

EUROPEAN STANDARD

EN ISO 13849-1

NORME EUROPÉENNE

EUROPÄISCHE NORM

May 2023

ICS 13.110

Supersedes EN ISO 13849-1:2015

English Version

Safety of machinery - Safety-related parts of control systems - Part 1: General principles for design (ISO 13849-1:2023)

Sécurité des machines - Parties des systèmes de commande relatives à la sécurité - Partie 1: Principes généraux de conception (ISO 13849-1:2023)

Sicherheit von Maschinen - Sicherheitsbezogene Teile von Steuerungen - Teil 1: Allgemeine Gestaltungsleitsätze (ISO 13849-1:2023)

This European Standard was approved by CEN on 3 March 2023.

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

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

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European foreword

This document (EN ISO 13849-1:2023) has been prepared by Technical Committee ISO/TC 199 "Safety of machinery" in collaboration with 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of an identical text or by endorsement, at the latest by November 2023, and conflicting national standards shall be withdrawn at the latest by May 2026.

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

This document supersedes EN ISO 13849-1:2015.

This document has been prepared under a Standardization Request given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directive(s) / Regulation(s).

For the relationship with EU Directive(s) / Regulation(s), see informative Annex ZA, which is an integral part of this document.

Any feedback and questions on this document should be directed to the users' national standards body/national committee. A complete listing of these bodies can be found on the CEN website.

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, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Türkiye and the United Kingdom.

Endorsement notice

The text of ISO 13849-1:2023 has been approved by CEN as EN ISO 13849-1:2023 without any modification.

Annex ZA (informative)

Relationship between this European Standard and the essential requirements of EU Directive 2006/42/EC aimed to be covered

This European Standard has been prepared under a Commission's standardization request M/396 Mandate to CEN and CENELEC for Standardisation in the field of machinery" to provide one voluntary means of conforming to essential requirements of Directive 2006/42/EC of the European Parliament and of the Council of 17 May 2006 on machinery, and amending Directive 95/16/EC (recast).

Once this standard is cited in the Official Journal of the European Union under that Directive, compliance with the normative clauses of this standard given in Table ZA.1 confers, within the limits of the scope of this standard, a presumption of conformity with the corresponding essential requirements of that Directive, and associated EFTA regulations.

Table ZA.1 — Correspondence between this European Standard and Directive 2006/42/EC

The relevant essential Requirements of Directive 2006/42/EC	Clause(s)/subclause(s) of this EN	Remarks/Notes
1.1.6	9	
1.2.1	6, 7, 10	
1.2.3	5.2.2.4	This subclause only deals with the restart function
1.2.4.1	5.2.2.2	This subclause only deals with those safety-related stop function achieving stop category 0 or 1.
1.2.4.2	5.2.2.2	This subclause only deals with those safety-related stop function achieving stop category 2.
1.2.4.3	5.2.1	This subclause only deals with the safety requirements specification (SRS) of an emergency stop function
1.2.5	5.2.2.9	
1.2.6	5.2.1.3 item i), 5.2.2.8	
1.6.1	11	
1.6.2	11	
1.6.4	11	
1.7.4.2 (e, g, i, r, s)	13	This subclause only deals with the instruction for safety functions.

Table ZA.2 — Applicable Standards to confer presumption of conformity as described in this Annex ZA

Reference in Clause 2	International Standard Edition	Title	Corresponding European Standard Edition
ISO 12100:2010	ISO 12100:2010	<i>Safety of machinery — General principles for design — Risk assessment and risk reduction</i>	EN ISO 12100:2010
ISO 13849-2:2012	ISO 13849-2:2012	<i>Safety of machinery — Safety-related parts of control systems — Part 2: Validation</i>	EN ISO 13849-2:2012
ISO 13855:2010	ISO 13855:2010	<i>Safety of machinery — Positioning of safeguards with respect to the approach of the human body</i>	EN ISO 13855:2010
ISO 20607:2019	ISO 20607:2019	<i>Safety of machinery — Instruction handbook — General drafting principles</i>	EN ISO 20607:2019
IEC 61508-3:2010	IEC 61508-3:2010	<i>Functional safety of electrical/electronic/programmable electronic safety-related systems — Part 3: Software requirements</i>	IEC 61508-3:2010
IEC 62046:2018	IEC 62046:2018	<i>Safety of machinery — Application of protective equipment to detect the presence of persons</i>	EN IEC 62046:2018
IEC 62061:2021	IEC 62061:2021	<i>Safety of machinery — Functional safety of safety-related control systems</i>	EN IEC 62061:2021
IEC/IEEE 82079-1:2019	IEC/IEEE 82079-1:2019	<i>Preparation of information for use (instructions for use) of products — Part 1: Principles and general requirements</i>	EN IEC/IEEE 82079-1:2019

The documents listed in the Column 1 of Table ZA.2, in whole or in part, are normatively referenced in this document, i.e. are indispensable for its application. The achievement of the presumption of conformity is subject to the application of the edition of Standards as listed in Column 4 or, if no European Standard Edition exists, the International Standard Edition given in Column 2 of Table ZA.2.

WARNING 1 — Presumption of conformity stays valid only as long as a reference to this European Standard is maintained in the list published in the Official Journal of the European Union. Users of this standard should consult frequently the latest list published in the Official Journal of the European Union.

WARNING 2 — Other Union legislation may be applicable to the product(s) falling within the scope of this standard.

INTERNATIONAL
STANDARD

ISO
13849-1

Fourth edition
2023-04

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

**Part 1:
General principles for design**

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

Partie 1: Principes généraux de conception

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Reference number
ISO 13849-1:2023(E)

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Published in Switzerland

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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.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 199, *Safety of machinery*, in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/TC 114, *Safety of machinery*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

This fourth edition cancels and replaces the third edition (ISO 13849-1:2015), which has been technically revised.

The main changes are as follows:

- the whole document was reorganized to better follow the design and development process for control systems;
- new [Clause 4](#) on recommendation for risk assessment;
- specification of the safety functions (updated [Clause 5](#));
- combination of several subsystems (updated in [Clause 6](#));
- new [Clause 7](#) on software safety requirements;
- new [Clause 9](#) on ergonomic aspects of design;
- validation (updated [Clause 8](#) and moved to [Clause 10](#));
- new [G.5](#) on management of the functional safety;
- new [Annex L](#) on electromagnetic interference (EMI) immunity;
- new [Annex M](#) with additional information for safety requirements specification;
- new [Annex N](#) on fault-avoiding measures for the design of safety related software;
- new [Annex O](#) with safety-related values of components or parts of the control systems.

A list of all parts in the ISO 13849 series can be found on the ISO website.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

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