SLOVENSKI STANDARD
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Varnost strojev - Varovalne naprave, občutljive na tlak - 1. del: Splošna načela načrtovanja in preskušanja preprog in podov, občutljivih na tlak (ISO 13856-1:2013)

Safety of machinery - Pressure-sensitive protective devices - Part 1: General principles for design and testing of pressure-sensitive mats and pressure-sensitive floors (ISO 13856-1:2013)

Sicherheit von Maschinen - Druckempfindliche Schutzeinrichtungen - Teil 1: Allgemeine Leitsätze für die Gestaltung und Prüfung von Schaltmatten und Schaltplatten (ISO 13856 -1:2013)

Sécurité des machines - Dispositifs de protection sensibles à la pression - Partie 1: Principes généraux de conception et d'essai des tapis et planchers sensibles à la pression (ISO 13856-1:2013)

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ICS:

13.110	Varnost strojev	Safety of machinery

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EUROPEAN STANDARD

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EUROPÄISCHE NORM

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English Version

Safety of machinery - Pressure-sensitive protective devices - Part 1: General principles for design and testing of pressure-sensitive mats and pressure-sensitive floors (ISO 13856-1:2013)

Sécurité des machines - Dispositifs de protection sensibles à la pression - Partie 1: Principes généraux de conception et d'essai des tapis et planchers sensibles à la pression (ISO 13856-1:2013)

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This European Standard was approved by CEN on 7 March 2013.

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-CENELEC 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-CENELEC Management Centre has the same status as the official versions.

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EUROPÄISCHES KOMITEE FÜR NORMUNG

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Contents

Page

Foreword

This document (EN ISO 13856-1:2013) has been prepared by Technical Committee ISO/TC 199 "Safety of machinery" in collaboration with Technical Committee CEN/TC 114 “Safety of machinery” the secretariat of which is held by DIN.

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 October 2013, and conflicting national standards shall be withdrawn at the latest by October 2013.

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 1760-1:1997+A1:2009.

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 EU Directive.

For relationship with EU Directive, see informative Annex ZA, 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, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

Endorsement notice

The text of ISO 13856-1:2013 has been approved by CEN as EN ISO 13856-1:2013 without any modification.

Annex ZA
(informative)

Relationship between this European Standard and the Essential Requirements of EU Directive 2006/42/EC

This European Standard has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association to provide a means of conforming to Essential Requirements of the New Approach Directive Machinery 2006/42/EC.

Once this standard is cited in the Official Journal of the European Union under that Directive and has been implemented as a national standard in at least one Member State, compliance with the normative clauses of this standard given in Table ZA.1 confers, within the limits of the scope of this standard, a presumption of conformity with the corresponding Essential Requirements of that Directive and associated EFTA regulations.

Table ZA.1 — Correspondence between this European Standard and Directive 2006/42/EC

Clause(s)/sub-clause(s) of this European Standard	Essential Requirements (ERs) of Directive 2006/42/EC	Qualifying remarks/Notes
Clause 4	Annex I, 1.2	Control systems
	Annex I, 1.3	Protection against mechanical hazards
	Annex I, 1.4	Required characteristics of (guards and) protection devices
	Annex I, 1.5	Risks due to other hazards
	Annex I, 1.6	Maintenance
Clauses 5 and 6	Annex I, 1.7	Information

WARNING — Other requirements and other EU Directives may be applicable to the product(s) falling within the scope of this standard.

INTERNATIONAL STANDARD

ISO 13856-1

Second edition
2013-04-15

Safety of machinery — Pressure-sensitive protective devices —

Part 1: General principles for design and testing of pressure-sensitive mats and pressure-sensitive floors

Sécurité des machines — Dispositifs de protection sensibles à la pression —

Partie 1: Principes généraux de conception et d'essai des tapis et planchers sensibles à la pression

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Contents

Page

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 13856-1 was prepared by Technical Committee ISO/TC 199, *Safety of machinery* and by Technical Committee CEN/TC 114, *Safety of machinery* in collaboration.

This second edition cancels and replaces the first edition (ISO 13856-1:2001) which has been technically revised.

