SLOVENSKI STANDARD
SIST EN 574:1998+A1:2008

01-oktober-2008

Varnost strojev - Dvoročne krmilne naprave - Funkcionalni vidiki - Načela načrtovanja

Safety of machinery - Two-hand control devices - Functional aspects - Principles for design

Sicherheit von Maschinen - Zweihandschaltungen - Funktionelle Aspekte - Gestaltungsleitsätze

Sécurité des machines - Dispositifs de commande bimanuelle - Aspects fonctionnels - Principes de conception

Ta slovenski standard je istoveten z: **EN 574:1996+A1:2008**

ICS:

13.110	Varnost strojev	Safety of machinery

SIST EN 574:1998+A1:2008 **en**

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 574:1996+A1

June 2008

ICS 13.110

Supersedes EN 574:1996

English Version

Safety of machinery - Two-hand control devices - Functional aspects - Principles for design

Sécurité des machines - Dispositifs de commande bimanuelle - Aspects fonctionnels - Principes de conception

Sicherheit von Maschinen - Zweihandschaltungen - Funktionelle Aspekte - Gestaltungsleitsätze

This European Standard was approved by CEN on 20 November 1996 and includes Amendment 1 approved by CEN on 18 May 2008.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN Management Centre or to any CEN member.

This European Standard 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.

CEN members are the national standards bodies of 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.

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

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

Ref. No. EN 574:1996+A1:2008: E

Contents

Page

Foreword

This document (EN 574:1996+A1:2008) 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 December 2008, and conflicting national standards shall be withdrawn at the latest by December 2008.

This document includes Amendment 1, approved by CEN on 2008-05-18.

This document supersedes EN 574:1996.

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

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 standard is a type B standard in the structure of A-/B-/C-standards as defined in EN 292.

Annex A of this standard is normative, whereas annexes B and C are informative.

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

This standard has been prepared to be a type B standard in the sense of the Machinery Directive (89/392/EWG) and associated EFTA regulations.

A two-hand control device is a safety device (safety component). It provides a measure of protection for the operator against reaching danger zones during hazardous situations by locating the control actuating devices in a specific position. For hand held machinery it should be taken into consideration that the danger zone is not stationary.

The selection of a two-hand control device as an appropriate safety device will depend upon the risk assessment made by designers, standard makers and others in accordance with EN 292-1 and EN 1050.

The definition of a two-hand control device is given in 3.1 and takes precedence over the definition in 3.23.4 of EN 292-1:1991.

In some arrangements enabling devices (see 3.23.2 of EN 292-1:1991) and/or hold-to-run devices (see 3.23.3 of EN 292-1:1991) may comply with the definition of a two-hand control device in this standard. Additionally, some special control devices - such as teach pendants for robots and some crane controls – require the use of two hands and can comply with the definition a two-hand control device in this standard.

1 Scope

This standard specifies the safety requirements of a two-hand control device and its logic unit as defined in 3.1.

This standard describes the main characteristics of two-hand control devices for the achievement of safety and sets out combinations of functional characteristics for three types. This standard does not apply to devices intended to be used as enabling devices, hold to run devices and as special control devices.

This standard does not specify with which machines two-hand control devices shall be used. It also does not specify which types of two-hand-control device shall be used. Moreover it does not specify the distance between the two-hand control device and the danger zone (see 9.8).

The standard provides requirements and guidance on the design and selection (based on a risk assessment) of two-hand control devices including their assessment, the prevention of defeat and the avoidance of faults. The standard also provides requirements and guidance for two-hand control devices containing a programmable electronic system (see 7).

This standard applies to all two-hand control devices, independent of the energy used, including:

— Two-hand control devices which are or are not integral parts of a machine;

— Two-hand control devices which consist of one or more than one separate elements.

2 Normative references

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed in this clause. For dated references, subsequent amendments to or revisions of any of these publications only apply to this European Standard when incorporated. For undated references, the latest edition of the publication applies.

