



BSI Standards Publication

Safety of machinery — Functional safety of safety-related control systems

National foreword

This British Standard is the UK implementation of EN IEC 62061:2021. It is identical to IEC 62061:2021. It supersedes BS EN 62061:2005+A2:2015, which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee MCE/3, Safeguarding of machinery.

A list of organizations represented on this committee can be obtained on request to its committee manager.

This publication has been prepared under a mandate given to the European Standards Organizations by the European Commission and the European Free Trade Association. It is intended to support requirements of the EU legislation detailed in the European Foreword. A European Annex, usually Annex ZA or ZZ, describes how this publication relates to that EU legislation.

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**Safety of machinery - Functional safety of safety-related control
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(IEC 62061:2021)**Sécurité des machines - Sécurité fonctionnelle des
systèmes de commande relatifs à la sécurité
(IEC 62061:2021)Sicherheit von Maschinen - Funktionale Sicherheit
sicherheitsbezogener Steuerungssysteme
(IEC 62061:2021)

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Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung**CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels**

European foreword

The text of document 44/885/FDIS, future edition 2 of IEC 62061, prepared by IEC/TC 44 "Safety of machinery - Electrotechnical aspects" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN IEC 62061:2021.

The following dates are fixed:

- latest date by which the document has to be implemented at national (dop) 2022-01-26 level by publication of an identical national standard or by endorsement
- latest date by which the national standards conflicting with the (dow) 2024-04-26 document have to be withdrawn

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In the official version, for Bibliography, the following notes have to be added for the standards indicated:

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ISO/TR 22100-4:2018	NOTE	Harmonized as CEN ISO/TR 22100-4:2020 (not modified)

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

**SAFETY OF MACHINERY –
FUNCTIONAL SAFETY OF SAFETY-RELATED CONTROL SYSTEMS**

FOREWORD

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IEC 62061 has been prepared by IEC technical committee 44: Safety of machinery – Electrotechnical aspects. It is an International Standard.

This second edition cancels and replaces the first edition, published in 2005, Amendment 1:2012 and Amendment 2:2015. This edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to the previous edition:

- structure has been changed and contents have been updated to reflect the design process of the safety function,
- standard extended to non-electrical technologies,
- definitions updated to be aligned with IEC 61508-4,
- functional safety plan introduced and configuration management updated (Clause 4),
- requirements on parametrization expanded (Clause 6),
- reference to requirements on security added (Subclause 6.8),
- requirements on periodic testing added (Subclause 6.9),

- various improvements and clarification on architectures and reliability calculations (Clause 6 and Clause 7),
- shift from "SILCL" to "maximum SIL" of a subsystem (Clause 7),
- use cases for software described including requirements (Clause 8),
- requirements on independence for software verification (Clause 8) and validation activities (Clause 9) added,
- new informative annex with examples (Annex G),
- new informative annexes on typical $MTTF_D$ values, diagnostics and calculation methods for the architectures (Annex C, Annex D and Annex H).

The text of this International Standard is based on the following documents:

Draft	Report on voting
44/885/FDIS	44/888/RVD

Full information on the voting for its approval can be found in the report on voting indicated in the above table.

The language used for the development of this International Standard is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/standardsdev/publications.

The committee has decided that the contents of this publication will remain unchanged until the stability date indicated on the IEC web site under "<http://webstore.iec.ch>" in the data related to the specific publication. At this date, the publication will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

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INTRODUCTION

As a result of automation, demand for increased production and reduced operator physical effort, Safety-related Control Systems (referred to as SCS) of machines play an increasing role in the achievement of overall machine safety. Furthermore, the SCS themselves increasingly employ complex electronic technology.

IEC 62061 specifies requirements for the design and implementation of safety-related control systems of machinery. This document is machine sector specific within the framework of IEC 61508.

NOTE While IEC 62061 and ISO 13849-1 are using different methodologies for the design of safety related control systems, they intend to achieve the same risk reduction.

This International Standard is intended for use by machinery designers, control system manufacturers and integrators, and others involved in the specification, design and validation of an SCS. It sets out an approach and provides requirements to achieve the necessary performance and facilitates the specification of the safety functions intended to achieve the risk reduction.

This document provides a machine sector specific framework for functional safety of an SCS of machines. It only covers those aspects of the safety lifecycle that are related to safety requirements allocation through to safety validation. Requirements are provided for information for safe use of SCS of machines that can also be relevant to later phases of the lifecycle of an SCS.

There are many situations on machines where SCS are employed as part of safety measures that have been provided to achieve risk reduction. A typical case is the use of an interlocking guard that, when it is opened to allow access to the danger zone, signals the safety related parts of the machine control system to stop hazardous machine operation. In automation, the machine control system that is used to achieve correct operation of the machine process often contributes to safety by mitigating risks associated with hazards arising directly from control system failures. This document gives a methodology and requirements to:

- assign the required safety integrity for each safety function to be implemented by SCS;
- enable the design of the SCS appropriate to the assigned safety (control) function(s);
- integrate safety-related subsystems designed in accordance with other applicable functional safety-related standards (see 6.3.4);
- validate the SCS.

This document is intended to be used within the framework of systematic risk reduction, in conjunction with risk assessment described in ISO 12100. Suggested methodologies for a safety integrity assignment are given in informative Annex A.

SAFETY OF MACHINERY – FUNCTIONAL SAFETY OF SAFETY-RELATED CONTROL SYSTEMS

1 Scope

This International Standard specifies requirements and makes recommendations for the design, integration and validation of safety-related control systems (SCS) for machines. It is applicable to control systems used, either singly or in combination, to carry out safety functions on machines that are not portable by hand while working, including a group of machines working together in a co-ordinated manner.

This document is a machinery sector specific standard within the framework of IEC 61508 (all parts).

The design of complex programmable electronic subsystems or subsystem elements is not within the scope of this document. This is in the scope of IEC 61508 or standards linked to it; see Figure 1.

NOTE 1 Elements such as systems on chip or microcontroller boards are considered complex programmable electronic subsystems.

The main body of this sector standard specifies general requirements for the design, and verification of a safety-related control system intended to be used in high/continuous demand mode.

This document:

- is concerned only with functional safety requirements intended to reduce the risk of hazardous situations;
- is restricted to risks arising directly from the hazards of the machine itself or from a group of machines working together in a co-ordinated manner;

NOTE 2 Requirements to mitigate risks arising from other hazards are provided in relevant sector standards. For example, where a machine(s) is part of a process activity, additional information is available in IEC 61511.

This document does not cover

- electrical hazards arising from the electrical control equipment itself (e.g. electric shock – see IEC 60204-1);
- other safety requirements necessary at the machine level such as safeguarding;
- specific measures for security aspects – see IEC TR 63074.

This document is not intended to limit or inhibit technological advancement.

Figure 1 illustrates the scope of this document.