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Incorporating corrigendum June 2012



BSI Standards Publication

Electromagnetic compatibility — Product family standard for audio, video, audio-visual and entertainment lighting control apparatus for professional use —

Part 2: Immunity

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National foreword

This British Standard is the UK implementation of EN 55103-2:2009. It supersedes BS EN 55103-2:1997, which will be withdrawn on 1 July 2012.

The UK participation in its preparation was entrusted by Technical Committee GEL/210, EMC - Policy committee, to Subcommittee GEL/210/11, EMC product standards.

A list of organizations represented on this subcommittee can be obtained on request to its secretary.

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EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN 55103-2

July 2009

ICS 33.100.20

Supersedes EN 55103-2:1996

English version

**Electromagnetic compatibility -
Product family standard for audio, video, audio-visual
and entertainment lighting control apparatus for professional use -
Part 2: Immunity**

Compatibilité électromagnétique -
Norme de famille de produits
pour les appareils à usage professionnel
audio, vidéo, audiovisuels et de
commande de lumière pour spectacles -
Partie 2: Immunité

Elektromagnetische Verträglichkeit -
Produktfamilienorm für Audio-, Video-
und audiovisuelle Einrichtungen sowie
für Studio-Lichtsteuereinrichtungen
für professionellen Einsatz -
Teil 2: Störfestigkeit

This European Standard was approved by CENELEC on 2009-07-01. 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.

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CENELEC

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

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Foreword

This European Standard was prepared by the Technical Committee CENELEC TC 210, Electromagnetic compatibility (EMC).

The text of the draft was submitted to the formal vote and was approved by CENELEC as EN 55103-2 on 2009-07-01.

This European Standard supersedes EN 55103-2:1996.

The following dates were fixed proposed:

- latest date by which the EN has to be implemented
at national level by publication of an identical
national standard or by endorsement (dop) 2010-07-01
- latest date by which the national standards conflicting
with the EN have to be withdrawn (dow) 2012-07-01

This European Standard has been prepared under a mandate given to CENELEC by the European Commission and the European Free Trade Association and covers protection requirements of EC Directive 2004/108/EC. See Annex ZZ.

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1 Scope

This European Standard for EMC immunity requirements applies to professional audio, video, audio-visual and entertainment lighting control apparatus as defined in 3.6 intended for use in the environments described in Clause 4. This includes the digital apparatus defined in 3.5 and sub-assemblies, see 7.4.

Disturbances in the frequency range 0 Hz to 400 GHz are covered, but requirements are not established over the whole of that range.

NOTE 1 In Annex C, information is included on infra-red radiation in the wavelength range 0,7 μm to 1,6 μm .

The objective of this standard is to define the immunity test requirements, test signals, performance criteria and test methods for apparatus defined in the scope, in relation to electromagnetic immunity to continuous and transient conducted and radiated electromagnetic disturbances including electrostatic discharges. These test requirements represent essential electromagnetic compatibility requirements.

Fault conditions of source or victim apparatus are not taken into account.

Apparatus as defined in 3.4, 3.5 and 3.6 may be operated with any source of power.

NOTE 2 Sources of power may include, for example: the public low-voltage supply; private supplies with similar characteristics; a d.c. source provided specifically for the apparatus; batteries internal to the apparatus; stand-by generators. Some standards may not apply to private low-voltage supplies.

NOTE 3 If it is intended to use a hand-held transmitter in proximity, additional mitigation measures may have to be employed to increase the electromagnetic immunity further, beyond the specified limits.

This European Standard does not apply to

- consumer apparatus,
- apparatus specifically designed for security systems,
- apparatus designed to radiate electromagnetic energy for radio communications purposes.

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.