EN 292-1:1991, *Safety of machinery, basic concepts, general principles for design — Part 1: Basic terminology, methodology.*

EN 292-2:1991/A1:1995, *Safety of machinery, basic concepts, general principles for design — Part 2: Technical principles and specifications.*

prEN 894-1:1992, *Safety of machinery, ergonomics requirements for the design of displays and control actuators – Part 1: Human interactions with displays and control actuators.*

prEN 894-2:1992, *Safety of machinery, ergonomics requirements for the design of displays and control actuators – Part 2: Displays.*

prEN 894-3:1992, *Safety of machinery, ergonomics requirements for the design of displays and control actuators – Part 3: Control actuators.*

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

prEN 999:1995, *Safety of machinery, the positioning of protective equipment in respect of approach speeds of parts of the human body.*

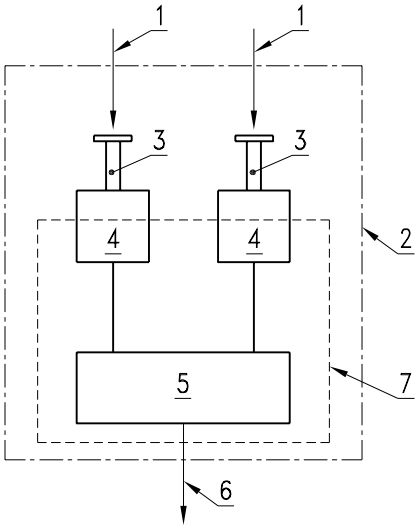
EN 1050:1996, *Safety of machinery, principles for risk assessment*

EN 60204-1:1992, *Safety of machinery, electrical equipment of machines – Part 1: General requirements.*

3 Definitions

For the purposes of this standard, the following definitions apply:

3.1
two-hand control device
a device which requires at least simultaneous actuation by the use of both hands in order to initiate and to maintain, whilst a hazardous condition exists, any operation of a machine thus affording a measure of protection only for the person who actuates it (see figure 1)



Key

1 input signal
2 two-hand control device
3 control actuating device
4 signal converter(s)
5 signal processor(s)
6 output signal
7 logic unit

Figure 1 — Schematic representation of a two-hand control device

3.2
input signal
the externally actuated signal applied by hand to a control actuating device (see fig. 1)

3.3
control actuating device
a component of the two-hand control device which senses an input signal from one hand and transmits it to a signal converter (see fig. 1)

3.4
simultaneous actuation
the continuing actuation of both control actuating devices during the same time period, whatever the time lag is between the start of one input signal and the start of the other (see fig. 2)

NOTE In the English language the word "concurrent" and the word "simultaneous" are often used synonymously (e.g. see clause 9.2.7 of EN 60204-1:1992).

3.5
synchronous actuation
a particular case of simultaneous actuation where the time lag between the start of one input signal and the start of the other is less than or equal to 0,5 s (see fig. 3).

3.6
signal converter
a component of the two-hand control device which receives an input signal from a control actuating device and which transmits and/or converts this signal into a form acceptable to the signal processor (see fig. 1).

3.7
signal processor
a part of the two-hand control device which generates the output signal as a consequence of the two input signals (see fig. 1).

3.8
output signal
the signal generated by the two-hand control device to be fed into the machinery to be controlled, and which is based on one pair of input signals (see fig. 1).

3.9
response time
the time between the release of a control actuating device and the cessation of the output signal (see 9.8)

3.10
mobile two-hand control device
a device which can be moved and used in more than one definable position relative to the danger zone of the machine which it controls

4 Types of two-hand control devices and their selection

Table 1 defines three types of two-hand control devices. It sets out the functional characteristics and the minimum measures for the safety of each type of two-hand control device in this standard. All two-hand control devices shall comply with EN 292 and the relevant parts of EN 60204-1.

