



SLOVENSKI STANDARD
SIST EN ISO 13849-2:2008

01-oktober-2008

BUXca Yý U
SIST EN ISO 13849-2:2004

Varnost strojev - Z varnostjo povezani deli krmilnih sistemov - 2. del: Potrjevanje
(ISO 13849-2:2003)

Safety of machinery - Safety-related parts of control systems - Part 2: Validation (ISO 13849-2:2003)

iTeh STANDARD PREVIEW

(standards.itech.ai)
Sicherheit von Maschinen - Sicherheitsbezogene Teile von Steuerungen - Teil 2:
Validierung (ISO 13849-2:2003)

[SIST EN ISO 13849-2:2008](https://standards.itech.ai/catalog/standards/sist/f4a48627-cdec-4dbd-95c1-222222222222)

<https://standards.itech.ai/catalog/standards/sist/f4a48627-cdec-4dbd-95c1-222222222222>
Sécurité des machines - Parties des systèmes de commande relatifs à la sécurité -
Partie 2: Validation (ISO 13849-2:2003)

Ta slovenski standard je istoveten z: EN ISO 13849-2:2008

ICS:

13.110 Varnost strojev Safety of machinery

SIST EN ISO 13849-2:2008 **en,fr,de**

iTeh STANDARD PREVIEW
(standards.iteh.ai)

SIST EN ISO 13849-2:2008

<https://standards.iteh.ai/catalog/standards/sist/f4a48627-cdec-4dbd-95c1-f4925c58776f/sist-en-iso-13849-2-2008>

EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN ISO 13849-2

June 2008

ICS 13.110

Supersedes EN ISO 13849-2:2003

English Version

**Safety of machinery - Safety-related parts of control systems -
Part 2: Validation (ISO 13849-2:2003)**

Sécurité des machines - Parties des systèmes de
commande relatifs à la sécurité - Partie 2: Validation (ISO
13849-2:2003)

Sicherheit von Maschinen - Sicherheitsbezogene Teile von
Steuerungen - Teil 2: Validierung (ISO 13849-2:2003)

This European Standard was 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.

[SIST EN ISO 13849-2:2008](https://standards.iteh.ai/catalog/standards/sist/f4a48627-cdec-4dbd-95c1-f4925c58776f/sist-en-iso-13849-2-2008)

<https://standards.iteh.ai/catalog/standards/sist/f4a48627-cdec-4dbd-95c1-f4925c58776f/sist-en-iso-13849-2-2008>



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

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

Contents

Page

Foreword	3
Annex ZA (informative) Relationship between this European Standard and the Essential Requirements of EU Directive 98/37/EC, amended by Directive 98/79/EC	4
Annex ZB (informative) Relationship between this European Standard and the Essential Requirements of EU Directive 2006/42/EC	5

iTeh STANDARD PREVIEW
(standards.iteh.ai)

[SIST EN ISO 13849-2:2008](https://standards.iteh.ai/catalog/standards/sist/f4a48627-cdec-4dbd-95c1-f4925c58776f/sist-en-iso-13849-2-2008)

<https://standards.iteh.ai/catalog/standards/sist/f4a48627-cdec-4dbd-95c1-f4925c58776f/sist-en-iso-13849-2-2008>

Foreword

The text of ISO 13849-2:2003 has been prepared by Technical Committee ISO/TC 199 "Safety of machinery" of the International Organization for Standardization (ISO) and has been taken over as EN ISO 13849-2:2008 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 November 2008, and conflicting national standards shall be withdrawn at the latest by December 2009.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

This document supersedes EN ISO 13849-2:2003.

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 EC Directive(s).

For relationship with EC Directive(s), see informative Annexes ZA and ZB, which are integral part of this document.

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 the United Kingdom.

<https://standards.iteh.ai/catalog/standards/sist/f4a48627-cdec-4dbd-95c1-f4925c58776f/sist-en-iso-13849-2-2008>

Endorsement notice

The text of ISO 13849-2:2003 has been approved by CEN as a EN ISO 13849-2:2008 without any modification.

