Irish Standard
I.S. EN 1760-3:2004+A1:2009

Safety of machinery - Pressure sensitive protective devices - Part 3: General principles for the design and testing of pressure sensitive bumpers, plates, wires and similar devices

I.S. EN 1760-3:2004+A1:2009

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Safety of machinery - Pressure sensitive protective devices - Part 3: General principles for the 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 d'essai des pare-chocs, plaques, câbles et dispositifs analogues sensibles à la pression

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

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EUROPEAN COMMITTEE FOR STANDARDIZATION
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Contents

page

Foreword

This document (EN 1760-3:2004+A1:2009) has been prepared by 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of an identical text or by endorsement, at the latest by September 2009, and conflicting national standards shall be withdrawn at the latest by December 2009.

This document includes Amendment 1, approved by CEN on 2009-02-15 and Corrigendum 1, issued by CEN on 2006-01-25.

This document supersedes EN 1760-3:2004.

The start and finish of text introduced or altered by amendment is indicated in the text by tags [A1] ⟨A1⟩.

The modifications of the related CEN Corrigendum have been implemented at the appropriate places in the text and are indicated by the tags [AC] ⟨AC⟩.

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).

[A1] For relationship with EU Directive(s), see informative Annexes ZA and ZB, which are integral parts of this document. ⟨A1⟩

This is the third part of a multi-part standard dealing with pressure sensitive protective devices which will cover safety devices that detect the presence of a person through the application of a pressure or force by a part of the persons body. After actuation they give a stop command which is used by the control system of a machine to provide protection for the person who caused the device to be actuated.

The other parts are:

EN 1760-1, *Safety of machinery - Pressure sensitive protective devices - Part 1: General principles for the design and testing of pressure sensitive mats and pressure sensitive floors.*

EN 1760-2, *Safety of machinery - Pressure sensitive protective devices - Part 2: General principles for design and testing of pressure sensitive edges and pressure sensitive bars.*

The safeguarding of machinery (see EN ISO 12100-1: 2003, 3.20) can be achieved by many different means. These means include guards which prevent access to the hazard zone by means of a physical barrier (e.g. fixed guards to EN 953 and interlocking guards to EN 1088); and protective devices, (e.g. electro-sensitive protective equipment to EN 61496 and pressure-sensitive protective devices to this European Standard).

Designers of machinery (including e.g. vehicles) should consider the way to achieve the required level of safety taking into account the intended application and the results of the risk assessment (see [A1] EN ISO 14121-1 ⟨A1⟩). The best solution may combine several of these different means. It is recommended that the machinery / vehicle supplier and the user examine together carefully the existing constraints before making their decision on the choice of safeguarding means.

This European Standard does not specify the dimensions and the configuration of the effective sensing surface of pressure sensitive protective devices in relation to any particular application. However, there is a requirement for the manufacturer of any safety 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.

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 United Kingdom.

Introduction

Pressure sensitive protective devices are used in a wide range of applications with different conditions of use relating, for example, to the maximum and minimum values of loading, electrical, physical and chemical environments. They are interfaced with machinery controls to ensure that the machine reverts to a safe condition when the device is actuated.

The forces given in this document should not be considered as those which will always avoid injury or fatal accidents. This depends upon several criteria which include the sensor, the actuating speed, the contact area, the material used and the part of the body affected.

The forces given in this document are primarily intended for the purpose of assessing the performance of the pressure-sensitive protective devices. These forces are under further investigation.

Each type of application of pressure sensitive protective devices can present particular hazards. It is not the intention of this document to identify those hazards nor to recommend specific applications to particular equipment. Particular applications may also necessitate special requirements which are not included in this document.

〚A1〉 This European Standard is a type-B standard as stated in EN ISO 12100-1. 〈A1〛

The provisions of this document may be supplemented or modified by a type C standard.

NOTE For machines which are covered by the scope of a type C standard and which have been designed and built according to the provisions of that standard, the provisions of that type C standard take precedence over the provisions of this type B standard.

1 Scope

This document deals with requirements for pressure sensitive protective devices which are not specified in EN 1760-1 and EN 1760-2. The majority of these devices are produced for specific applications and are not available as off-the-shelf items.

The purpose of this document relates primarily to safety and reliability rather than suitability. For the relationship between safety and reliability, see EN 954-1:1996, Annex D.

