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Australian/New Zealand Standard™

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



AS/NZS 62061:2025

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Australian/New Zealand Standard™

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

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Requirements

To conform to a Standard, all requirements in the Standard need to be met.

A requirement is any statement in the Standard which uses the word "shall".

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The following words are commonly used in Standards, but statements using them do not have to be followed to conform to the Standard:

- (a) "should" means that something is recommended.
- (b) "may" means that something is permitted.
- (c) "can" means that something is possible.

Structure of Standards

A Standard always has the following parts:

- (i) The Preface states who developed the Standard, what the Standard is aiming to do, and how it relates to other documents.
- (ii) The Scope states what the Standard is about, what it covers and what it does not cover.
- (iii) The Normative references clause lists other documents that are referenced in the Standard as part of requirements.
- (iv) The Terms and definitions clause defines important terms to help with understanding the Standard.

A Standard may also include other parts, such as the following:

- (1) A normative appendix sets additional requirements that need to be conformed to.
- (2) An informative appendix provides additional information or guidance. They usually do not contain requirements. If an informative appendix does contain requirements, the Standard will explain when those requirements apply
- (3) A Bibliography lists documents referenced in the Standard but not as part of requirements.

Many Standards include notes. Notes provide recommendations and/or guidance only. They never contain requirements.

Preface

This Standard was prepared by the Joint Standards Australia/Standards New Zealand Committee SF-041, Safety of Machinery, to supersede AS/NZS 62061:2019, *Safety of machinery — Functional safety of safety-related electrical, electronic and programmable electronic control systems* (IEC 62061:2005+AMD1:2012+AMD2:2015 CSV (ED.1.2)/COR1:2015 MOD).

The objective of this document is to specify requirements and make 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 coordinated manner.

This document is a machinery sector specific standard within the framework of AS 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 AS 61508 or standards linked to it.

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 —

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

This document does not cover —

- (i) electrical hazards arising from the electrical control equipment itself (e.g. electric shock; refer to AS/NZS 4024.1204);
- (ii) other safety requirements necessary at the machine level such as safeguarding; or
- (iii) specific measures for security aspects (refer to IEC TR 63074).

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

This document is identical with and has been reproduced from IEC 62061:2021, *Safety of machinery — Functional safety of safety-related control systems* and its Amendment No. 1 (2024) which has been added at the end of the source text.

This Standard provides for the use of the following Australian Standards as equivalent to the IEC Standards referenced herein:

IEC Standards

IEC 60204-1:2005, *Safety of machinery — Electrical equipment of machines — Part 1: General requirements*

AS Standard and AS/NZS Standards

AS 60204.1-2005, *Safety of machinery — Electrical equipment of machines, Part 1: General requirements* (IEC 60204-1, Ed. 5 (FDIS) MOD)

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Australian or Australian/New Zealand Standards that are identical adoptions of international normative references may be used interchangeably. Refer to the [online catalogue](#) for information on specific Standards.

The terms “normative” and “informative” are used in Standards to define the application of the appendices or annexes to which they apply. A “normative” appendix or annex is an integral part of a Standard, whereas an “informative” appendix or annex is only for information and guidance.

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FOREWORD

- 1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
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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.

IMPORTANT — The 'colour inside' logo on the cover page of this publication indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this document using a colour printer.

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](#).

NOTES

Australian/New Zealand Standard

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.