Annex ZA (informative)

Relationship between this European Standard and the Essential Requirements of EU Directive 98/37/EC, amended by Directive 98/79/EC

This European Standard has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association to provide a means of conforming to Essential Requirements of the New Approach Directive 98/37/EC, amended by Directive 98/79/EC.

Once this standard is cited in the Official Journal of the European Communities under that Directive and has been implemented as a national standard in at least one Member State, compliance with the normative clauses of this standard confers, within the limits of the scope of this standard, a presumption of conformity with Essential Requirements 1.2.1 and 1.2.7 of Annex I of that Directive and associated EFTA regulations.

WARNING: Other requirements and other EU Directives may be applicable to the products falling within the scope of this standard.

iTeh STANDARD PREVIEW (standards.iteh.ai)

[SIST EN ISO 13849-2:2008](https://standards.iteh.ai/catalog/standards/sist/f4a48627-cdec-4dbd-95c1-f4925c58776f/sist-en-iso-13849-2-2008)

<https://standards.iteh.ai/catalog/standards/sist/f4a48627-cdec-4dbd-95c1-f4925c58776f/sist-en-iso-13849-2-2008>

Annex ZB (informative)

Relationship between this European Standard and the Essential Requirements of EU Directive 2006/42/EC

This European Standard has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association to provide a means of conforming to Essential Requirements of the New Approach Directive Machinery 2006/42/EC.

Once this standard is cited in the Official Journal of the European Communities under that Directive and has been implemented as a national standard in at least one Member State, compliance with the normative clauses of this standard confers, within the limits of the scope of this standard, a presumption of conformity with Essential Requirements 1.2.1 of Annex I of that Directive and associated EFTA regulations.

WARNING — Other requirements and other EU Directives may be applicable to the product(s) falling within the scope of this standard.

iTeh STANDARD PREVIEW
(standards.iteh.ai)

[SIST EN ISO 13849-2:2008](https://standards.iteh.ai/catalog/standards/sist/f4a48627-cdec-4dbd-95c1-f4925c58776f/sist-en-iso-13849-2-2008)

<https://standards.iteh.ai/catalog/standards/sist/f4a48627-cdec-4dbd-95c1-f4925c58776f/sist-en-iso-13849-2-2008>

iTeh STANDARD PREVIEW
(standards.iteh.ai)

SIST EN ISO 13849-2:2008

<https://standards.iteh.ai/catalog/standards/sist/f4a48627-cdec-4dbd-95c1-f4925c58776f/sist-en-iso-13849-2-2008>

INTERNATIONAL STANDARD

ISO 13849-2

First edition
2003-08-15

Safety of machinery — Safety-related parts of control systems —

Part 2: Validation

*Sécurité des machines — Parties des systèmes de commande relatifs
à la sécurité*

iTeh STANDARD PREVIEW
(standards.iteh.ai)

Partie 2: Validation

SIST EN ISO 13849-2:2008

<https://standards.iteh.ai/catalog/standards/sist/f4a48627-cdec-4dbd-95c1-f4925c58776f/sist-en-iso-13849-2-2008>



Reference number
ISO 13849-2:2003(E)

© ISO 2003

ISO 13849-2:2003(E)**PDF disclaimer**

This PDF file may contain embedded typefaces. In accordance with Adobe's licensing policy, this file may be printed or viewed but shall not be edited unless the typefaces which are embedded are licensed to and installed on the computer performing the editing. In downloading this file, parties accept therein the responsibility of not infringing Adobe's licensing policy. The ISO Central Secretariat accepts no liability in this area.

Adobe is a trademark of Adobe Systems Incorporated.

