

Australian/New Zealand Standard™

Electromagnetic compatibility (EMC)

Part 6.7: Generic standards—Immunity requirements for equipment intended to perform functions in a safety-related system (functional safety) in industrial locations



AS/NZS IEC 61000.6.7:2015

This Joint Australian/New Zealand Standard was prepared by Joint Technical Committee TE-003, Electromagnetic Compatibility. It was approved on behalf of the Council of Standards Australia on 26 October 2015 and on behalf of the Council of Standards New Zealand on 22 October 2015.
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PREFACE

This Standard was prepared by the Joint Standards Australia/Standards New Zealand Committee TE-003, Electromagnetic Compatibility.

The objective of this Standard is to define immunity test requirements for equipment in relation to continuous and transient conducted and radiated disturbances, including electrostatic discharges. These requirements apply only to functions intended for use in functional safety applications.

This Standard is identical with, and has been reproduced from IEC 61000-6-7, Ed. 1.0 (2014), *Electromagnetic compatibility (EMC), Part 6-7: Generic standards—Immunity requirements for equipment intended to perform functions in a safety-related system (functional safety) in industrial locations*.

As this Standard is reproduced from an International Standard, the following applies:

- (a) In the source text ‘this part of IEC 61000’ should read ‘this Australian/New Zealand Standard’.
- (b) A full point substitutes for a comma when referring to a decimal marker.

References to International Standards should be replaced by references to Australian or Australian/New Zealand Standards, as follows:

<i>Reference to International Standard</i>		<i>Australian/New Zealand Standard</i>	
IEC		AS/NZS IEC	
61000	Electromagnetic compatibility (EMC)	61000	Electromagnetic compatibility (EMC)
61000-4-2	Part 4-2: Testing and measurement techniques—Electrostatic discharge immunity test	61000.4.2	Part 4.2: Testing and measurement techniques—Electrostatic discharge immunity test
61000-4-3	Part 4-3: Testing and measurement techniques—Radiated, radio-frequency, electromagnetic field immunity test	61000.4.3	Part 4.3: Testing and measurement techniques—Radiated, radio-frequency, electromagnetic field immunity test
61000-4-4	Part 4-4: Testing and measurement techniques—Electrical fast transient/burst immunity test	61000.4.4	Part 4.4: Testing and measurement techniques—Electrical fast transient/burst immunity test
		AS/NZS	
61000	Electromagnetic compatibility (EMC)	61000	Electromagnetic compatibility (EMC)
61000-4-5	Part 4-5: Testing and measurement techniques—Surge immunity test	61000.4.5	Part 4.5: Testing and measurement techniques—Surge immunity test
		AS/NZS IEC	
61000-4-6	Part 4-6: Testing and measurement techniques—Immunity to conducted disturbances, induced by radio-frequency fields	61000.4.6	Part 4.6: Testing and measurement techniques—Immunity to conducted disturbances, induced by radio-frequency fields

IEC		AS/NZS	
61000-4-8	Part 4-8: Testing and measurement techniques—Power frequency magnetic field immunity test	61000.4.8	Part 4.8: Testing and measurement techniques—Power frequency magnetic field immunity test
61000-4-11	Part 4-11: Testing and measurement techniques—Voltage dips, short interruptions and voltage variations immunity tests	61000.4.11	Part 4.11: Testing and measurement techniques—Voltage dips, short interruptions and voltage variations immunity tests (IEC 61000-4-11, Ed. 2.0 (2004) MOD)
61000-4-16	Part 4-16: Testing and measurement techniques—Test for immunity to conducted, common mode disturbances in the frequency range 0 Hz to 150 kHz	61000.4.16	Part 4.16: Testing and measurement techniques—Test for immunity to conducted, common mode disturbances in the frequency range 0 Hz to 150 kHz
61000-4-34	Part 4-34: Testing and measurement techniques—Voltage dips, short interruptions and voltage variations immunity tests for equipment with mains current more than 16 A per phase	61000.4.34	Part 4.34: Testing and measurement techniques—Voltage dips, short interruptions and voltage variations immunity tests for equipment with mains current more than 16 A per phase
61508	Functional safety of electrical/electronic/programmable electronic safety-related systems (series)	AS 61508	Functional safety of electrical/electronic/programmable electronic safety-related systems (series)

Only normative references that have been adopted as Australian or Australian/New Zealand Standard have been listed.

The term ‘informative’ has been used to define the application of the annex to which it applies. An ‘informative annex’ is only for information and guidance.

