition 6.22]

3.8
drive power
energy source or sources for the robot actuators

3.9
end-effector
device specifically designed for attachment to the mechanical interface to enable the robot to perform its task

EXAMPLES Gripper, nutrunner, welding gun, spray gun.

[ISO 8373:1994, definition 3.11]

3.10
energy source
any electrical, mechanical, hydraulic, pneumatic, chemical, thermal, potential, kinetic, or other sources of power

3.11
hazardous motion
any motion that is likely to cause personal physical injury or damage to health

3.12
limiting device
device that restricts the maximum space by stopping or causing to stop all robot motion and is independent of the control programme and the task programmes

3.13
local control
state of the system or portions of the system in which the system is operated from the control panel or pendant of the individual machines only

3.14
manual mode
control state that allows the generation, storage, and playback of positional data points

[ISO 8373:1994, definition 5.3.8.2 modified]

3.15
pendant
teach pendant
hand-held unit linked to the control system with which a robot can be programmed or moved

[ISO 8373:1994, definition 5.8]

3.16 Programme

3.16.1
control programme
inherent set of instructions which defines the capabilities, actions, and responses of a robot system

NOTE This programme is fixed and usually not modified by the user.

[ISO 8373:1994, definition 5.1.2]

3.16.2
task programme
set of instructions for motion and auxiliary functions that define the specific intended task of the robot system

NOTE 1 This type of programme is normally generated by the user.

NOTE 2 An application is a general area of work, a task is specific within the application.

[ISO 8373:1994, definition 5.1.1]