Details of the software products used to create this PDF file can be found in the General Info relative to the file; the PDF-creation parameters were optimized for printing. Every care has been taken to ensure that the file is suitable for use by ISO member bodies. In the unlikely event that a problem relating to it is found, please inform the Central Secretariat at the address given below.

iTeh STANDARD PREVIEW (standards.iteh.ai)

SIST EN ISO 13849-2:2008

<https://standards.iteh.ai/catalog/standards/sist/f4a48627-cdec-4dbd-95c1-f4925c58776f/sist-en-iso-13849-2-2008>

© ISO 2003

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office
Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
E-mail copyright@iso.org
Web www.iso.org

Published in Switzerland

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 13849-2 was prepared by the European Committee for Standardization (CEN) in collaboration with Technical Committee ISO/TC 199, *Safety of machinery*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

Throughout the text of this document, read “...this European Standard...” to mean “...this International Standard...”.

ISO 13849 consists of the following parts, under the general title *Safety of machinery — Safety-related parts of control systems*: <https://standards.iteh.ai/catalog/standards/sist/f4a48627-cdec-4dbd-95c1-f4925c58776f/sist-en-iso-13849-2-2008>

- *Part 1: General principles for design*
- *Part 2: Validation*
- *Part 100: Guidelines for the use and application of ISO 13849-1*

Contents

Page

Foreword.....	v
Introduction	vi
1 Scope	1
2 Normative references	1
3 Validation process	1
3.1 Validation principles.....	1
3.2 Generic fault lists	3
3.3 Specific fault lists	3
3.4 Validation plan.....	3
3.5 Information for validation.....	4
3.6 Validation record.....	5
4 Validation by analysis	5
4.1 General.....	5
4.2 Analysis techniques	6
5 Validation by testing.....	6
5.1 General.....	6
5.2 Measurement uncertainty	7
5.3 Higher requirements.....	7
5.4 Number of test samples	7
6 Validation of safety functions.....	8
7 Validation of categories	8
7.1 Analysis and testing of categories.....	8
7.2 Validation of category specifications	9
7.3 Validation of combination of safety-related parts	10
8 Validation of environmental requirements.....	10
9 Validation of maintenance requirements	11
Annex A (informative) Validation tools for mechanical systems	12
Annex B (informative) Validation tools for pneumatic systems	17
Annex C (informative) Validation tools for hydraulic systems	28
Annex D (informative) Validation tools for electrical systems	38
Bibliography	49

iTeh STANDARD PREVIEW
(standards.iteh.ai)

[SIST EN ISO 13849-2:2008](https://standards.iteh.ai/catalog/standards/sist/14a48627-cdec-4dbd-95c1-f1925c58776f/sist-en-iso-13849-2-2008)

[https://standards.iteh.ai/catalog/standards/sist/14a48627-cdec-4dbd-95c1-](https://standards.iteh.ai/catalog/standards/sist/14a48627-cdec-4dbd-95c1-f1925c58776f/sist-en-iso-13849-2-2008)

[f1925c58776f/sist-en-iso-13849-2-2008](https://standards.iteh.ai/catalog/standards/sist/14a48627-cdec-4dbd-95c1-f1925c58776f/sist-en-iso-13849-2-2008)

Foreword

This document EN ISO 13849-2:2003 has been prepared by Technical Committee CEN/TC 114, "Safety of machinery", the secretariat of which is held by DIN in collaboration with Technical Committee ISO/TC 199 "Safety of machinery".

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 February 2004, and conflicting national standards shall be withdrawn at the latest by February 2004.

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 EC Directive(s).

Annexes A to D are informative and structured as given in Table 1.

Table 1 — Structure of the clauses of annexes A to D

Annex	Technology	List of basic safety principles	List of well-tried safety principles	List of well-tried components	Fault lists and fault exclusions
A	Mechanical	A.2	A.3	A.4	A.5
B	Pneumatic	B.2	B.3	B.4	B.5
C	Hydraulic	C.2	C.3	C.4	C.5
D	Electrical (includes electronics)	D.2	D.3	D.4	D.5

This document includes a Bibliography.

EN ISO 13849 consists of the following parts, under the general title "Safety of machinery – Safety-related parts of control systems":

Part 1: General principles for design

Part 2: Validation

Part 100: Guidelines for the use and application of EN ISO 13849-1.

