

Australian Standard[®]

Static transfer systems (STS)

**Part 2: Electromagnetic compatibility
(EMC) requirements**



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 - Australian Electrical and Electronic Manufacturers Association
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 - Department of Defence (Australia)
 - Energy Networks Association
 - Monash University
-

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Static transfer systems (STS)

Part 2: Electromagnetic compatibility (EMC) requirements

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PREFACE

This Standard was prepared by the Standards Australia Committee EL-027, Power Electronics.

The objective of this Standard is to provide electromagnetic compatibility (EMC) requirements for free standing a.c. static transfer systems (STS) intended to ensure the continuity of power to load by automatically or manually controlled transfer, with or without interruption, from two or several a.c. independent sources.

This Standard is Part 2 of a three part Standard which, when complete, will consist of the following:

AS

62310 Static transfer systems (STS)

62310.1 Part 1: General and safety requirements

62310.2 Part 2: Electromagnetic compatibility (EMC) requirements (this Standard)

62310.3 Part 3: Method of specifying the performance and test requirements

This Standard is identical with, and has been reproduced from IEC 62310-2, Ed. 1.0 (2006), *Static transfer systems (STS) – Part 2: Electromagnetic compatibility (EMC) requirements*.

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

- (a) Its number does not appear on each page of text and its identity is shown only on the cover and title page.
- (b) In the source text 'IEC 62310-2' should read 'AS 62310.2'.
- (c) A full point should be substituted for a comma when referring to a decimal marker.

The terms 'normative' and 'informative' are used to define the application of the annex to which they apply. A normative annex is an integral part of a standard, whereas an informative annex is only for information and guidance.

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STANDARDS AUSTRALIA

Australian Standard**Static transfer systems (STS)****Part 2: Electromagnetic compatibility (EMC) requirements**

1 Scope

The IEC 62310 series applies to free standing operation a.c. static transfer systems (STS) intended to ensure the continuity of load supply through controlled transfer, with or without interruption of power, from two or more independent a.c. sources.

The IEC 62310 series includes requirements for the switching elements, their control and protective elements, where applicable. The IEC 62310 series also includes information for the overall integration of the STS and its accessories into the a.c. power network.

This standard applies to systems up to 1 000 V a.c. which are intended to be used in single-phase, phase-phase or three-phase applications

This part of IEC 62310 takes precedence over all aspects of the generic standards, and no additional testing is necessary.

The requirements have been selected so as to ensure an adequate level of Electromagnetic Compatibility (EMC) for STS at public and industrial locations. These levels cannot, however, cover extreme cases which may occur in any location, but with extremely low probability of occurrence.

It takes into account the differing test conditions necessary to encompass the range of physical sizes and power ratings of STS.

A STS, whether presented as a unit or an assembly of units shall meet the relevant requirements of this part of IEC 62310 as a stand-alone product. EMC phenomena produced by any supply or load connected to the input or output of the STS equipment shall not be taken into account.

This standard does not apply to:

- devices for d.c. source switching;
- single source systems;
- transfer systems using only electromechanical switching devices intended to be used in emergency power systems with interruption of the supply to the load during transfer;
NOTE 1 Such equipment is covered by IEC 60947-6-1.
- automatic switching devices integrated into Uninterruptible Power Systems (UPS) covered by the IEC 62040 series.

NOTE 2 For STS intended to be used in vehicles, on board ships or aircraft, in tropical countries, for Emergency Power Systems (such as those used for health care facilities, fire fighting, emergency rescue, etc.), or at altitudes greater than 1 000 m, different requirements may be necessary.

This part of IEC 62310 concerns Electromagnetic Compatibility (EMC). See IEC 62310-1 for general and safety requirements.

Special installation environments are not covered, nor are fault conditions of STS taken into account.

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This standard specifies:

- EMC requirements;
- test methods;
- minimum performance levels.

2 Normative references

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

References to international standards that are struck through in this clause are replaced by references to Australian or Australian/New Zealand Standards that are listed immediately thereafter and identified by shading. Any Australian or Australian/New Zealand Standard that is identical to the International Standard it replaces is identified as such.