EN 55020	2007	<i>Sound and television broadcast receivers and associated equipment - Immunity characteristics - Limits and methods of measurement</i> (CISPR 20:2006)
EN 61000-3-2	2006	<i>Electromagnetic compatibility (EMC) - Part 3-2: Limits - Limits for harmonic current emissions (equipment input current ≤ 16 A per phase)</i> (IEC 61000-3-2:2005)
EN 61000-4-2	1995	<i>Electromagnetic compatibility (EMC) - Part 4-2: Testing and measurement techniques - Electrostatic discharge immunity test</i> (IEC 61000-4-2:1995 + A1:1998 + A2:2000)
+ A1	1998	
+ A2	2001	
EN 61000-4-3	2006	<i>Electromagnetic compatibility (EMC) - Part 4-3: Testing and measurement techniques - Radiated, radio-frequency, electromagnetic field immunity test</i> (IEC 61000-4-3:2006 + A1:2007)
+ A1	2008	
EN 61000-4-4	2004	<i>Electromagnetic compatibility (EMC) - Part 4-4: Testing and measurement techniques - Electrical fast transient/burst immunity test</i> (IEC 61000-4-4:2004)

EN 61000-4-5	2006	<i>Electromagnetic compatibility (EMC) - Part 4-5: Testing and measurement techniques - Surge immunity test (IEC 61000-4-5:2005)</i>
EN 61000-4-6	2007	<i>Electromagnetic compatibility (EMC) - Part 4-6: Testing and measurement techniques - Immunity to conducted disturbances, induced by radio-frequency fields (IEC 61000-4-6:2003 + A1:2004 + A2:2006)</i>
EN 61000-4-11	2004	<i>Electromagnetic compatibility (EMC) - Part 4-11: Testing and measurement techniques - Voltage dips, short interruptions and voltage variations immunity tests (IEC 61000-4-11:2004)</i>
EN 61000-6-2	2005	<i>Electromagnetic compatibility (EMC) - Part 6-2: Generic standards - Immunity for industrial environments (IEC 61000-6-2:2005)</i>
HD 483.1 S2	1989	<i>Sound system equipment - Part 1: General (IEC 60268-1:1985 + A1:1988)</i>

3 Definitions

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

Definitions related to EMC and to relevant phenomena may be found in the EU Directive on EMC (2004/108/EC), in IEC 60050-161 and in other IEC and CISPR Publications.

3.1

electromagnetic compatibility

the ability of a device, unit of equipment or system to function satisfactorily in its electromagnetic environment without introducing intolerable disturbances to anything in that environment

3.2

port

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

3.3

enclosure port

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

3.4

professional apparatus

apparatus for use in trades, professions or industries and which is not intended for sale to the general public

3.5

professional digital apparatus

professional apparatus designed for the purpose of controlling audio, video, audiovisual or entertainment lighting characteristics, by means of periodic pulsed electrical waveforms, or of processing audio, video or lighting control signals in digital form

3.6

professional entertainment lighting control apparatus

professional apparatus producing electrical control signals for controlling the intensity, colour, nature or direction of the light from a luminaire, where the intention is to create artistic effects in theatrical, television or musical productions and visual presentations

3.7

test report

the documentation of the EMC tests performed, and their results, prepared by the persons who carried out the tests, for example the manufacturer or a test laboratory

3.8

screened-cable port

a signal, control or DC power port on a metal-cased apparatus intended for the termination of a braid-screened cable where provision is made for direct, low impedance connection between the cable screen and the case of the apparatus. Where a connector is used it shall provide either a 360° continuous connection between the screen and the case, or at least four points of connection distributed around the connector aperture

NOTE This definition does not permit single-point earthing of the cable screen nor connection of the screen to the case via any component intended to provide an impedance.

3.9

functional earth port

an earth terminal not marked as a protective earth terminal

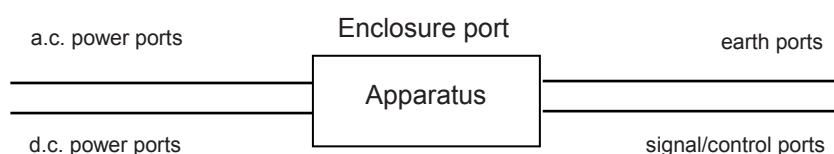


Figure 1 - Examples of ports

4 Electromagnetic environment

Sets of requirements are specified in Clause 6 for the following five environments. The apparatus shall comply with one or more of the sets of requirements. It is the responsibility of the manufacturer to apply the appropriate set or sets of requirements to his apparatus (see 7.1).

