



SLOVENSKI STANDARD
SIST EN 574:1998

01-februar-1998

JUfbcghlfc^yj '!`8 j cfc bY_fa]bY'bUdfUj Y!': i b_W]cbUbj]j]X]_J!'BU YU
bU flcj Ub^U

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

Sicherheit von Maschinen - Zweihandschaltungen - Funktionelle Aspekte -
Gestaltungsleitsätze

iTeh STANDARD PREVIEW
(standards.iteh.ai)

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

[SIST EN 574:1998](#)

<https://standards.iteh.ai/catalog/standards/sist/c94fcac7-d6b5-4156-95bf-abb2f6570c52/sist-en-574-1998>

Ta slovenski standard je istoveten z: EN 574:1996

ICS:

13.110

Varnost strojev

Safety of machinery

SIST EN 574:1998

en

iTeh STANDARD PREVIEW
(standards.iteh.ai)

SIST EN 574:1998

<https://standards.iteh.ai/catalog/standards/sist/c94fcac7-d6b5-4156-95bf-abb2f6570c52/sist-en-574-1998>

EUROPEAN STANDARD

EN 574

NORME EUROPÉENNE

EUROPÄISCHE NORM

November 1996

ICS 13.110

Descriptors: safety of machines, control devices, safety devices, manual controls, accident prevention, safety measures, performance evaluation, safety requirements, tests, technical notices, marking

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 1996-02-10. 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 Central Secretariat or to any CEN member.

The European Standards exist 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 Central Secretariat has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

CEN

European Committee for Standardization
Comité Européen de Normalisation
Europäisches Komitee für Normung

Central Secretariat: rue de Stassart, 36 B-1050 Brussels

CONTENTS

	Page
FOREWORD	4
0 INTRODUCTION	5
1 SCOPE	5
2 NORMATIVE REFERENCES	6
3 DEFINITIONS	7
3.1 Two-hand control device	7
3.2 Input signal	7
3.3 Control actuating device	7
3.4 Simultaneous actuation	7
3.5 Synchronous actuation	8
3.6 Signal converter	8
3.7 Signal processor	8
3.8 Output signal	8
3.9 Response time	8
3.10 Mobile two-hand control device	8
4 TYPES OF TWO-HAND CONTROL DEVICES AND THEIR SELECTION	8
5 CHARACTERISTICS OF SAFETY FUNCTIONS	10
5.1 Use of both hands (simultaneous actuation)	10
5.2 Relationship between input signals and output signal	10
5.3 Cessation of the output signal	10
5.4 Prevention of accidental operation	10
5.5 Prevention of defeat	11
5.6 Reinitiation of the output signal	11
5.7 Synchronous actuation	11
6 REQUIREMENTS RELATED TO CATEGORIES OF CONTROL	12
6.1 Category selection	12
6.2 Use of Category 1	12
6.3 Use of Category 3	12
6.4 Use of Category 4	13
7 USE OF PROGRAMMABLE ELECTRONIC SYSTEMS	13

iTeh STANDARD PREVIEW
(standards.iteh.ai)

[SIST EN 574:1998](https://standards.iteh.ai/catalog/standards/sist/c94fcac7-d6b5-4156-95bf-abb2f6570c52/sist-en-574-1998)

<https://standards.iteh.ai/catalog/standards/sist/c94fcac7-d6b5-4156-95bf-abb2f6570c52/sist-en-574-1998>

8	PREVENTION OF ACCIDENTAL ACTUATION AND OF DEFEAT	14
8.1	Common considerations	14
8.2	Prevention of defeat using one hand	14
8.3	Prevention of defeat using hand and elbow of the same arm	15
8.4	Prevention of defeat using the forearm(s) or elbow(s)	15
8.5	Prevention of defeat using one hand and any other part of the body (e.g. knee, hip)	15
8.6	Prevention of defeat by blocking one control actuating device	16
8.7	Accidental actuation	16
9	GENERAL REQUIREMENTS	16
9.1	Ergonomic requirements	16
9.2	Operating conditions, environmental influences	17
9.3	Enclosures	17
9.4	Selection, design and installation of control actuating devices	18
9.5	Prevention of unintended output signals by acceleration forces	18
9.6	Unintended operation of mobile and portable hand held machines	18
9.7	Mobile two-hand control devices	18
9.8	Safety distance	19
10	VERIFICATION	20
10.1	General requirements for verification	20
10.2	Visual inspection	23
10.3	Performance check	23
10.4	Measurement	23
10.5	Prevention of defeat	23
11	MARKING	23
12	INFORMATION FOR INSTALLATION, USE AND MAINTENANCE	24
12.1	Provision of information	24
12.2	Installation instructions	25
12.3	Instructions for use	25
12.4	Maintenance instructions	25
Annex A (normative)	Measurement test for the prevention of defeat	27
Annex B (informative)	Use of categories (according to EN 954-1:1996) in types of two-hand control devices	33
Annex C (informative)	Bibliography	34
Annex ZA (informative)	Clauses of this European Standard addressing requirements or other provisions of EU directives	35

iTeh STANDARD PREVIEW
(standards.iteh.ai)

SIST EN 574:1998

<https://standards.iteh.ai/catalog/standards/sist/c94fcac7-d6b5-4156-95bf-abb2f6570c52/sist-en-574-1998>

FOREWORD

This European Standard has been prepared by Technical Committee CEN/TC 114 "Safety of machinery", the secretariat of which is held by DIN.