Table 1 — List of types of two-hand control devices and minimum safety requirements

REQUIREMENTS	CLAUSE	TYPES				
		I	II	III		
				A	B	C
Use of both hands (simultaneous actuation)	5.1	X	X	X	X	X
Relationship between input signals and output signal	5.2	X	X	X	X	X
Cessation of the output signal	5.3	X	X	X	X	X
Prevention of accidental operation	5.4	X	X	X	X	X
Prevention of defeat	5.5	X	X	X	X	X
Reinitiation of the output signal	5.6	*)	X	X	X	X
Synchronous actuation	5.7			X	X	X
Use of category 1 (EN 954-1:1996)	6.2	X		X		
Use of category 3 (EN 954-1:1996)	6.3		X		X	
Use of category 4 (EN 954-1:1996)	6.4					X

*) NOTE for the selection of Type I see 8.6.

The selection and the design of the type (see table 1) of two-hand control device will depend on:

— The hazard(s) present;

— The assessment of risk;

— Experience in use of technology;

— Other factors which shall be specified for each application (e.g. the prevention of accidental actuation and of defeat (see 8), other conditions (see 3 of EN 292-2:1991)).

NOTE Guidance on risk assessment may be found in EN 292-1 and detailed guidance is given in EN 1050

5 Characteristics of safety functions

The characteristics of safety functions described in 5.1 to 5.7 shall be included in two-hand control devices in accordance with table 1.

5.1 Use of both hands (simultaneous actuation)

The two-hand control device shall be designed so that the operator shall use both hands during the same time period, one hand on each control actuating device, to operate the two-hand control device. This is simultaneous actuation and is independent of any time lag between the initiation of each of the two input signals (see fig. 2).

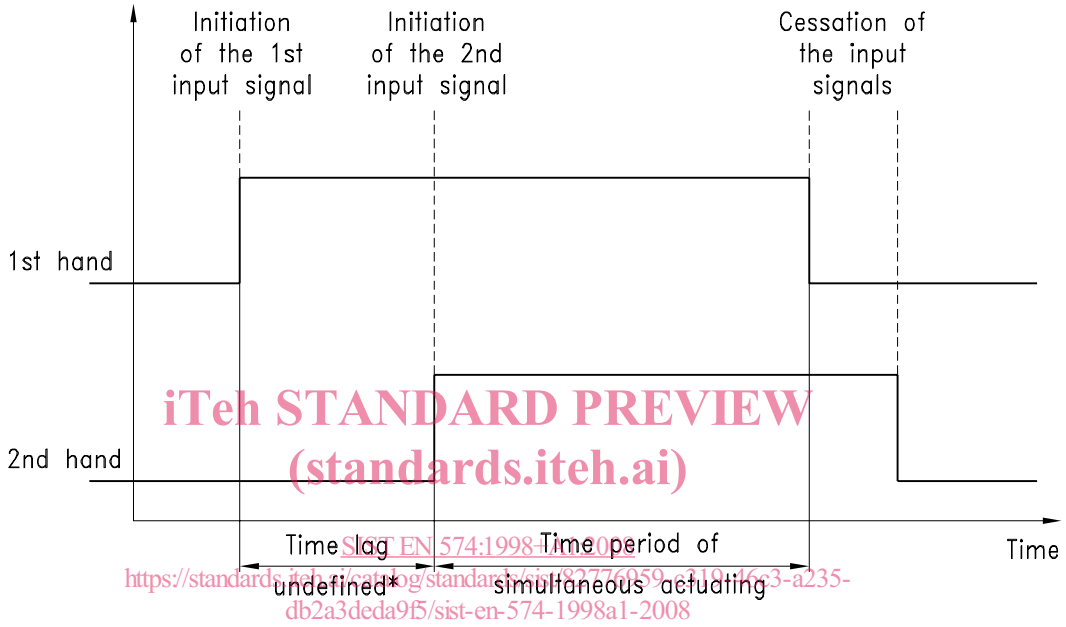


Figure 2 — Input signals of simultaneous actuation

5.2 Relationship between input signals and output signal

The input signal applied to each of the two control actuating devices shall together initiate and maintain the output signal from the two-hand control device only so long as both input signals are applied. The form of the output signal (e.g. in number of channels, by pulse, shape etc.) may vary according to the design requirements in each case. It shall always be regarded and shall be identified as a single output signal by the machine control circuit.