- E1** Residential (including both of the location types class 1 and 2 found in IEC 61000-2-5)
- E2** Commercial and light industrial (including, for example, theatres, and television studios which are not purpose-built studios)
- E3** Urban outdoors (based on the definition of location type class 6 in IEC 61000-2-5)
- E4** Controlled EMC environment (for example purpose-built broadcasting or recording studio), and the rural outdoors environment (far away from railways, transmitters, overhead power lines, etc.)

NOTE 1 A controlled EMC environment exists in a building where the installation has been designed having special regard to EMC, and where technical personnel are present with experience of EMC technology.

- E5** Heavy industrial (see EN 61000-6-2); and environments close to broadcast transmitters

NOTE 2 Situations arise where the level of disturbance may exceed the levels specified in this standard for example where an apparatus is installed in proximity to ISM apparatus as defined in EN 55011 or where a hand-held transmitter is used in close proximity to an apparatus. In these instances special mitigation measures may have to be employed.

5 Disturbing phenomena

This standard sets requirements for the following disturbing phenomena (see Table 1):

- 1) RF electromagnetic field;
- 2) electrostatic discharge;
- 3) magnetic fields;

NOTE There are two tests, with a homogenous field (3a) and an inhomogenous field (3b). The inhomogeneous field test is specifically intended to test immunity to fields acting on the surface of rack mounted apparatus and investigates poor screening.

- 4) fast transients, common mode;
- 5) audio frequency common mode;
- 6) RF common mode;
- 7) surges, line-to-line and line-to-earth;
- 8) voltage dips;
- 9) voltage interruptions.

6 Immunity requirements

Apparatus within the scope of this standard shall comply with the requirements of this standard independently of the nature of its source of power. Some example sources are listed in Clause 1. The immunity requirements are shown in Table 1.

Table 1 - Immunity requirements

Port	Pheno- menon	Frequency range	Test levels E1 to E3		Test levels E4	Test levels E5	Applicable standard	Perform- ance Criterion	Notes	List of notes
Enclosure	1 RF electro- magnetic field	80 MHz to 1 000 MHz	3 V/m		1 V/m	10 V/m	EN 61000-4-3	A	1 & 2	1. For broadcast radio and television receivers, EN 55020 applies. 2. The carrier signal is amplitude modulated to a depth of 80 % by a 1 kHz sine wave. The test levels are set up with the carrier signal unmodulated.
		1,4 GHz to 2,0 GHz	3 V/m		no test	3 V/m				
		2,0 GHz to 2,7 GHz	1 V/m		no test	1 V/m				
	2 Electro- static discharge	Not applicable	4 kV contact 8 kV air		2 kV contact 4 kV air	4 kV contact 8 kV air	EN 61000-4-2	B	--	3. Applicable only to apparatus NOT intended for rack-mounted applications. Homogeneous/pseudo-homogeneous magnetic field decreasing linearly with the logarithm of frequency from 50 Hz to 5 kHz and constant from 5 kHz to 10 kHz (see A.3 and A.4 for details of test configuration). CRT disturbance is permitted above 1A/m
	3a Magnetic field, homo- genous	50 Hz to 10 kHz	E1 1 A/m to 0,01 A/m 50 Hz to 5 kHz	E2 and E3 3 A/m to 0,03 A/m 50 Hz to 5 kHz	0,8 A/m to 0,008 A/m 50 Hz to 5 kHz 0,008 A/m 5 kHz to 10 kHz	10 A/m to 0,1 A/m 50 Hz to 5 kHz 0,1 A/m 5 kHz to 10 kHz	Annex A	A	4. Applicable only to apparatus intended for rack-mounted applications. Inhomogeneous magnetic field decreasing linearly with the logarithm of frequency from 50 Hz to 500 Hz and constant from 500 Hz to 10 kHz (see A.5). Apparatus used in close proximity to television monitors shall be tested at 15,625 kHz using the 10 kHz limit. CRT disturbance is permitted above 3 A/m.	
	3b Magnetic field, inomo- genous	50 Hz to 10 kHz	4 A/m to 0,4 A/m, 50 Hz to 500 Hz 0,4 A/m, 500 Hz to 10 kHz						4	

