

Australian/New Zealand Standard™

Electromagnetic compatibility (EMC)

Part 1.1: General—Application and interpretation of fundamental definitions and terms



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AS/NZS 61000.1.1:2000

This Joint Australian/New Zealand Standard was prepared by Joint Technical Committee TE/3, Electromagnetic Interference. It was approved on behalf of the Council of Standards Australia on 15 March 2000 and on behalf of the Council of Standards New Zealand on 11 April 2000. It was published on 2 May 2000.

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This Standard was issued in draft form for comment as DR 99497.

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OF

AS/NZS 61000.1.1:2000

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Approved for reconfirmation in accordance with Standards Australia procedures for reconfirmation on 18 May 2015.

Approved for reconfirmation in New Zealand on behalf of the Standards Council of New Zealand on 4 November 2016.

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NOTES

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First published as AS/NZS 61000.1.1:2000.

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Jointly published by Standards Australia International Ltd, PO Box 1055, Strathfield, NSW 2135 and Standards New Zealand, Private Bag 2439, Wellington 6020

ISBN 0 7337 3349 2

PREFACE

This Standard was prepared by the Joint Standards Australia/Standards New Zealand Committee TE/3, Electromagnetic Interference. This Standard is identical with and has been reproduced from IEC 61000-1-1:1992, *Electromagnetic compatibility (EMC), Part 1: General, Section 1: Application and interpretation of fundamental definitions and terms*.

The objective of this Standard is to provide the users of electromagnetic emissions and immunity Standards with a specification for the application of fundamental terms contained in those Standards.

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AUSTRALIAN/NEW ZEALAND STANDARD

Electromagnetic compatibility (EMC)

Part 1.1: General—Application and interpretation of fundamental definitions and terms

1 Scope

The object of this report is to describe and interpret various terms considered to be of basic importance to concepts and practical application in the design and evaluation of electromagnetically compatible systems. In addition, attention is drawn to the distinction between electromagnetic compatibility (EMC) tests carried out in a standardized set-up and those carried out at the location where a device (equipment or system) is installed (*in situ* tests).

The terms and their definitions are given in clause 2, with reference to chapter 161 of the IEC [1]. The application of the terms is described in clause 3 and an interpretation of their definitions is presented in the annexes.

2 Definition of terms

The terms of importance in the context of this report are defined below. Each definition is followed by its IEC number when it is identical with the definition (and any note accompanying it) given in [1]*. Where it differs, the IEC number is followed by "/A", or it is indicated that the term has not been defined in IEC 50(161).

The terms and their definitions can be divided into three groups:

- 1) **Basic terms**, for example electromagnetic compatibility, emission, immunity and level;
- 2) **Combined terms**, which combine basic terms, for example emission level, compatibility level and immunity limit.
- 3) **Interrelated terms**, which interrelate combined terms, for example emission margin and compatibility margin.

2.1 Basic terms

electromagnetic environment (161-01-01): The totality of electromagnetic phenomena existing at a given location.

Note/A: In general, this totality is time dependent and its description may need a statistical approach.

electromagnetic disturbance (161-01-05): Any electromagnetic phenomenon which may degrade the performance of a device, equipment or system, or adversely affect living or inert matter.

NOTE - An electromagnetic disturbance may be an electromagnetic noise, an unwanted signal or a change in the propagation medium itself.

* The figures in square brackets indicate the references listed in page 64.

electromagnetic interference; EMI (abbreviation) (161-01-06): Degradation of the performance of a device, equipment or system caused by an electromagnetic disturbance.

Note/A: Disturbance and interference are cause and effect respectively.

NOTES

- 1 The English words "interference" and "disturbance" are often used indiscriminately.
- 2 In French, the term "perturbation électromagnétique" is also used with the meaning of "brouillage électromagnétique".
- 3 In Russian, the terms "vozmuschenie" and "pomeha" are often used with the same meaning.

electromagnetic compatibility; EMC (abbreviation) (161-01-07): The ability of an equipment or system to function satisfactorily in its electromagnetic environment without introducing intolerable electromagnetic disturbances to anything in that environment.

(electromagnetic) emission (161-01-08): The phenomenon by which electromagnetic energy emanates from a source.

degradation (of performance) (161-01-19): An undesired departure in the operational performance of any device, equipment or system from its intended performance.

NOTE - The term "degradation" can apply to temporary or permanent failure.

immunity (to a disturbance) (161-01-20): The ability of a device, equipment or system to perform without degradation in the presence of an electromagnetic disturbance.

(electromagnetic) susceptibility (161-01-21): The inability of a device, equipment or system to perform without degradation in the presence of an electromagnetic disturbance.

NOTE - Susceptibility is a lack of immunity.

level (of a quantity) (not defined in IEC 50(161): The magnitude of a quantity evaluated in a specified manner.

NOTE - The level of a quantity may be expressed in logarithmic units, for example decibels with respect to a reference value.

