

Static transfer systems (STS) —

Part 2: Electromagnetic compatibility (EMC) requirements

The European Standard EN 62310-2:2007 has the status of a
British Standard

ICS 29.200; 33.100

National foreword

This British Standard was published by BSI. It is the UK implementation of EN 62310-2:2007. It was derived by CENELEC from IEC 62310-2:2006.

The CENELEC common modifications have been implemented at the appropriate places in the text and are indicated by tags (e.g. **Ⓒ** **Ⓒ**).

The UK participation in its preparation was entrusted to Technical Committee PEL/22, Power electronics.

A list of organizations represented on PEL/22 can be obtained on request to its secretary.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

Compliance with a British Standard cannot confer immunity from legal obligations.

This British Standard was published under the authority of the Standards Policy and Strategy Committee on 30 March 2007

© BSI 2007

ISBN 978 0 580 50381 8

Amendments issued since publication

Amd. No.	Date	Comments

**Static transfer systems (STS) -
Part 2: Electromagnetic compatibility (EMC) requirements
(IEC 62310-2:2006, modified)**

Systèmes de transfert statique (STS) -
Partie 2: Exigences pour
la compatibilité électromagnétique (CEM)
(CEI 62310-2:2006, modifiée)

Statische Transfersysteme (STS) -
Teil 2: Anforderungen an die
elektromagnetische Verträglichkeit (EMV)
(IEC 62310-2:2006, modifiziert)

This European Standard was approved by CENELEC on 2006-09-01. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CENELEC member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CENELEC member into its own language and notified to the Central Secretariat has the same status as the official versions.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Bulgaria, Cyprus, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and the United Kingdom.

CENELEC

European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

Central Secretariat: rue de Stassart 35, B - 1050 Brussels

Foreword

The text of document 22H/81/FDIS, future edition 1 of IEC 62310-2, prepared by SC 22H, Uninterruptible power systems (UPS), of IEC TC 22, Power electronic systems and equipment, was submitted to the IEC-CENELEC parallel vote.

A draft amendment, prepared by the Technical Committee CENELEC TC 22X, Power electronics, was submitted to the formal vote.

The combined texts were approved by CENELEC as EN 62310-2 on 2006-09-01.

The following dates were fixed:

- latest date by which the EN has to be implemented
at national level by publication of an identical
national standard or by endorsement (dop) 2007-09-01
- latest date by which the national standards conflicting
with the EN have to be withdrawn (dow) 2009-09-01

This European Standard has been prepared under a mandate given to CENELEC by the European Commission and the European Free Trade Association and covers essential requirements of EC Directive 89/336/EEC. See Annex ZZ.

Annexes ZA and ZZ have been added by CENELEC.

Endorsement notice

The text of the International Standard IEC 62310-2:2006 was approved by CENELEC as a European Standard with agreed common modifications.

CONTENTS

1	Scope.....	5
2	Normative references	6
3	Terms and definitions	7
3.1	General definitions	7
3.2	Circuit characteristics – Specified values.....	7
3.3	EMC definitions	9
3.4	Environments	9
4	STS categories.....	9
4.1	STS of category C1	9
4.2	STS of category 2	9
4.3	STS of category C3	10
4.4	STS of category C4	10
4.5	Categories and environment.....	10
5	Emission	11
5.1	General requirements.....	11
5.2	General measurement conditions	11
5.3	Conducted emissions	12
5.4	Radiated emissions	13
6	Immunity	13
6.1	General requirements and performance criteria.....	13
6.2	Basic immunity requirements – high-frequency disturbances	14
6.3	Immunity to low-frequency signals.....	17
6.4	Immunity to power frequency magnetic field	17
6.5	Immunity to voltage dips, short interruptions and voltage variations.....	17
	Annex A (normative) Electromagnetic emission – Test methods.....	18
	Annex B (informative) Electromagnetic emission limits of magnetic field – H field	29
	Annex C (informative) Electromagnetic emission – Limits of signal ports	31
	Annex D (normative) Electromagnetic immunity – Test methods	32
	Annex E (informative) User installation testing (<i>in situ</i> testing).....	34
	Annex ZA (normative) Normative references to international publications with their corresponding European publications.....	36
	Annex ZZ (informative) Coverage of Essential Requirements of EC Directives.....	38
	Bibliography.....	35
	Figure 1 – Examples of ports	9
	Figure A.1 – Circuit for disturbance voltage measurements on mains supply or STS output	22
	Figure A.2 – Test configuration for table-top equipment (conducted emission measurement).....	25
	Figure A.3 – Test configuration for floor-standing equipment (conducted emission measurement).....	26

