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Irish Standard
I.S. EN 1760-2:2001+A1:2009

Safety of machinery - Pressure sensitive protective devices - Part 2: General principles for the design and testing of pressure sensitive edges and pressure sensitive bars

I.S. EN 1760-2:2001+A1:2009

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English Version

Safety of machinery - Pressure sensitive protective devices -
Part 2: General principles for the design and testing of pressure
sensitive edges and pressure sensitive bars

Sécurité des machines - Dispositifs de protection sensibles
à la pression - Partie 2: Principes généraux de conception
et d'essais des bords et barres sensibles à la pression

Sicherheit von Maschinen - Druckempfindliche
Schutzeinrichtungen - Teil 2: Allgemeine Leitsätze für die
Gestaltung und Prüfung von Schaltleisten und
Schaltstangen

This European Standard was approved by CEN on 13 January 2001 and includes Amendment 1 approved by CEN on 22 February 2009.

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Foreword

This document (EN 1760-2:2001+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of an identical text or by endorsement, at the latest by October 2009, and conflicting national standards shall be withdrawn at the latest by December 2009.

This document includes Amendment 1, approved by CEN on 2009-02-22.

This document supersedes EN 1760-2:2001.

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

This European Standard 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 second part of a multi-part type B Standard 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 person's body. After actuation the safety devices give a stop command which is used by the control system of the machine to provide protection for the person who caused the device to be actuated.

The other parts of the standard cover:

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

Part 3: Safety of machinery - Pressure sensitive protective devices - General principles for the design and testing of pressure sensitive bumpers and plates including pressure sensitive wires and barriers A1 *deleted text* A1.

Normative annex A presents timing diagrams for devices with and without reset. Informative annex B explains the relationship between operating speed, the force exerted on the body and the distance travelled by the device following actuation. The notes in informative annex C provide guidance to users on the selection of a suitable device. It is recommended that the supplier and customer liaise to examine carefully the constraints presented by the application before placing an order for the equipment.

The safeguarding of machinery A1 (see 3.20 of EN ISO 12100-1:2003) A1 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 A1 EN 61496-1, CLC/TS 61496-2 and CLC/TS 61496-3 A1 and pressure-sensitive protective devices to this standard).

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 A1 EN ISO 14121-1 A1). The best solution may combine several of these different means. It is recommended that the machinery / installation supplier and the user examine together carefully the existing constraints before making their decision on the choice of safeguarding means.

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The notes in informative annex D give guidance regarding the design of pressure sensitive edges and pressure sensitive bars. Informative annex E gives guidance on the application of pressure sensitive edges and pressure sensitive bars. Informative annex F gives guidance on installation, commissioning and testing. Informative annex G covers general considerations for meeting category 2 according to EN 954-1.

This European Standard does not specify the dimensions or the configuration of the effective sensing surface of pressure sensitive edges or pressure sensitive bars 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

^{A1} Pressure sensitive edges and pressure sensitive bars are safety devices of the "mechanically actuated trip device" type. General requirements for these devices (as well as other safety devices) are given in 5.1 and 5.2 of EN ISO 12100-2:2003. ^{A1}

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

Pressure sensitive edges and pressure sensitive bars may be fitted to a moving part of a machine at the point where a trapping, crushing or collision hazard may occur. They may also be fitted to a fixed part of a machine or an obstacle to prevent trapping or crushing hazards with a moving part of a machine. Pressure sensitive edges and pressure sensitive bars are designed, selected, installed and/or interfaced with the control system of the machine so that the force/pressure applied to a person or parts of the body do not exceed certain limits.

^{A1} This European Standard is a type-B standard as stated in EN ISO 12100-1. ^{A1}

Pressure sensitive edges, bars, bumpers and barriers have many similarities. The following table summarises the differences which generally apply between the devices and gives guidance for their application.

Table 1 — Characteristic features of pressure sensitive devices excluding mats and floors

	Edge	Bar	Bumper
	Part 2		Part 3
Cross section	regular	regular	regular / irregular
Length/Width ratio	>1	any ratio	any ratio
Effective sensing surface	deflects locally	moves as a whole	deflects locally and / or moves as a whole
Intended to detect	finger hand arm leg head torso	finger hand arm leg head torso	hand arm leg head torso

1 Scope

This standard contains requirements for pressure sensitive edges and pressure sensitive bars for use as safety devices and not as actuating devices for normal operational. The standard applies to pressure sensitive edges and pressure sensitive bars used to detect persons or parts of persons who may be exposed to danger such as hazardous moving parts.

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