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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/DIS 13856-1:2011)

Safety of machinery - Pressure-sensitive protective devices - Part 1: General principles for design and testing of pressure-sensitive mats and pressure-sensitive floors (ISO/DIS 13856-1:2011)

Sicherheit von Maschinen - Druckempfindliche Schutzeinrichtungen - Teil 1: Allgemeine Leitsätze für die Gestaltung und Prüfung von Schaltmatten und Schaltplatten (ISO/DIS 13856-1:2011)

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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/DIS 13856-1:2011)

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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/DIS 13856-
1:2011)**

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/DIS 13856-1:2011)

Sicherheit von Maschinen - Druckempfindliche
Schutzeinrichtungen - Teil 1: Allgemeine Leitsätze für die
Gestaltung und Prüfung von Schalmatten und
Schaltplatten (ISO/DIS 13856-1:2011)

This draft European Standard is submitted to CEN members for parallel enquiry. It has been drawn up by the Technical Committee CEN/TC 114.

If this draft becomes a European Standard, 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.

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COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

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Foreword

This document (prEN ISO 13856-1:2011) 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 document is currently submitted to the parallel Enquiry.

This document will supersede 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(s).

Endorsement notice

The text of ISO/DIS 13856-1:2011 has been approved by CEN as a prEN ISO 13856-1:2011 without any modification.

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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

[Revision of first edition (ISO 13856-1:2001)]

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ISO/CEN PARALLEL PROCESSING

This draft has been developed within the International Organization for Standardization (ISO), and processed under the **ISO-lead** mode of collaboration as defined in the Vienna Agreement.

This draft is hereby submitted to the ISO member bodies and to the CEN member bodies for a parallel five-month enquiry.

Should this draft be accepted, a final draft, established on the basis of comments received, will be submitted to a parallel two-month approval vote in ISO and formal vote in CEN.

To expedite distribution, this document is circulated as received from the committee secretariat. ISO Central Secretariat work of editing and text composition will be undertaken at publication stage.

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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.

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

- Part 1: *General principles for the design and testing of pressure-sensitive mats and pressure-sensitive floors*
- Part 2: *General principles for the design and testing of pressure-sensitive edges and pressure-sensitive bars*
- Part 3: *General principles for the design and testing of pressure-sensitive bumpers 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-B 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.

ISO/TC 199 has a mandate in this area to produce type-A and type-B standards, which will allow verification of conformity with the essential health and safety requirements (EHSRs) relating to the design and construction of machinery.

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 and fixed guards according to ISO 14120) and protective devices (for example, electro-sensitive protective equipment according to IEC 61496-1 and pressure-sensitive protective devices according to this part of ISO 13856).

Type-C standards makers and designers of machinery / installations should 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 best solution can also be to combine several of these different means. The machinery/installation supplier and the user should examine together carefully the existing 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.

Each type of application presents particular hazards. It is not the intention of this part of ISO 13856 to identify those hazards nor to recommend specific methods of application to particular machines. This is normally the aim of type-C standards.

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 specifies requirements for pressure-sensitive mats and pressure-sensitive floors normally actuated by the feet for use as protective devices to protect 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 type of energy used (e.g. electrical, hydraulic, pneumatic or mechanical) which are designed to detect:

- a) persons weighing more than 35 kg; and
- b) persons (e.g. children) weighing more than 20 kg.

This part of ISO 13856 is not applicable for the detection of persons weighing less than 20 kg.

This part of ISO 13856 does not specify the dimensions or the configuration of the effective sensing area of pressure-sensitive mat(s) or pressure-sensitive floor(s) in relation to any particular application. However, there is a requirement for the manufacturer of the protective device to provide sufficient information to enable the user (i.e. the machinery manufacturer and / or the user of the machinery) to specify an adequate arrangement.

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 12100:2010, *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 protective equipment with respect to the approach speeds of parts of the human body*

ISO 14122-2:2001, *Safety of machinery – Permanent means of access to machines and industrial plants – Part 2: Working platforms and gangways*

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*

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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 61439-1:2009, *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 comprising of a sensor or sensors, a control unit and one or more output signal switching device(s) which detects a person standing on it or who steps onto it and where the effective sensing area is deformed locally when the sensor(s) is actuated

NOTE 1 Compare Figure 1 for a schematic sketch of a pressure-sensitive mat.

NOTE 2 For the definition of sensitive protective equipment see ISO 12100:2010, 3.28.5.

3.2**pressure-sensitive floor**

sensitive protective equipment comprising of a sensor or sensors, a control unit and one or more output signal switching device(s) which detects a person standing on it or who steps onto it and where the effective sensing area is moved as a whole when the sensor(s) is actuated

NOTE 1 Compare Figure 1 for a schematic sketch of a pressure-sensitive floor.

NOTE 2 For the definition of sensitive protective equipment see ISO 12100:2010, 3.28.5.

3.3**sensor**

part of the pressure-sensitive mat or pressure-sensitive floor which contains an effective sensing area

NOTE 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 or a combination of sensors of the pressure-sensitive mat or pressure-sensitive floor within which a response to an actuating force will take place

NOTE See 4.2 for requirements with regard to the actuating force.

3.5**control unit**

device that responds to the condition of the sensor(s) and controls the state of the output signal switching device

NOTE 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 it can contain facilities to process 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 or pressure-sensitive floor which responds by producing an OFF state when the sensor or monitoring function means is actuated

NOTE 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 to create an OFF state in the output signal switching device

3.8**reset**

function which permits an ON state in the output signal switching devices, providing that certain conditions are met

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3.9**ON state**

<output signal switching device> state in which the output circuit(s) of an output signal switching device is complete and permits the flow of current or fluid

3.10**OFF state**

<output signal switching device> state in which the output circuit(s) of an output signal switching device is broken and interrupts 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 and the start of the OFF state of the output signal switching device

NOTE See 4.3 for requirements with regard to the response time.

3.12**dead zone**

part of the top surface area of the sensor outside the effective sensing area