Table 1 - Immunity requirements (continued)

Port	Phenomenon	Frequency range	Test levels E1 to E3	Test levels E4	Test levels E5	Applicable standard	Performance Criterion	Notes	List of notes
Signal and control	4 Fast transients common-mode	Not applicable	0,5 kV peak		1 kV peak	EN 61000-4-4	B	5 & 6	5. Applicable only to ports interfacing with cables whose total length according to the manufacturer's functional specification may exceed 3 m. 6. T_P/T_R : 5 ns/50 ns; repetition frequency 5 kHz.
	5 AF common-mode	50 Hz to 10 kHz	See Annex B	See Annex B		Annex B	A	7	7. Applicable only to balanced ports to which may be attached cables whose total length according to the manufacturer's functional specification may exceed 10 m. See Annex B for limits for video, data and control ports. Balanced antenna ports are excluded from this requirement. For balanced signal or control ports intended to be connected to PSTN or similar lines; refer to the appropriate ETSI or CENELEC immunity standard.
	6 RF common-mode	0,15 MHz to 80 MHz							8. Screened-cable ports as defined in 3.8 are deemed to comply with the requirements for this phenomenon without testing. 9. Applicable only to ports interfacing with cables whose total length according to the manufacturer's functional specification may exceed 1 m. 10. For antenna ports, refer to EN 55020. 11. Source impedance = 150 Ω . 12. Apparatus having a single cable port shall be tested with a 150 Ω common-mode impedance network in the cable to the port under test and an artificial hand in contact with the EUT. For all other apparatus two 150 Ω common-mode impedance networks shall be used, one in the cable under test and one in the power connection to the EUT. Where there is no input power port, the second 150 Ω common-mode impedance network shall terminate a second signal or control port. The test setup for screened cables on mains-powered apparatus shall be in accordance with Figure 5b of EN 61000-4-6; any cables other than the mains input and the cable under test (e.g. other cables for monitoring or exercising the EUT) shall be decoupled via networks meeting the requirements of 6.2.4 of EN 61000-4-6. Unscreened signal or control cables shall be tested either with a suitable 150 Ω CDN, or with the combination of a current clamp and a 150 Ω common-mode impedance network.

Table 1 - Immunity requirements (continued)

Port	Phenomenon	Frequency range	Test levels E1 to E3	Test levels E4	Test levels E5	Applicable standard	Performance Criterion	Notes	List of notes
DC power, input and output	4 Fast transients	Not applicable	0,5 kV peak		--	EN 61000-4-4	B	5, 6, 13 & 14	13. Use capacitive clamp; not applicable to input ports intended for connection to d.c. power supplies intended to be used only with the apparatus under test.
					2 kV peak			6 & 15	14. This test need not be carried out where apparatus is intended to be used with an a.c./d.c. adaptor, with or without rechargeable batteries, provided that phenomenon 6 is tested using the recommended a.c./d.c. adaptor.
									15. Not applicable to input ports intended for connection to a battery or rechargeable battery which must be removed or disconnected from the apparatus for recharging.
AC power, input and output	6 RF common-mode	0,15 MHz to 80 MHz	3 V		10 V	EN 61000-4-6	A	2, 9, 10, 11 & 12	
	4 Fast transients	Not applicable	1 kV peak	0,5 kV peak	2 kV peak	EN 61000-4-4	B	6 & 16	16. CDN for input ports, see EN 61000-4-4, and capacitive clamp for output ports.
	6 RF common-mode	0,15 MHz to 80 MHz	3 V	1 V	10 V	EN 61000-4-6	A	2, 11 & 17	17. The port under test shall be connected to a suitable 150 Ω CDN and one other cable port shall be terminated via a second 150 Ω common-mode impedance network; any other cables (e.g. cables for monitoring or exercising the EUT) shall be decoupled via networks meeting the requirements of 6.2.4 of EN 61000-4-6. The configuration of the cables and EUT with respect to the ground plane shall be as shown in Figure 5b of EN 61000-4-6, except that the dimensions shown in the figure for the position of the injection point shall apply to the CDN connected to the port under test.