ISO 13856 consists of the following parts, under the general title *Safety of machinery — Pressure-sensitive protective devices*:

— *Part 1: General principles for design and testing of pressure-sensitive mats and pressure-sensitive floors*

— *Part 2: General principles for design and testing of pressure-sensitive edges and pressure-sensitive bars*

— *Part 3: General principles for design and testing of pressure-sensitive bumpers, plates, wires and similar devices*

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 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);

c) Type-C standards (machine safety standards) dealing with detailed safety requirements for a particular machine or group of machines.

This document is a type-B2 standard as stated in ISO 12100.

The requirements of this document can be supplemented or modified by a type-C standard.

For machines which are covered by the scope of a type-C standard and which have been designed and built according to the requirements of that standard, the requirements of that type-C standard take precedence.

The safeguarding of machinery (see ISO 12100:2010, 3.21) can be achieved by many different means. These means include guards which prevent access to the hazard zone by means of a physical barrier (for example, interlocking guards according to ISO 14119 or fixed guards according to ISO 14120) and protective devices (for example, electro-sensitive protective equipment according to IEC 61496-1 or pressure-sensitive protective devices according to this part of ISO 13856).

Type-C standards makers and designers of machinery/installations consider the best way to achieve the required level of safety taking into account the intended application and the results of the risk assessment (see ISO 12100).

The required solution can also be to combine several of these different means: the machinery/installation supplier and the user examine together carefully the existing hazards and constraints before making their decision on the choice of safeguarding.

Pressure-sensitive protective devices are used in a wide range of applications with different conditions of use relating, for example, to extremes of loading or electrical, physical and chemical environments. They are interfaced with machine controls to ensure that the machine reverts to a safe condition if the sensitive protective equipment is actuated.

ISO 13856 is restricted to the design of pressure-sensitive protective devices so that they can be used when the risk assessment carried out by the machine manufacturer and/or relevant type-C standard, when available, shows this to be appropriate.

Safety of machinery — Pressure-sensitive protective devices —

Part 1: General principles for design and testing of pressure-sensitive mats and pressure-sensitive floors

1 Scope

This part of ISO 13856 establishes general principles and specifies requirements for the design and testing of pressure-sensitive mats and pressure-sensitive floors normally actuated by the feet for use as devices for protecting persons from hazardous machinery. The minimum safety requirements for the performance, marking and documentation are given.

This part of ISO 13856 is applicable to pressure-sensitive mats and pressure-sensitive floors, regardless of the type of energy used (e.g. electrical, hydraulic, pneumatic or mechanical), designed to detect

— persons weighing more than 35 kg, and

— persons (e.g. children) weighing more than 20 kg.

It is not applicable to the detection of persons weighing less than 20 kg.

It does not specify the following because they are application-specific:

a) dimensions or configuration of the effective sensing area of pressure-sensitive mat(s) or pressure-sensitive floor(s) in relation to any particular application;

b) when pressure-sensitive mats or floors are appropriate in a particular situation;

c) performance levels (PLs) for safety-related parts of control systems (SRP/CSs) other than providing a minimum level.

This part of ISO 13856 gives guidance to assist the user (i.e. machinery manufacturer and/or user of the machinery) in providing an adequate arrangement.

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 13849-1:2006, *Safety of machinery — Safety-related parts of control systems — Part 1: General principles for design*

ISO 13849-2, *Safety of machinery — Safety-related parts of control systems — Part 2: Validation*

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

ISO 15552, *Pneumatic fluid power — Cylinders with detachable mountings, 1 000 kPa (10 bar) series, bores from 32 mm to 320 mm — Basic, mounting and accessories dimensions*

IEC 60068-2-6, *Environmental testing — Part 2-6: Tests — Test Fc: Vibration (sinusoidal)*

IEC 60068-2-14, *Environmental testing — Part 2-14: Tests — Test N: Change of temperature*

IEC 60068-2-78, *Environmental testing — Part 2-78: Tests — Test Cab: Damp heat, steady state*