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

ISO 13849-2:2003(E)**Introduction**

For the use in the European Union, this part of EN ISO 13849 has the status of a generic safety standard (type B1).

This European Standard specifies the validation process, including both analysis and testing, for the safety functions and categories for the safety-related parts of control systems. Descriptions of the safety functions and the requirements for the categories are given in EN 954-1 (ISO 13849-1) which deals with the general principles for design. Some requirements for validation are general and some are specific to the technology used. EN ISO 13849-2 also specifies the conditions under which the validation by testing of the safety-related parts of control systems should be carried out.

EN 954-1 (ISO 13849-1) specifies the safety requirements and gives guidance on the principles for the design [see EN 292-1:1991 (ISO/TR 12100:1992), 3.11] of the safety-related parts of control systems. For these parts it specifies categories and describes the characteristics of their safety functions, regardless of the type of energy used. Additional advice on EN 954-1 (ISO 13894-1) is given in CR 954-100 (ISO/TR 13849-100).

The achievement of the requirements can be validated by any combination of analysis (see clause 4) and testing (see clause 5). The analysis should be started as early as possible within the design process.

iTeh STANDARD PREVIEW
(standards.iteh.ai)

[SIST EN ISO 13849-2:2008](https://standards.iteh.ai/catalog/standards/sist/f4a48627-cdec-4dbd-95c1-f4925c58776f/sist-en-iso-13849-2-2008)

<https://standards.iteh.ai/catalog/standards/sist/f4a48627-cdec-4dbd-95c1-f4925c58776f/sist-en-iso-13849-2-2008>

1 Scope

This European Standard specifies the procedures and conditions to be followed for the validation by analysis and testing of:

- the safety functions provided, and
- the category achieved

of the safety-related parts of the control system in compliance with EN 954-1 (ISO 13849-1), using the design rationale provided by the designer.

This European Standard does not give complete validation requirements for programmable electronic systems and therefore can require the use of other standards.

NOTE CEN/TC 114/WG 6 proposes to deal in more detail with the validation of programmable electronic systems in the elaboration of the revision to EN 954-1 (ISO 13849-1). An application standard for machinery (draft IEC 62061), based on IEC 61508, is under preparation. Requirements for programmable electronic systems, including embedded software, are given in IEC 61508.

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 hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies (including amendments).

EN 292-1:1991 (ISO/TR 12100:1992), *Safety of machinery — Basic concepts, general principles for design — Part 1: Basic terminology, methodology*. [SIST EN ISO 13849-2:2008](https://standards.iteh.ai/catalog/standards/sist/f4a48627-cdec-4dbd-95c1-3a2c3777e6d0-13849-2-2008)

EN 954-1:1996 (ISO 13849-1:1999), *Safety of machinery — Safety-related parts of control systems — Part 1: General principles for design*. <https://standards.iteh.ai/catalog/standards/sist/f4a48627-cdec-4dbd-95c1-3a2c3777e6d0-13849-1-1999>

3 Validation process

3.1 Validation principles

The purpose of the validation process is to confirm the specification and the conformity of the design of the safety-related parts of the control system within the overall safety requirements specification of the machinery.

The validation shall demonstrate that each safety-related part meets the requirements of EN 954-1 (ISO 13849-1), in particular:

- the specified safety characteristics of the safety functions provided by that part, as set out in the design rationale, and
- the requirements of the specified category [see EN 954-1:1996 (ISO 13849-1:1999), clause 6].

Validation should be carried out by persons who are independent of the design of the safety-related part(s).

NOTE Independent person does not necessarily mean that a 3rd party test is required.

The degree of independence should reflect the safety performance of the safety-related part.

Validation consists of applying analysis (see clause 4) and, if necessary, executing tests (see clause 5) in accordance with the validation plan. Figure 1 gives an overview of the validation process. The balance between the analysis and/or testing depends on the technology.