IEC 60050(161), *International Electrotechnical Vocabulary (IEV) – Chapter 161: Electromagnetic compatibility*

~~IEC 61000-2-2:2002, *Electromagnetic compatibility (EMC) – Part 2-2: Environment – Compatibility levels for low frequency conducted disturbances and signalling in public low-voltage power supply systems*~~

AS/NZS 61000.2.2, *Electromagnetic compatibility (EMC), Part 2.2: Environment – Compatibility levels for low-frequency conducted disturbances and signalling in public low-voltage power supply systems* (identical to IEC 61000-2-2)

IEC 61000-3-2:2000, *Electromagnetic compatibility (EMC) – Part 3-2: Limits – Limits for harmonic current emissions (equipment input current ≤16 A per phase)*¹

Amendment 1 (2001)

Amendment 2 (2004)

~~IEC 61000-4-1:2000, *Electromagnetic compatibility (EMC) – Part 4-1: Overview of 61000-4 series*~~

AS/NZS 61000.4.1, *Electromagnetic compatibility (EMC), Part 4.1: Overview of 61000-4 series* (identical to IEC 61000-4-1)

~~IEC 61000-4-2:1995, *Electromagnetic compatibility (EMC) – Part 4-2: Testing and measurement techniques – Electrostatic discharge immunity test*²~~

~~Amendment 1 (1998)~~

~~Amendment 2 (2000)~~

AS/NZS 61000.4.2, *Electromagnetic compatibility (EMC), Part 4.2: Testing and measurement techniques – Electrostatic discharge immunity test* (identical to IEC 61000-4-2, Ed. 1.2(2001))

¹ A consolidated edition 2.2 exists, including IEC 61000-3-2:2000, its Amendment 1 (2001) and its Amendment 2 (2004) .

² A consolidated edition 1.2 exists, including IEC 61000-4-2:1995, its Amendment 1 (1998) and its Amendment 2 (2000) .

~~IEC 61000-4-3:2002, Electromagnetic compatibility (EMC) — Part 4-3: Testing and measurement techniques — Radiated, radio-frequency, electromagnetic field immunity test³ Amendment 1 (2002)~~

AS/NZS 61000.4.3, *Electromagnetic compatibility (EMC), Part 4.3: Testing and measurement techniques—Radiated, radio-frequency, electromagnetic field immunity test* (identical to IEC 61000-4-3)

~~IEC 61000-4-4:2004, Electromagnetic compatibility (EMC) — Part 4-4: Testing and measurement techniques — Electrical fast transient/ burst immunity test~~

AS/NZS 61000.4.4, *Electromagnetic compatibility (EMC), Part 4.4: Testing and measurement techniques – Electrical fast transient/ burst immunity test* (identical to IEC 61000-4-4)

~~IEC 61000-4-5:1995, Electromagnetic compatibility (EMC) — Part 4-5: Testing and measurement techniques — Surge immunity test⁴— Amendment 1 (2000)~~

AS/NZS 61000.4.5, *Electromagnetic compatibility (EMC), Part 4.5: Testing and measurement techniques—Surge immunity test* (identical to IEC 61000-4-5)

~~IEC 61000-4-6:2004, Electromagnetic compatibility (EMC) — Part 4-6: Testing and measurement techniques — Immunity to conducted disturbances induced by radio frequency fields~~

AS/NZS 61000.4.6, *Electromagnetic compatibility (EMC) – Part 4.6: Testing and measurement techniques—Immunity to conducted disturbances induced by radio frequency fields* (identical to IEC 61000-4-6)

~~IEC 61000-4-8:1993, Electromagnetic compatibility (EMC) — Part 4-8: Testing and measurement techniques — Power frequency magnetic field immunity test. Basic EMC publication — Amendment 1:2000~~

AS/NZS 61000.4.8, *Electromagnetic compatibility (EMC), Part 4.8: Testing and measurement techniques—Power frequency magnetic field immunity test* (identical to IEC 61000-4-8)

~~IEC 62310-1: 2005, Static Transfer Systems (STS) — Part 1: General and safety requirements.~~

