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NSAI Standards

Irish Standard
I.S. EN ISO 13856-3:2013

Safety of machinery - Pressure-sensitive protective devices - Part 3: General principles for design and testing of pressure-sensitive bumpers, plates, wires and similar devices (ISO 13856-3:2013)

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EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN ISO 13856-3

July 2013

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Supersedes EN 1760-3:2004+A1:2009

English Version

Safety of machinery - Pressure-sensitive protective devices - Part 3: General principles for design and testing of pressure-sensitive bumpers, plates, wires and similar devices (ISO 13856-3:2013)

Sécurité des machines - Dispositifs de protection sensibles à la pression - Partie 3: Principes généraux de conception et d'essai des pare-chocs, plaques, câbles et dispositifs analogues sensibles à la pression (ISO 13856-3:2013)

Sicherheit von Maschinen - Druckempfindliche Schutzeinrichtungen - Teil 3: Allgemeine Leitsätze für die Gestaltung und Prüfung von Schaltpuffern, Schaltflächen, Schaltleinen und ähnlichen Einrichtungen (ISO 13856-3:2013)

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Contents

Page

Foreword **3**

Annex ZA (informative) **Relationship between this European Standard and the Essential Requirements of EU Directive 2006/42/EC** **4**

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Foreword

This document (EN ISO 13856-3:2013) 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of an identical text or by endorsement, at the latest by January 2014, and conflicting national standards shall be withdrawn at the latest by January 2014.

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 1760-3:2004+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.

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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 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 EC Directives may be applicable to the product(s) falling within the scope of this standard.

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I.S. EN ISO 13856-3:2013

INTERNATIONAL STANDARD

ISO 13856-3

Second edition
2013-07-15

Safety of machinery — Pressure-sensitive protective devices —

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

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

Partie 3: Principes généraux de conception et d'essai des pare-chocs, plaques, câbles et dispositifs analogues sensibles à la pression

Reference number
ISO 13856-3:2013(E)

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Contents

Page

Foreword ..... **iv**

Introduction ..... **v**

1 Scope **1**

2 Normative references **1**

3 Terms and definitions **2**

4 Requirements for design and testing **8**
- 4.1 General 8
- 4.2 Basic requirements 8
- 4.3 Specific requirements for pressure-sensitive bumpers 15
- 4.4 Specific requirements for pressure-sensitive plates 16
- 4.5 Specific requirements for pressure-sensitive wires (trip wires) 16

5 Marking **17**
- 5.1 General 17
- 5.2 Labels 17
- 5.3 Marking of the control unit 17
- 5.4 Marking of the sensor 17

6 Information for selection and use **17**
- 6.1 General 17
- 6.2 Essential data for selection of suitable pressure-sensitive protective device 18
- 6.3 Information for use 19

7 Verification of requirements **21**
- 7.1 Verification of requirements applicable to all pressure-sensitive protective devices covered by this part of ISO 13856 21
- 7.2 Verification of requirements for pressure-sensitive bumpers only 31
- 7.3 Verification of requirements for pressure-sensitive plates only 32
- 7.4 Verification of requirements for pressure-sensitive wires only 32
- 7.5 Other tests 33

Annex A (normative) **Timing diagrams for pressure-sensitive bumpers, plates, wires and similar devices with/without reset** **34**

Annex B (informative) **Device characteristics — Explanatory remarks and recommendations** **38**

Annex C (informative) **Design guidance** **40**

Annex D (informative) **Application guidance** **50**

Annex E (informative) **Commissioning and inspection** **54**

Bibliography **56**

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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 13856-3 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 13856-3:2006), 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*

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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 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 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.

This part of 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.

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

The forces for the activation of the pressure-sensitive protection devices specified in this part of ISO 13856 are based on the information available at the time of publication. These forces will be kept under review so that the results of further research into forces that can be applied to the human body without causing significant injury can be taken into account. While these forces provide a practical means for the design and testing of the pressure-sensitive device, they cannot prevent injury in all applications. When specifying the actuating force for a specific device or application many factors should be taken into account. These include the contact area, the contact speed, the material used and the part of the body affected.

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Safety of machinery — Pressure-sensitive protective devices —

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

1 Scope

This part of ISO 13856 establishes general principles and specifies requirements for the design and testing of those pressure-sensitive protective devices, with or without an external reset facility, that are not specified in either ISO 13856-1 or ISO 13856-2, and the majority of which are produced for specific applications and are not available as "off-the-shelf" items.

This part of ISO 13856 also gives specific requirements for the following pressure-sensitive protective devices:

a) pressure-sensitive bumpers;

b) pressure-sensitive plates;

c) pressure-sensitive wires (trip wires).

It deals with the design of a pressure-sensitive device with regard to safety and reliability rather than its suitability for particular applications.

NOTE 1 For the relationship between safety and reliability, see ISO 13849-1:2006, 4.2.

NOTE 2 The machinery manufacturer and/or user is responsible for installing appropriate types of protective device based on a risk assessment.

It is not applicable to

— specifying the dimensions of pressure-sensitive protective devices in relation to any particular application, or

— stopping devices according to IEC 60204-1 used for the normal operation, including emergency stopping of machinery.

NOTE 3 Specific requirements for particular applications are intended to be set forth in relevant type-C standards (see ISO 12100 and Introduction).

Additional requirements can be necessary where pressure-sensitive protective devices are used in locations accessible to elderly or disabled people or children.

NOTE 4 While requirements are given for the immunity of the device to electromagnetic disturbances, these are not intended to cover all aspects of electromagnetic compatibility (EMC).

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 4413, *Hydraulic fluid power — General rules and safety requirements for systems and their components*

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ISO 4414, *Pneumatic fluid power — General rules and safety requirements for systems and their components*

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 13855:2010, *Safety of machinery — Positioning of safeguards with respect to the approach speeds of parts of the human body*

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 60068-2-27, *Environmental testing — Part 2-27: Tests — Test Ea and guidance: Shock*

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 60664-1:2007, *Insulation coordination for equipment within low-voltage systems — Part 1: Principles, requirements and tests*

IEC 60947-5-1, *Low-voltage switchgear and controlgear — Part 5-1: Control circuit devices and switching elements — Electromechanical control circuit devices*

IEC 60947-5-5:1997, *Low-voltage switchgear and controlgear — Part 5-5: Control circuit devices and switching elements — Electrical emergency stop device with mechanical latching function*

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 61000-4-6, *Electromagnetic compatibility (EMC) — Part 4-6: Testing and measurement techniques — Immunity to conducted disturbances, induced by radio-frequency fields*

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 and the following apply.

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