Figure A.4 – Test configuration for table-top equipment (radiated emission requirement)	27
Figure A.5 – Test configuration for floor-standing equipment (radiated emission measurement).....	28
Figure B.1 – Test set-up for measuring radiated disturbances.....	29
Table 1 – Limits of a.c. terminal interference voltage in the frequency range 0,15 MHz to 30 MHz for Category C2-STs, Category C1-STs equipment and Category C3-STs equipment.....	12
Table 2 – Limits of radiated emission in the frequency range 30 MHz to 1 000 MHz.....	13
Table 3 – Performance criteria for immunity tests	14
Table 4 – Minimum immunity requirements for STs intended for STs of Category C1	15
Table 5 – Minimum immunity requirements for STs intended for STs of Category C2 and C3.....	16
Table B.1 – STs which has a rated output current less than or equal to 16 A.....	30
Table B.2 – STs which has a rated output current greater than 16 A	30
Table C.1 – Limits of signal ports.....	31

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 is intended as a product standard allowing the EMC conformity assessment of products of categories C1, C2 and C3 as defined in Clause 4, before placing them on the market. Equipment of category C4 is treated as a fixed installation. Checking is generally done after installation in its final place of use. Sometimes partial checking may be done before. See Annex E. 

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.

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.

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*

IEC 61000-3-2:2000, *Electromagnetic compatibility (EMC) – Part 3-2: Limits – Limits for harmonic current emissions (equipment input current ≤ 16 A per phase)* ²
Amendment 1 (2001)
Amendment 2 (2004)

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

IEC 61000-4-2:1995, *Electromagnetic compatibility (EMC) – Part 4-2: Testing and measurement techniques – Electrostatic discharge immunity test* ³
Amendment 1 (1998)
Amendment 2 (2000)

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

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

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

³ A consolidated edition 1.2 exists, including IEC 61000-4-2:1995, its Amendment 1 (1998) and its Amendment 2 (2000) .

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

IEC 61000-4-5:1995, *Electromagnetic compatibility (EMC) – Part 4-5: Testing and measurement techniques – Surge immunity test*⁵
Amendment 1 (2000)

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

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

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

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*

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*

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]

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

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

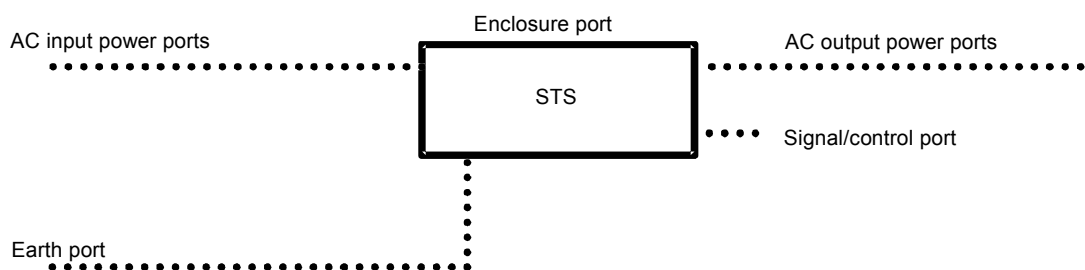
port

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.

For *in situ* testing, see Annex E.

5.2.2 Documentation for the purchaser/user

- a) The purchaser/user shall be informed if special measures have to be taken to achieve compliance, for example the use of shielded or special cables. Any restriction on the length of the a.c. output cables shall also be indicated.
- b) A STS offered with accessories shall comply with the requirements of this standard. A list of emission complying accessories for the STS shall be made available to the purchaser/user upon request.