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

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 May 1997, and conflicting national standards shall be withdrawn at the latest by May 1997.

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).

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

For relationship with EU Directive(s), see informative Annex Z.A, which is an integral part of this standard.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

iTeh STANDARD PREVIEW
(standards.iteh.ai)

SIST EN 574:1998

<https://standards.iteh.ai/catalog/standards/sist/c94fcac7-d6b5-4156-95bf-abb2f6570c52/sist-en-574-1998>

0 INTRODUCTION

This standard has been prepared to be a type B standard in the sense of the Machinery Directive (89/392/EEG) 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 of 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	Safety of machinery - Basic concepts, general principles for design - Part 2: Technical principles and specifications (and Amendment A1:1995)
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

<https://standards.iteh.ai/catalog/standards/sist/c94fcac7-d6b5-4156-95bf-ab6219576c52/sist-en-574-1998>

STANDARD PREVIEW
(standards.iteh.ai)

SIST EN 574:1998

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).

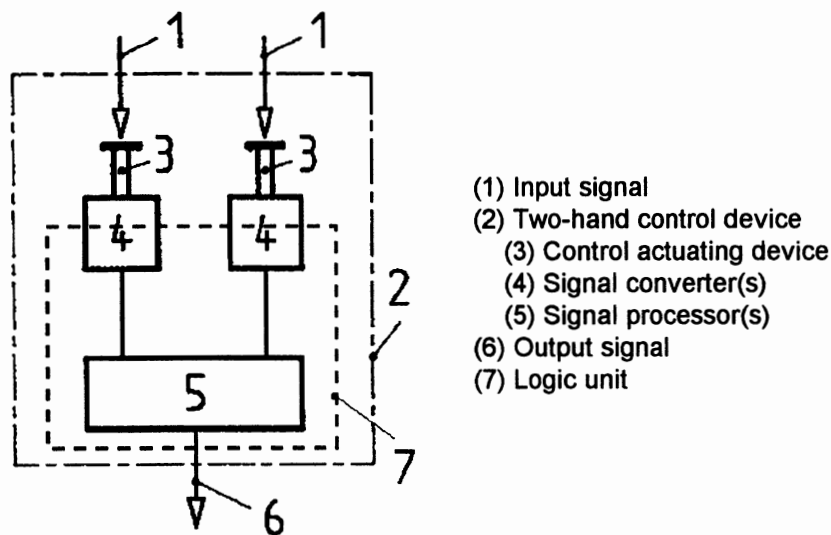


Figure 1: Schematic representation of a two-hand control device.

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.

ITeH STANDARD PREVIEW
(standards.iteh.ai)

SIST EN 574:1998

<https://standards.iteh.ai/catalog/standards/sist/c94fcac7-d6b5-4156-95bf-abb2f6570c52/sist-en-574-1998>

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).

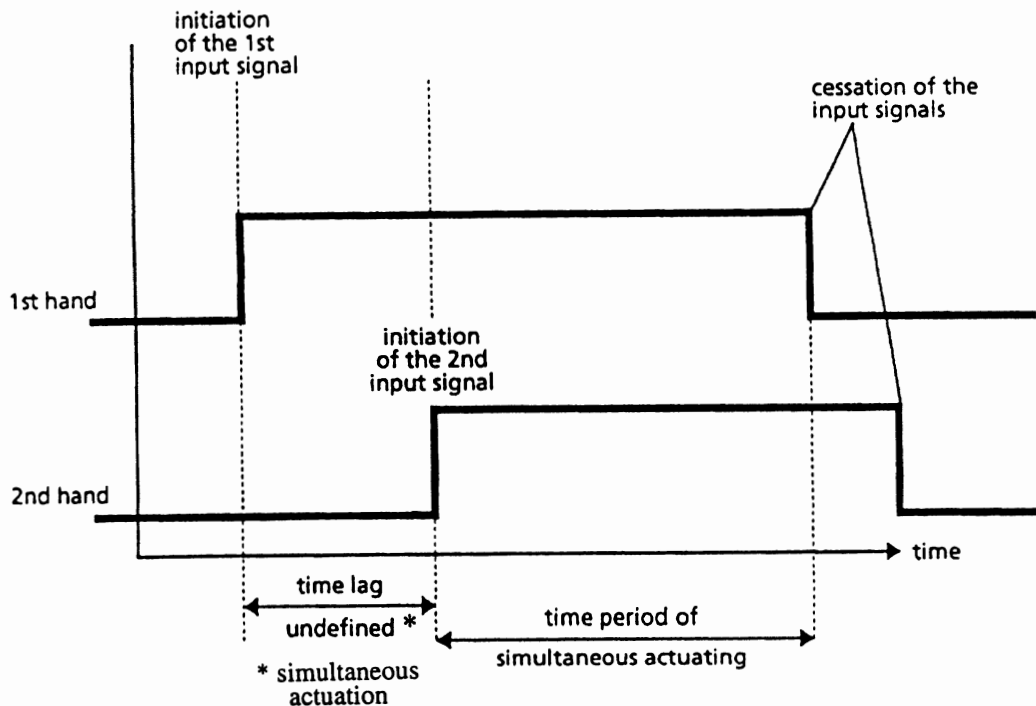


Figure 2: Input signals of simultaneous actuation

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 minimized (see 8 and 9).