AS 62310.1: 2005, *Static Transfer Systems (STS), Part 1: General and safety requirements* (identical to IEC 62310-1)

~~CISPR 16-1-1:2003 Specification for radio disturbance and immunity measuring apparatus and methods — Part 1: Radio disturbance and immunity measuring apparatus — Measuring apparatus~~

AS/NZS CISPR 16.1.1, *Specification for radio disturbance and immunity measuring apparatus and methods, Part 1.1: Radio disturbance and immunity measuring apparatus—Measuring apparatus* (identical to CISPR 16-1-1)

~~CISPR 16-1-2, Specification for radio disturbance and immunity measuring apparatus and methods — Part 1-2: Radio disturbance and immunity measuring apparatus — Ancillary equipment — Conducted disturbances~~

³—A consolidated edition 2.1 exists, including IEC 61000-4-3:2002 and its Amendment 1 (2002).

⁴—A consolidated edition 1.1 exists, including IEC 61000-4-5:1995 and its Amendment 1 (2000).

AS/NZS CISPR 16.1.2, *Specification for radio disturbance and immunity measuring apparatus and methods – Part 1.2: Radio disturbance and immunity measuring apparatus—Ancillary equipment—Conducted disturbances* (identical to IEC 61000-1-2)

CISPR 16-1-5, *Specification for radio disturbance and immunity measuring apparatus and methods – Part 1-5: Radio disturbance and immunity measuring apparatus – Antenna calibration test sites for 30 MHz to 1 000 MHz*

CISPR 22:2005, *Information technology equipment – Radio disturbance characteristics – Limits and methods of measurement*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1 General definitions

For general definitions, the terms and definitions given in IEC 62310-1, as well as the terms and definitions in IEC 60050 (161) related to EMC and to relevant phenomena apply.

3.2 Circuit characteristics – Specified values

3.2.1 rating

set of rated values and operating conditions of a machine or a device or equipment

[IEV 151-16-11, modified]

3.2.2 rated value

quantity value assigned, generally by a manufacturer, for a specified operating condition of a component, device or equipment

[IEV 151-16-08, modified]

3.2.3 nominal value

suitable approximate quantity value used to designate or identify a component, device or equipment

[IEV 151-16-09, modified]

3.2.4 rated voltage

input or output voltage (for three-phase supply, the phase-to-phase voltage) as declared by the manufacturer

3.2.5 rated voltage range

input or output voltage range as declared by the manufacturer expressed by its lower and upper rated voltages

3.2.6 rated current

input or output current of the equipment as declared by the manufacturer

3.2.7 rated frequency

operating frequency as declared by the manufacturer

3.2.8**rated frequency range**

input or output frequency range as declared by the manufacturer, expressed by its lower and upper rated frequencies

3.2.9**linear load**

load where the current drawn from the supply is defined by the relationship:

$$I = U/Z$$

where

I is the load current;

U is the supply voltage;

Z is the constant impedance

3.2.10**harmonic components**

components of the harmonic content as expressed in terms of the order and r.m.s. values of the Fourier series terms describing the periodic function

3.2.11**harmonic content**

quantity obtained by subtracting from an alternating quantity its fundamental component

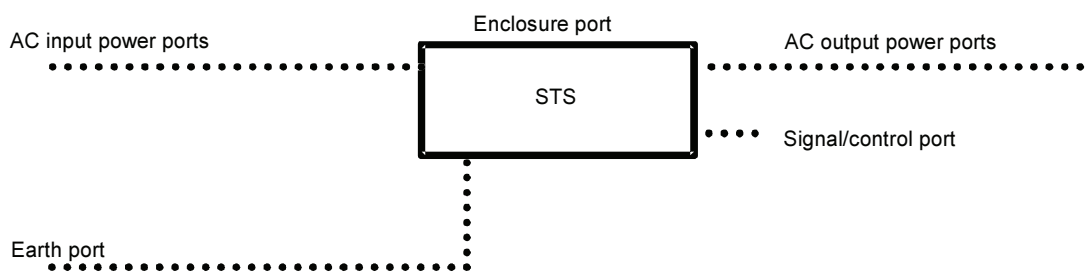
NOTE The harmonic content may be given as a time-function or as an r.m.s value.