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

IEC 60529, *Degrees of protection provided by enclosures (IP code)*

IEC 61000-4-2, *Electromagnetic compatibility (EMC) — Part 4-2: Testing and measuring techniques — Electrostatic discharge immunity test*

IEC 61000-4-3, *Electromagnetic compatibility (EMC) — Part 4-3: Testing and measurement techniques — Radiated, radio-frequency, electromagnetic field immunity test*

IEC 61000-4-4, *Electromagnetic compatibility (EMC) — Part 4-4: Testing and measurement techniques — Electrical fast transient/burst immunity test*

IEC 61000-4-5, *Electromagnetic compatibility (EMC) — Part 4-5: Testing and measurement techniques — Surge immunity test*

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

IEC 61439-1:2011, *Low-voltage switchgear and controlgear assemblies — Part 1: General rules*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 12100, ISO 13849-1 and the following apply.

3.1
pressure-sensitive mat
sensitive protective equipment (ISO 12100:2010, 3.28.5) comprising a *sensor* (3.3) or sensors, a *control unit* (3.5) and one or more one or more *output signal switching devices* (3.6) which detects a person standing on it or who steps onto it and where the *effective sensing area* (3.4) is deformed locally when the sensor(s) is actuated

Note 1 to entry: See Figure 1 for a schematic sketch of a pressure-sensitive mat.

3.2
pressure-sensitive floor
sensitive protective equipment (ISO 12100:2010, 3.28.5) comprising a *sensor* (3.3) or sensors, a *control unit* (3.5) and one or more *output signal switching devices* (3.6) which detects a person standing on it or who steps onto it and where the *effective sensing area* (3.4) is moved as a whole when the sensor(s) is actuated

Note 1 to entry: See Figure 1 for a schematic sketch of a pressure-sensitive floor.

3.3
sensor
part of the *pressure-sensitive mat* (3.1) or *pressure-sensitive floor* (3.2) which contains an *effective sensing area* (3.4)

Note 1 to entry: The application of an actuating force to the effective sensing area causes the signal from the sensor to the control unit to change its state.

3.4
effective sensing area
part of the top surface area of the *sensor* (3.3) or a combination of sensors of the *pressure-sensitive mat* (3.1) or *pressure-sensitive floor* (3.2) within which a response to an actuating force will take place

Note 1 to entry: See 4.2 for requirements with regard to the actuating force.

3.5
control unit
device that responds to the condition of the *sensor* (3.3) and controls the state of the *output signal switching device* (3.6)

Note 1 to entry: The control unit can also monitor the integrity of the pressure-sensitive mat or pressure-sensitive floor (see reference to categories and performance levels according to ISO 13849-1) and can contain facilities for processing a reset signal. The control unit can be integrated with the machine control system.

3.6
output signal switching device
part of the *pressure-sensitive mat* (3.1) or *pressure-sensitive floor* (3.2) which responds by producing an OFF state when the *sensor* (3.3) or monitoring function means is actuated

Note 1 to entry: The output signal switching device can be integrated with the machine control system.

3.7
actuating force
any force which produces a pressure on the *effective sensing area* (3.4) to create an OFF state in the *output signal switching device* (3.6)

3.8
reset
function which permits an ON state in the *output signal switching device* (3.6), providing that certain conditions are met

3.9
ON state
state in which the output circuit(s) of an *output signal switching device* (3.6) is complete and permits the flow of current or fluid

3.10
OFF state
state in which the output circuit or circuits of an *output signal switching device* (3.6) are broken and interrupt the flow of current or fluid

3.11
response time
time between the start of the application of a force to the *effective sensing area* (3.4) and the start of the OFF state of the *output signal switching device* (3.6)

Note 1 to entry: See 4.3 for requirements with regard to the response time.

3.12
dead zone
part of the top surface area of the *sensor* (3.3) outside the *effective sensing area* (3.4)

4 Requirements for design and testing

4.1 General

The following requirements are based on the assumption that the user (e.g. machine manufacturer or user of the machinery) determines the suitability of a pressure-sensitive mat or pressure-sensitive floor,