SLOVENSKI STANDARD
SIST EN 1088:2000/A1:2007

01-september-2007

Varnost strojev - Zaporne naprave, povezane z varovali - Naļ ela za naļ rtovanje in izbiro

Safety of machinery - Interlocking devices associated with guards - Principles for design and selection

Sicherheit von Maschinen - Verriegelungseinrichtungen in Verbindung mit trennenden Schutzeinrichtungen - Leitsätze für Gestaltung und Auswahl

Sécurité des machines - Dispositifs de verrouillage associés a des protecteurs - Principes de conception et de choix

Ta slovenski standard je istoveten z: **EN 1088:1995/A1:2007**

ICS:

13.110	Varnost strojev	Safety of machinery

SIST EN 1088:2000/A1:2007 **en,fr,de**

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 1088:1995/A1

April 2007

ICS 13.110

English Version

Safety of machinery - Interlocking devices associated with guards - Principles for design and selection

Sécurité des machines - Dispositifs de verrouillage associés à des protecteurs - Principes de conception et de choix

Sicherheit von Maschinen - Verriegelungseinrichtungen in Verbindung mit trennenden Schutzeinrichtungen - Leitsätze für Gestaltung und Auswahl

This amendment A1 modifies the European Standard EN 1088:1995; it was approved by CEN on 8 March 2007.

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This amendment exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the CEN Management Centre has the same status as the official versions.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

Management Centre: rue de Stassart, 36 B-1050 Brussels

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Foreword

This document (EN 1088:1995/A1:2007) has been prepared by Technical Committee CEN/TC 114 “Safety of machinery”, the secretariat of which is held by DIN.

This Amendment to the European Standard EN 1088:1995 shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by October 2007, and conflicting national standards shall be withdrawn at the latest by April 2008.

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).

This document corresponds to ISO 14119:1998/DAM1:2006 prepared by Technical Committee ISO/TC 199 "Safety of machinery" (secretariat: DIN), which is currently submitted to FDIS vote.

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

The aim of this document is the specification of more precise requirements in order to improve the provisions for minimizing the possibilities for defeat by machine operators. Research in some fields has shown that operators often try to defeat a guard interlocking safety function by attempting to defeat the interlocking device, the possibility of defeat being primarily attributable to shortcomings in the design of the machine.

1 Modification to 5.7

Delete 5.7 "Design to minimize defeat possibilities" and replace with the following:

"5.7 Design to minimize defeat possibilities

5.7.1 General

The requirements contained in this amendment for minimizing the possibilities for defeat of an interlocking device need not apply if the safety interlocking function has other effective measures to minimize the possibility of its defeat. These other measures include:

— specification of the safety interlocking function is such that measures for minimizing the possibilities for defeat are implemented at the system level and therefore do not rely on the interlocking device itself (e.g. cyclical testing, status indication, time limitation), see NOTE 1;

— specification of the safety interlocking function is such that measures for minimizing the possibilities for defeat is achieved by removing the foreseeable reason for attempting to defeat the interlocking device. This can include the provision of specific operating modes to facilitate the safe and efficient accomplishment of all foreseeable tasks during the full lifecycle of the machine, see NOTES 1 and 2.

NOTE 1 The specification of safety functions and the design of safety related control systems that implement them are outside the scope of this European Standard. For information on this subject see EN ISO 12100, EN 62061, EN ISO 13849-1 and EN ISO 13849-2.

NOTE 2 This approach can be effective at preventing any defeat of the safety function.

If the specification of the safety interlocking function is such that it is possible to defeat the safety function solely by a reasonably foreseeable action at the interlocking device itself and if the device itself is to be relied on to prevent defeat, it should provide measures to minimize the possibility of defeat. The extent to which these measures are applied should depend on the likelihood of occurrence of attempts to defeat the device and also on the risk exposed by the defeat of the safety function. This information shall be produced by risk assessment (see EN 1050).

Interlocking devices shall be designed and instructions for their installation and maintenance shall be given, to prevent the possibility of their defeat in a reasonably foreseeable manner.

NOTE 3 The implementation of alternative modes of operation can avoid the temptation and/or motivation of defeat.