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INTRODUCTION

IEC 61000 is published in separate parts according to the following structure:

Part 1: General

General considerations (introduction, fundamental principles)

Definitions, terminology

Part 2: Environment

Description of the environment

Classification of the environment

Compatibility levels

Part 3: Limits

Emission limits

Immunity limits (insofar as they do not fall under the responsibility of the product committees)

Part 4: Testing and measurement techniques

Measurement techniques

Testing techniques

Part 5: Installation and mitigation guidelines

Installation guidelines

Mitigation methods and devices

Part 6: Generic standards

Part 9: Miscellaneous

Each part is further subdivided into several parts, published either as International Standards or technical reports, some of which have already been published as sections. Others will be published with the part number followed by a dash and completed by a second number identifying the subdivision (example: IEC 61000-3-11).

AUSTRALIAN/NEW ZEALAND STANDARD

Electromagnetic compatibility (EMC)**Part 6.7:**

Generic standards—Immunity requirements for equipment intended to perform functions in a safety-related system (functional safety) in industrial locations

1 Scope and object

This part of IEC 61000 is intended to be used by suppliers when making claims for the immunity of equipment intended for use in safety-related systems against electromagnetic disturbances.

This standard should also be used by designers, integrators, installers, and assessors of safety-related systems to assess the claims made by suppliers. It provides guidance to product committees.

This part of IEC 61000 applies to electrical and electronic equipment intended for use in safety-related systems and that is

- intended to comply with the requirements of IEC 61508 and/or other sector-specific functional safety standards, and
- intended to be operated in industrial locations as described in 3.1.15.

NOTE 1 The final safety-related system is designed by a system integrator (or equivalent) that has the responsibility to assess the adequacy of the equipment for the particular application. This process is described in Annex D of IEC/TS 61000-1-2:2008.

The object of this standard is to define immunity test requirements for equipment in relation to continuous and transient, conducted and radiated disturbances, including electrostatic discharge. These requirements apply only to functions intended for use in functional safety applications. Test requirements are specified for each port considered.

NOTE 2 The immunity requirements of this standard do not, however, cover extreme cases, which can occur at any location, but with an extremely low probability of occurrence. In consequence, a designer of a safety-related system checks whether the requirements of this standard cover the expected electromagnetic phenomena within the intended application.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 60050 (all parts), *International Electrotechnical Vocabulary (IEV)* (available at www.electropedia.org)

IEC/TS 61000-1-2:2008, *Electromagnetic compatibility (EMC) – Part 1-2: General – Methodology for the achievement of functional safety of electrical and electronic systems including equipment with regard to electromagnetic phenomena*

IEC 61000-1-6:2012, *Electromagnetic compatibility (EMC) – Part 1-6: General – Guide to the assessment of measurement uncertainty*

IEC 61000-4-2, *Electromagnetic compatibility (EMC) – Part 4-2: Testing and measurement techniques – Electrostatic discharge immunity test*

IEC 61000-4-3, *Electromagnetic compatibility (EMC) – Part 4-3: Testing and measurement techniques – Radiated, radio-frequency, electromagnetic field immunity test*

IEC 61000-4-4, *Electromagnetic compatibility (EMC) – Part 4-4: Testing and measurement techniques – Electrical fast transient/burst immunity test*

IEC 61000-4-5, *Electromagnetic compatibility (EMC) – Part 4-5: Testing and measurement techniques – Surge immunity test*

IEC 61000-4-6, *Electromagnetic compatibility (EMC) – Part 4-6: Testing and measurement techniques – Immunity to conducted disturbances, induced by radio-frequency fields*

IEC 61000-4-8, *Electromagnetic compatibility (EMC) – Part 4-8: Testing and measurement techniques – Power frequency magnetic field immunity test*

IEC 61000-4-11, *Electromagnetic compatibility (EMC) – Part 4-11: Testing and measurement techniques – Voltage dips, short interruptions and voltage variations immunity tests*

IEC 61000-4-16, *Electromagnetic compatibility (EMC) – Part 4-16: Testing and measurement techniques – Test for immunity to conducted, common mode disturbances in the frequency range 0 Hz to 150 kHz*

IEC 61000-4-29, *Electromagnetic compatibility (EMC) – Part 4-29: Testing and measurement techniques – Voltage dips, short interruptions and voltage variations on d.c. input power port immunity tests*

IEC 61000-4-34, *Electromagnetic compatibility (EMC) – Part 4-34: Testing and measurement techniques – Voltage dips, short interruptions and voltage variations immunity tests for equipment with mains current more than 16 A per phase*

IEC 61508 (all parts), *Functional safety of electrical/electronic/programmable electronic safety-related systems*

IEC 61784-3, *Industrial communication networks – Profiles – Part 3: Functional safety fieldbuses – General rules and profile definitions*

IEC Guide 107, *Electromagnetic compatibility – Guide to the drafting of electromagnetic compatibility publications*

3 Terms, definitions and abbreviations

3.1 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 60050-161, as well as the following apply.