2.2 Combined terms

emission level (of a disturbing source) (161-03-11): The level of a given electromagnetic disturbance emitted from a particular device, equipment or system, measured in a specified way.

emission limit (from a disturbing source) (161-03-12/A): The maximum permissible emission level.

immunity level (161-03-14/A): The maximum level of a given electromagnetic disturbance, incident in a specified way on a particular device, equipment or system, at which no degradation of operation occurs.

immunity limit (161-03-15/A): The minimum required immunity level.

disturbance level (not defined in IEC 50(161): The level of a given electromagnetic disturbance, measured in a specified way.

(electromagnetic) compatibility level (161-03-10/A): The specified disturbance level at which an acceptable, high probability of electromagnetic compatibility should exist.

2.3 *Interrelated terms*

emission margin (161-03-13/A): The ratio of the electromagnetic compatibility level to the emission limit.

immunity margin (161-03-16/A): The ratio of the immunity limit to the electromagnetic compatibility level.

(electromagnetic) compatibility margin (161-03-17/A): The ratio of the immunity limit to the emission limit.

Note/A: the compatibility margin is the product of the emission margin and the immunity margin.

General note: If the levels are expressed in dB(...), in the above margin definitions "difference" should be read instead of "ratio" and "sum" instead of "product".

3 Application of EMC terms and definitions

3.1 *General*

The definitions given in clause 2 are basic, conceptual definitions. When they are applied to assign specific values to the levels in a particular case, several considerations should be borne in mind. A number of these are given in this section, together with examples which will elucidate them. For an interpretation of the various terms used, see annexes A and B.

The basic devices of systems can be divided into two groups

- 1) *emitters*, i.e. devices, equipment or systems which emit potentially disturbing voltages, currents or fields, and
- 2) *susceptors*, i.e. devices, equipment or systems whose operation might be degraded by those emissions.

Some devices may belong simultaneously to both groups.

3.2 *Relation between various levels*

3.2.1 *Emission and immunity level/limit*

Figure 1 shows a possible combination of an emission and an immunity level and their associated limits as a function of some independent variable, for example the frequency, for a single type of emitter and a single type of susceptor.

In figure 1 the emission level is always lower than its maximum permissible level, i.e. the emission limit, and the immunity level is always higher than its minimum required level, i.e. the immunity limit. Hence, the emitter and the susceptor comply with their prescribed limit. In addition the immunity limit has been chosen above the emission limit, and it has been assumed that the levels and limits are continuous functions of the independent variable. These levels and limits may also be discrete functions of some independent variable, see example 1 in 3.2.2.

The following considerations should be kept in mind.

Consideration A

By drawing the emission and immunity level (and the associated limits) in one figure it is assumed that only one particular disturbance is considered, unless it is clearly indicated that different disturbances are considered and the relationship between the different disturbances is also indicated.

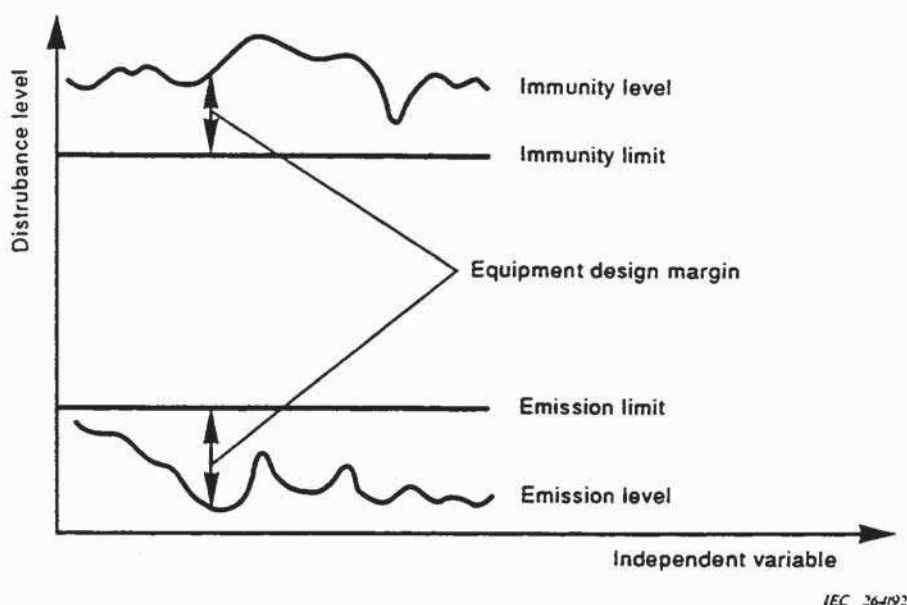


Figure 1 – Limits and levels for a single emitter and susceptor as a function of some independent variable (e.g. the frequency)

Consideration B

Drawing the emission and immunity level in one figure is only relevant when there is a good interrelation between the specified way the emission level of the particular disturbance is measured and the specified way that type of disturbance is incident on the equipment under test. If this is the case, figure 1 indicates an electromagnetically compatible situation.