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## **Safety of machinery — Pressure-sensitive protective devices —**

### **Part 2: General principles for 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'essai des bords et barres sensibles à la pression*



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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 13856-2 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 13856-2:2005), 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 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 edges and pressure-sensitive bars are safeguards of the *mechanically-actuated trip device* type. General requirements for these safeguards (as well as others) are given in ISO 12100:2010, 6.3.1 and 6.3.2.

Pressure-sensitive edges and pressure-sensitive bars 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 edges and pressure-sensitive bars 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.

Pressure-sensitive edges and pressure-sensitive bars can be fitted to a fixed or moving part of a machine or an obstacle to prevent trapping or crushing hazards from another 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.

Pressure-sensitive edges, pressure-sensitive bars, pressure-sensitive bumpers and similar devices have many similarities. [Table 1](#) summarizes the differences which generally apply between the two types of

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pressure-sensitive protective devices covered by this part of ISO 13856 and pressure-sensitive bumpers (covered by ISO 13856-3 and gives guidance for their application).

**Table 1 — Characteristic features of pressure-sensitive edges, pressure-sensitive bars and pressure-sensitive bumpers**

Cross-section	Pressure-sensitive edge	Pressure-sensitive bar	Pressure-sensitive bumper
	Regular	Regular	Regular/irregular
Length/width ratio	>1	Any ratio	Any ratio
Effective sensing surface	Deforms locally	Moves as a whole	Deforms locally and/or moves as a whole
Body part(s) intended to be detected	Finger	Finger	—
	Hand	Hand	Hand
	Arm	Arm	Arm
	Leg	Leg	Leg
	Head	Head	Head
	Torso	Torso	Torso