5.3 Cessation of the output signal

The release of either one or both control actuating devices shall initiate the cessation of the output signal.

5.4 Prevention of accidental operation

The probability of operating the control actuating devices accidentally shall be minimised (see 8 and 9).

5.5 Prevention of defeat

The protective effect of the two-hand control device shall not be easily defeated (see 8 and 9).

5.6 Reinitiation of the output signal

The reinitiation of the output signal shall only be possible after the release of both control actuating devices.

5.7 Synchronous actuation

5.7.1 An output signal shall be generated only when both control actuating devices are actuated in a time lag which is less or equal to 0,5 s (see figure 3).

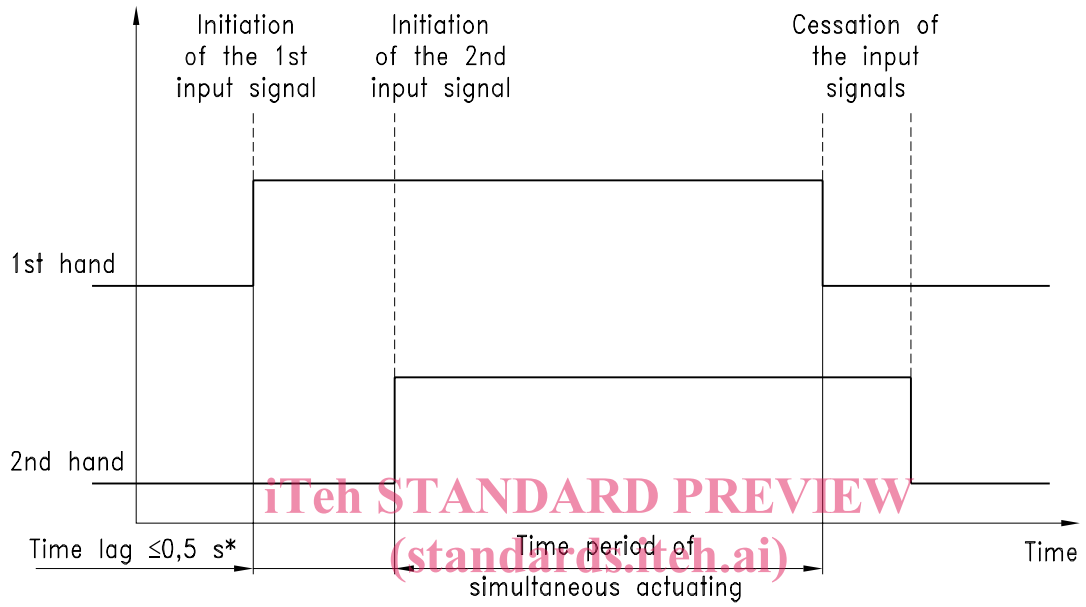


Figure 3 — Input signals of synchronous actuation

5.7.2 Mechanical two-hand control devices shall only generate an output signal by satisfying particular spatial requirements for the travel of both of the control actuating devices.

5.7.3 If the control actuating devices are not actuated synchronously the output signal shall be prevented and it shall be necessary to release both control actuating devices and to re-apply both input signals.

NOTE Where two or more two-hand control devices are used to operate one machine, synchronous actuation is required only within each two-hand control device and is not required between devices.

6 Requirements related to categories of control

6.1 Category selection

The behaviour of parts of a two-hand control device in the case of failure shall be in accordance with the selected category of EN 954-1:1996 (see table 2).

The category of control of two-hand control devices shall not be less than the category of control of the relevant safety related part of the machine control system (see EN 954-1:1996).

Annex B describes the relationship between the types of two-hand control devices and the categories according to EN 954-1:1996.