3.3 EMC definitions**3.3.1****port**

particular interface of the specified STS with the external electromagnetic environment (see Figure 1)

3.3.2**enclosure port**

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



IEC 2552/05

Figure 1 – Examples of ports

3.3.3***in situ***

tests performed at the location where the item is used

3.4 Environments

3.4.1

first environment

environment that includes residential, commercial and light industrial premises directly connected without intermediate transformers to a public low-voltage mains supply

3.4.2

second environment

environment that includes all commercial, light industry and industrial establishments other than those directly connected to a low-voltage mains that supplies buildings used for residential purposes

4 STS categories

4.1 STS of category C1

This category includes STS intended for use without any restriction in the first environment. Such STS are suitable for use in residential establishments. Category C1-STS shall meet the category C1-STS emission limits and withstand the immunity requirements of Table 4.

4.2 STS of category 2

This category includes STS with an input output current not exceeding 16 A and intended for use without any restriction in the second environment. Such STS may also be used in the first environment when connected:

- through industrial plugs and sockets or,
- through national plugs and sockets; or
- permanently.

Category C2-STS shall meet the category C2-STS emission limits and withstand the immunity requirements of Table 5 as specified in this document.

The following wording shall be included in the instructions for use:

WARNING: This is a category C2-STS product. In a residential environment, this product may cause radio interference, in which case the user may be required to take additional measures.

NOTE All STS with an input current not exceeding 16 A and connected by industrial plugs and sockets of type B or by national plugs and sockets marketed solely for industrial use or permanently connected are Category C2-STS.

4.3 STS of category C3

This category includes STS with an output current exceeding 16 A and intended for use in the second environment. Such STS are suitable for use in commercial or industrial installations having a minimum boundary of 30 m from other buildings classified as first environment.

Category C3-STS shall meet category C3-STS emission limits and withstand the immunity requirements of Table 5.

The following wording shall be included in the instruction for use:

WARNING: This is a product for commercial and industrial application in the second environment: installation restrictions or additional measures may be needed to prevent disturbances.

4.4 STS of category C4

STS systems intended for use in complex environments and subject to an agreement between supplier and customer regarding applicable emission and immunity levels.

The STS of category C4 is not limited by current ratings.

4.5 Categories and environment

If the environment has been determined as the 1st environment, STS of category C1 or C2 shall be used.

If the environment has been determined as the 2nd environment, STS of category C2 or C3 shall be used.

If the environment is not covered exclusively either by 1st environment or 2nd environment, STS of category C4 shall be used.

5 Emission

5.1 General requirements

Disturbances in the frequency range from 0 Hz to 1,0 GHz are covered.

The emission limits represent essential electromagnetic requirements that have been selected together with test methods so as to ensure that disturbances generated by STS operating normally do not reach a level which could prevent other apparatus from operating as intended.

NOTE The limits in this standard may not, however, fully provide protection against interference to radio and television reception when the STS is used closer than 10 m from the receiving antenna for Category C1-STS and 30 m for Category C2-STS.

5.2 General measurement conditions

5.2.1 General

The requirements are specified for each STS port that shall comply with the applicable emission limits of 5.3 to 5.4 considering the STS category and under the following measurement conditions:

- rated input voltage;
- all combinations of operating modes concerning input sources and load;
- at the linear load current that results in highest emission level (see Note).

For STS with a.c. input terminals (ports) for the connection to accessories, for example transformers, these terminals (ports) shall, wherever possible, be temporarily connected to the normal a.c. input port supply or alternatively terminated into an equivalent impedance. Conducted emission tests in 5.3 shall include measurement of these additional circuits.

For STS with a.c. output terminals (ports) for the connection to accessories for example transformers, these terminals (ports) shall be connected to the minimum configuration of accessories necessary to exercise the ports.

NOTE Test currents may be limited to 100 A provided that the relevant emission can be determined to be independent of the load current.

For test set-up and measurement criteria, see Annex A.