NOTE Other definitions, not included in IEC 60050-161 and in this standard, but nevertheless necessary for the application of the different tests, are given in the EMC basic publications of the IEC 61000 series.

3.1.1

auxiliary equipment

AE

equipment necessary to provide the equipment under test (EUT) with the signals required for normal operation and equipment to verify the performance of the EUT

3.1.2

dangerous failure

failure of an element and/or subsystem and/or system that plays a part in implementing the safety function that:

- a) prevents a safety function from operating when required (demand mode) or causes a safety function to fail (continuous mode) such that the EUC (equipment under control) is put into a hazardous or potentially hazardous state; or
- b) decreases the probability that the safety function operates correctly when required

[SOURCE: IEC 61508-4:2010, 3.6.7]

3.1.3

DC distribution network

local DC electricity supply network in the infrastructure of a certain site or building intended for connection of any type of DC-powered equipment

Note 1 to entry: Connection to a local or remote battery/power supply/PELV/SELV/UPS is not regarded as a DC distribution network if such a link comprises only the power source mentioned above for a single piece of equipment. These lines are considered as signal lines.

3.1.4

electrical/electronic/programmable electronic

E/E/PE

based on electrical (E) and/or electronic (E) and/or programmable electronic (PE) technology

EXAMPLE Electrical/electronic/programmable electronic devices include

- electro-mechanical devices (electrical);
- solid-state non-programmable electronic devices (electronic);
- electronic devices based on computer technology (programmable electronic);

Note 1 to entry: The term is intended to cover any and all devices or systems operating on electrical principles.

[SOURCE: IEC 61508-4:2010, 3.2.13]

3.1.5

enclosure port

physical boundary of the apparatus through which electromagnetic fields may radiate or impinge on

3.1.6

equipment

electrical and electronic subsystems, apparatus, modules, devices and other assemblies of products intended to be used to construct safety-related systems, and which are

- intended to comply with the requirements of IEC 61508 and/or other sector-specific functional safety standards, and
- intended to be operated in industrial locations as described in 3.1.15

3.1.7

equipment under control

EUC

equipment, machinery, apparatus or plant used for manufacturing, process, transportation, medical or other activities

Note 1 to entry: The EUC control system is separate and distinct from the EUC.

Note 2 to entry: This note applies to the French language only.

[SOURCE: IEC 61508-4:2010, 3.2.1, modified – note 2 has been added.]

3.1.8
equipment under test
EUT

equipment (products, devices, appliances and systems) subjected to immunity tests

3.1.9
extra-low voltage
ELV

any voltage not exceeding the relevant voltage limit specified in IEC 61201

[SOURCE: IEC 61140:2009, 3.26]

3.1.10
functional earth port

cable port other than signal/control or power port, intended for connection to earth for purposes other than electrical safety

3.1.11
functional safety

part of the overall safety relating to the EUC and the EUC control system that depends on the correct functioning of the E/E/PE safety-related systems and other risk reduction measures

[SOURCE: IEC 61508-4:2010, 3.1.12]

3.1.12
functional safety application

system, equipment or product that is intended for use in a safety-related system but is not itself a complete safety-related system

Note 1 to entry: This definition refers to aspects of the safety functions of the safety-related system within which it will be used.

3.1.13
harm

physical injury or damage to the health of people, or damage to property or the environment

[SOURCE: IEC 60050-351:2013, 351-57-02]

3.1.14
hazard

potential source of harm

Note 1 to entry: The term includes dangers to persons arising within a short time scale (for example, fire and explosion) and also those that have a long-term effect on a person's health (for example, release of a toxic substance).

[SOURCE: IEC 60050-351:2013, 351-57-01, modified – the note has been modified.]

3.1.15
industrial location

location characterized by a separate power network, supplied from a high- or medium-voltage transformer, dedicated for the supply of the installation

Note 1 to entry: Industrial locations can generally be described by the existence of an installation with one or more of the following characteristics:

- items of equipment installed and connected together and working simultaneously;
- significant amount of electrical power is generated, transmitted and/or consumed;