NOTE 4 "Defeat in a reasonably foreseeable manner" needs to take into account the characteristics of a specific application and therefore should be based on risk assessment. Typically "defeat in a reasonably foreseeable manner" can be an intentional attempt to defeat an interlocking device either manually or by using a readily available object.Readily available objects can be:

— screws, needles, sheet-metal pieces;

— objects in daily use such as keys, coins, adhesive tape, string and wire;

— spare actuators or spare keys for the trapped-key interlocking devices;

— tools required by the intended use of the machine or readily available tools (e.g. screwdrivers, wrenches, hexagonal keys and pliers).

“Defeat in a reasonably foreseeable manner” includes the removal of switches or actuators with the help of the above-mentioned tools, with the intention to disable an interlocking device.

The measures include, but are not limited to the provisions given below.

Provisions by which defeat may be made more difficult shall include, in addition to a correct arrangement and fastening of detectors indicated in 5.2, one or more of the following measures, taking into account the characteristics of the device(s):

a) use of interlocking devices or systems which are coded or individual coded, e.g. mechanically, electrically, magnetically, optically used singly or in combination;

b) physical obstruction or shielding preventing access to the interlocking device while the guard is open (e.g. hidden position) (see examples in Figures 5 and 6 and in Annex F, variant b);

c) technical control measures carried out by the functional control system (e. g. cyclical testing);

NOTE 5 When interlocking circuits are defeated the signals become static. Therefore monitoring of signal change by control means may be an effective measure.

d) provision of additional position detectors in accordance with Figure 4 (see 5.4.1);

e) other equally effective measures.

Where interlocking systems rely on special actuators or keys (coded or not), advice shall be given in the instruction handbook concerning risks associated with the availability of spare actuators or keys and master keys.

5.7.2 Additional requirements for the design of mechanically actuated position detectors

5.7.2.1 Position detectors operated by cams

When a single detector is used, it shall be actuated in the positive mode (see 5.1) since, among other characteristics, this mode of actuation prevents the detector from being defeated in a reasonably foreseeable manner (see Annex A).

Furthermore, the device shall be secured by fastenings which cannot be easily released or loosened..

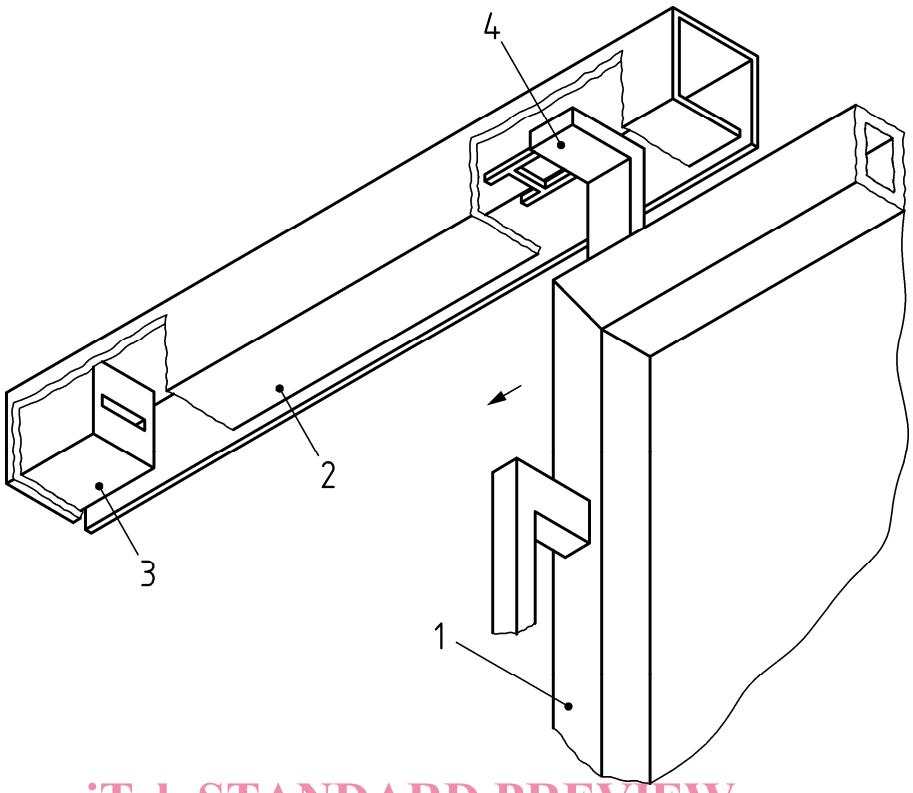
NOTE A higher level of protection against defeat when a single detector is used can be achieved by enclosing the cam and detector in the same housing.