This document specifies requirements for pressure sensitive protective devices with and without an external reset facility.

This document does not specify the dimensions of pressure sensitive protective devices in relation to any particular application. Specific requirements for particular applications may be set out in relevant type C standards.

The document does not cover stopping devices used only for the regular operation, including emergency stopping, of machinery. It also does not apply to use in locations accessible to elderly or disabled persons or children, where special additional requirements may be necessary.

Basic requirements are given for pressure sensitive protective devices not covered in EN 1760-1 and EN 1760-2.

Specific requirements are given for the following devices:

— pressure sensitive bumpers;

— pressure sensitive plates;

— pressure sensitive wires (trip wires).

NOTE Some requirements are made with respect to electromagnetic compatibility (EMC). These are intended to meet the requirements of the Council Directive 98/37/EC ("Machinery Directive") [1] only and not those of Council Directive 89/336/EC ("EMC Directive") [2].

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.

EN 954-1:1996, *Safety of machinery – Safety-related parts of control systems - Part 1: General principles for design*

EN 982, *Safety of machinery - Safety requirements for fluid power systems and their components - Hydraulics*

EN 983, *Safety of machinery - Safety requirements for fluid power systems and their components - Pneumatics*

EN 999:1998, *Safety of machinery - The positioning of protective equipment in respect of approach speeds of parts of the human body*

〚A1〛 *deleted text* 〚A1〛

EN 60068-2-6, *Environmental testing - Part 2: Tests - Tests Fc: Vibration (sinusoidal) (IEC 60068-2-6:1995 + Corrigendum 1995)*

EN 60068-2-14, *Environmental testing - Part 2: Tests - Test N. Change of temperature (IEC 60068-2-14:1984 + A1:1986)*

EN 60068-2-29, *Basic environmental testing procedures - Part 2: Tests; Test Eb and guidance: bump (IEC 60068-2-29:1987)*

EN 60204-1:1997, *Safety of machinery - Electrical equipment of machines - Part 1: General requirements (IEC 60204-1:1997)*

EN 60439-1:1999, *Low-voltage switchgear and controlgear assemblies - Part 1: Type-tested and partially type-tested assemblies (IEC 60439-1:1999)*

EN 60529, *Degrees of protection provided by enclosures (IP code) (IEC 60529:1989)*

EN 60947-5-1, *Low-voltage switchgear and controlgear - Part 5-1: Electromechanical control circuit devices (IEC 60947-5-1:1997)*

EN 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 60947-5-5:1997)*

EN 61000-4-2, *Electromagnetic compatibility (EMC) - Part 4: Testing and measurement techniques - Section 2: Electrostatic discharge immunity test - Basic EMC publication (IEC 61000-4-2:1995)*

EN 61000-4-3, *Electromagnetic compatibility (EMC) - Part 4-3: Testing and measurement techniques; Radiated, radio-frequency, electromagnetic field immunity test (IEC 61000-4-3:2002)*

EN 61000-4-4, *Electromagnetic compatibility (EMC) - Part 4: Testing and measurement techniques - Section 4: Electrical fast transient/burst immunity test, Basic EMV publication (IEC 61000-4-4:1995)*

EN 61000-4-5, *Electromagnetic compatibility (EMC) - Part 4: Testing and measurement techniques - Section 5: Surge immunity test (IEC 61000-4-5:1995)*

EN 61000-4-6, *Electromagnetic compatibility (EMC) - Part 4: Testing and measurement techniques - Section 6: Immunity to conducted disturbances, induced by radio-frequency fields (IEC 61000-4-6:1996)*

EN 61000-6-2, *Electromagnetic compatibility (EMC) - Part 6-2: Generic standards - Immunity for industrial environments (IEC 61000-6-2:1999)*

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

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

EN ISO 13849-2, *Safety of machinery - Safety-related parts of control systems - Part 2: Validation (ISO 13849-2:2003)*

EN 60068-2-78, *Environmental testing - Part 2-78: Tests; Test Cab: Damp heat, steady state (IEC 60068-2-78:2001)*

EN 60664-1:2003, *Insulation coordination for equipment within low-voltage systems — Part 1: Principles, requirements and tests (IEC 60664-1:1992)*