

Australian Standard™

**Functional safety of electrical
electronic/programmable electronic
safety-related systems**

Part 4: Definitions and abbreviations

This Australian Standard was prepared by Committee IT/6, Information Technology for Industrial Automation and Integration. It was approved on behalf of the Council of Standards Australia on 14 July 1999 and published on 5 August 1999.

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Australian Electrical and Electronic Manufacturers Association
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PREFACE

This Standard was prepared by the Standards Australia Committee IT/6, Information Technology for Industrial Automation and Integration. This Standard is identical with and has been reproduced from IEC 61508-4:1998, *Functional safety of electrical/electronic/programmable electronic safety-related systems*, Part 4: *Definitions and abbreviations*.

The objective of this Standard is to provide designers of electrical/electronic/programmable electronic devices used in safety related applications with the definitions and abbreviations used in other Parts of this series of Standards.

A reference to an International Standard identified in the normative references clause (Clause 2) by strikethrough (~~example~~) is replaced by a reference to the Australian Standards listed immediately thereafter and identified by shading (example). Where the struck-through referenced document and the referenced Australian Standard are identical, this is indicated in parenthesis after the title of the latter.

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INTRODUCTION

Systems comprised of electrical and/or electronic components have been used for many years to perform safety functions in most application sectors. Computer-based systems (generically referred to as programmable electronic systems (PESs)) are being used in all application sectors to perform non-safety functions and, increasingly, to perform safety functions. If computer system technology is to be effectively and safely exploited, it is essential that those responsible for making decisions have sufficient guidance on the safety aspects on which to make those decisions.

This International Standard sets out a generic approach for all safety lifecycle activities for systems comprised of electrical and/or electronic and/or programmable electronic components (electrical/electronic/programmable electronic systems (E/E/PESs)) that are used to perform safety functions. This unified approach has been adopted in order that a rational and consistent technical policy be developed for all electrically based safety-related systems. A major objective is to facilitate the development of application sector standards.

In most situations, safety is achieved by a number of protective systems which rely on many technologies (for example mechanical, hydraulic, pneumatic, electrical, electronic, programmable electronic). Any safety strategy must therefore consider not only all the elements within an individual system (for example sensors, controlling devices and actuators), but also all the safety-related systems making up the total combination of safety-related systems. Therefore, while this International Standard is concerned with electrical/electronic/programmable electronic (E/E/PE) safety-related systems, it may also provide a framework within which safety-related systems based on other technologies may be considered.

It is recognised that there is a great variety of E/E/PE applications in a variety of application sectors and covering a wide range of complexity, hazard and risk potentials. In any particular application, the required safety measures will be dependent on many factors specific to the application. This International Standard, by being generic, will enable such measures to be formulated in future application sector international standards.

This International Standard

- considers all relevant overall E/E/PE and software safety lifecycle phases (for example, from initial concept, through design, implementation, operation and maintenance to decommissioning) when E/E/PEs are used to perform safety functions;
 - has been conceived with a rapidly developing technology in mind; the framework is sufficiently robust and comprehensive to cater for future developments;
 - enables application sector international standards, dealing with safety-related E/E/PEs, to be developed; the development of application sector international standards, within the framework of this International Standard, should lead to a high level of consistency (for example, underlying principles, terminology, etc.) both within application sectors and across application sectors; this will have both safety and economic benefits;
 - provides a method for the development of the safety requirements specification necessary to achieve the required functional safety for E/E/PE safety-related systems;
 - uses safety integrity levels for specifying the target level of safety integrity for the safety functions to be implemented by the E/E/PE safety-related systems;
- adopts a risk-based approach for the determination of the safety integrity level requirements;
- sets numerical target failure measures for E/E/PE safety-related systems which are linked to the safety integrity levels;

- sets a lower limit on the target failure measures, in a dangerous mode of failure, that can be claimed for a single E/E/PE safety-related system; for E/E/PE safety-related systems operating in
 - a low demand mode of operation, the lower limit is set at an average probability of failure of 10^{-5} to perform its design function on demand,
 - a high demand or continuous mode of operation, the lower limit is set at a probability of a dangerous failure of 10^{-9} per hour;
- NOTE – A single E/E/PE safety-related system does not necessarily mean a single-channel architecture.
- adopts a broad range of principles, techniques and measures to achieve functional safety for E/E/PE safety-related systems, but does not use the concept of fail safe which may be of value when the failure modes are well defined and the level of complexity is relatively low; the concept of fail safe was considered inappropriate because of the full range of complexity of E/E/PE safety-related systems that are within the scope of the standard.

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STANDARDS AUSTRALIA

Functional safety of electrical/electronic/programmable electronic safety-related systems

Part 4:
Definitions and abbreviations

1 Scope

1.1 This part of IEC 61508 contains the definitions and explanation of terms that are used in parts 1 to 7 of this standard.

1.2 The definitions are grouped under general headings so that related terms can be understood within the context of each other. But it should be noted that these headings are not intended to add meaning to the definitions, and in this sense the headings should be disregarded.

1.3 IEC 61508-1, IEC 61508-2, IEC 61508-3 and IEC 61508-4 are basic safety publications, although this status does not apply in the context of low-complexity E/E/PE safety-related systems (see 3.4.4). As basic safety publications, they are intended for use by technical committees in the preparation of standards in accordance with the principles contained in IEC Guide 104 and ISO/IEC Guide 51. One of the responsibilities of a technical committee is, wherever applicable, to make use of basic safety publications in the preparation of its own publications. IEC 61508 is also intended for use as a stand-alone standard.

1.4 Figure 1 shows the overall framework for parts 1 to 7 of IEC 61508 and indicates the role that IEC 61508-4 plays in the achievement of functional safety for E/E/PE safety-related systems.

NOTE – In the USA and Canada, until the proposed process sector implementation of IEC 61508 (i.e. IEC 61511) is published as an international standard in the USA and Canada, existing national process safety standards based on IEC 61508 (i.e. ANSI/ISA S84.01-1996) can be applied in the process sector instead of IEC 61508.