5.7.2.2 Tongue–operated switches

The design of the switch, and in particular of the combination tongue/switching mechanism, shall prevent "defeating in a reasonably foreseeable manner" by minimizing the possibility of actuation by tools and objects other than the tongue.

NOTE For “defeat in a reasonably foreseeable manner” see 5.7.1.

In order to make defeat with the help of separate or dismantled actuators more difficult in addition to the requirements given in 5.7.1 the actuator assembly shall be constructed so as to resist dismantling, e.g. by welding, riveting, “one-way” screws, glue, drilled screwhead.



Key

1 sliding guard (open)
2 cover (fixed part)
3 switch
4 tongue

Figure 5 — Example of protection against defeating a tongue–operated switch

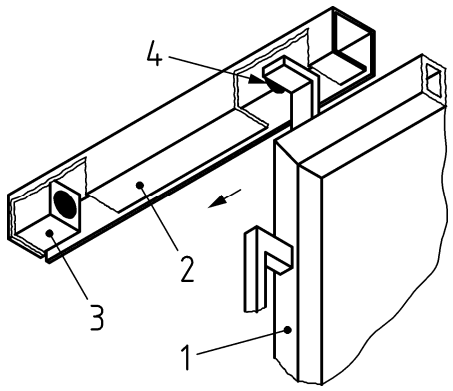
5.7.3 Additional requirements for the design of proximity switches and magnetic switches

Proximity switches and magnetic switches shall be selected, installed and/or shielded such that they cannot be defeated in a reasonably foreseeable manner, e.g. by using a magnet or a piece of metal (see Figure 6).

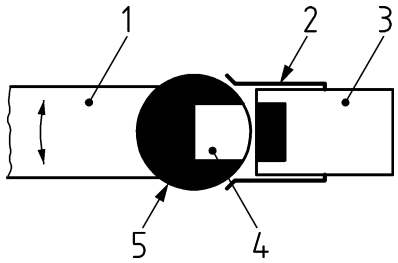
NOTE See EN 60947-5-3 for guidance on the selection of a suitable switch. This standard defines four different types of proximity devices depending on the resistance to faults and on the behaviour in case of a fault.

In order to make defeat with the help of separate or dismantled actuators more difficult in addition to the requirements given in 5.7.1 the actuator assembly shall be constructed so as to resist dismantling, e.g. by welding, riveting, “one-way” screws, glue, drilled screwhead.

Where there is a risk of a substitute actuator being used to defeat the system, an obstruction shall be incorporated into the mechanical arrangement to prevent the substitute actuator being used to actuate the switch (see Figure 6).



a) Sliding guard



b) Rotating guard

Key

1	guard (open)	1	guard (closed)
2	cover (fixed part)	2	cover (fixed part)
3	proximity switch	3	magnetic switch (contact open when guard detected)
4	actuator	4	non-detectable part
		5	detectable part

NOTE Defeating the detector is made difficult by the cover (Figures 6 a) and b)), or by the presence of the guard in front of it (Figure 6 b)).

Figure 6 — Examples of protection against defeat of a proximity switch or magnetic switch

5.7.4 Additional requirements for the design of plug and socket interlocking devices

Protection against defeat shall be achieved by means of at least one of the following measures:

a) by locating the socket so that access to it is prevented when the guard is open (see example in Annex F, variant b);

b) by using a multi-pin plug and socket system the wiring of which, being hidden, makes it difficult to restore the continuity of the circuit (see example in Annex F, variant a);

c) by using a plug and a socket system specially designed for each particular application, or the spare parts of which are not readily available;

d) other equivalent measures.

NOTE The wiring shown in Figures F.1 and F.2 (designated the "ring circuit") makes it necessary to use an additional wire with a plug and a socket at its ends in order to restore the continuity of the circuit when the guard is open; this contributes to prevent defeat."