



SLOVENSKI STANDARD

SIST EN 55103-2:1998

01-september-1998

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

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

Elektromagnetische Verträglichkeit - Produktfamilienorm für Audio-, Video- und audiovisuelle Einrichtungen sowie für Studio-Lichtsteuereinrichtungen für professionellen Einsatz -- Teil 2: Störfestigkeit (standards.iteh.ai)

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

Ta slovenski standard je istoveten z: EN 55103-2:1996

ICS:

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33.160.01	Avdio, video in avdiovizualni sistemi na splošno	Audio, video and audiovisual systems in general

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EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN 55103-2

November 1996

ICS 29.020

Descriptors: Electromagnetic compatibility, video equipment, radio equipment, control equipment, lighting, theatres, specifications, tests, radio disturbances, operating requirements

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
Produktfamiliennorm für Audio-, Video- und audiovisuelle Einrichtungen sowie für Studio-Lichtsteuereinrichtungen für den professionellen Einsatz
Teil 2: Anforderungen an die Störfestigkeit

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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.

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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 SC 210A, EMC products, of Technical Committee CENELEC TC 210, EMC.

Compliance with this standard may be used to demonstrate presumption of compliance with the protection requirements in the EMC Directive (89/336/EEC).

The text of the draft was submitted to a formal vote and was approved by CENELEC as EN 55103-2 on 1996-07-02.

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) 1997-03-01

- latest date by which the national standards conflicting with the EN have to be withdrawn

(dow) 1999-09-01

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1 Scope

This standard for EMC immunity requirements applies to professional audio, video, audio-visual and entertainment lighting control apparatus as defined in clause 4 intended for use in the environments described in clause 5. This includes the digital apparatus defined in 4.5 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 .

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

Apparatus as defined in 4.4, 4.5 and 4.6 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.

NOTE 3: In special cases, for instance if it is intended to use a hand-held transmitter in proximity, additional mitigative measures may have to be employed to increase the electromagnetic immunity further beyond the specified limits.

This 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

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of the publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

The information in the forewords of the European Standards below concerning application and withdrawal with respect to both dates and equipment, replaces the corresponding information in the foreword of this standard.

International Standard	Year	Title	European Standard	Year
—		Electromagnetic compatibility – Generic immunity standard.	EN 50082-1	
—		Part 1: Residential, commercial and light industrial.		
IEC 50(161)	1990	Part 2: Industrial environment. International Electrotechnical Vocabulary. Chapter 161: Electromagnetic Compatibility.	EN 50082-2	
—		Electromagnetic immunity of broadcast receivers and associated equipment.	EN 55020	1994
IEC 268-1		Sound system equipment/ Part 1: general.	HD 483.1	
IEC 268-3		Sound system equipment/ Part 3: amplifiers.	HD 483.3	
IEC 1000-2-5		Part 2: Environment – Section 5: Classification of electromagnetic environments.	—	
IEC 1000-3-2		Part 3: Limits – Section 2: Limits for harmonic currents emissions (equipment input current up to 16 A and including 16 A per phase).	EN 61000-3-2	
IEC 1000-4-2		Part 4: Testing and measurement techniques – Section 2: Electrostatic discharge immunity test.	EN 61000-4-2	
IEC 1000-4-3 (mod)		Section 3: Radiated, radio-frequency electromagnetic field immunity test.	EN 61000-4-3	
IEC 1000-4-4		Section 4: Electrical fast transient/burst immunity test.	EN 61000-4-4	
IEC 1000-4-5		Section 5: Surge immunity test.	EN 61000-4-5	
IEC 1000-4-6		Section 6: Immunity to conducted disturbances induced by radio-frequency fields.	EN 61000-4-6	
IEC 1000-4-11		Section 11: Voltage dips, short interruptions and voltage variations – immunity tests.	EN 61000-4-11	
ITU/R 500-4		Method for the subjective assessment of television pictures.	—	
ITU/R 562-3		Subjective assessment of sound quality.	—	

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3 Objective

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.

4 Definitions

Definitions related to EMC and to relevant phenomena may be found in the EU Directive on EMC (89/336/EEC), in Chapter 161 of IEC 50 and in other IEC and CISPR Publications.

The following particular definitions are used in this standard.

- 4.1 **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.
- 4.2 **port:** Particular interface of the specified apparatus with the external electromagnetic environment (see figure 1).
- 4.3 **enclosure port:** The physical boundary of the apparatus through which the electromagnetic fields may radiate or penetrate.
- 4.4 **professional apparatus:** Apparatus for use in trades, professions or industries and which is not intended for sale to the general public.
- 4.5 **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.
- 4.6 **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, televisual or musical productions and visual presentations.
- 4.7 **test report:** The documentation of the EMC tests performed and their results, according to 7.2, prepared by the persons who carried out the tests, for example the manufacturer or a test laboratory.
- 4.8 **functional earth port:** Any single-conductor earth terminal not marked as a protective earth terminal.

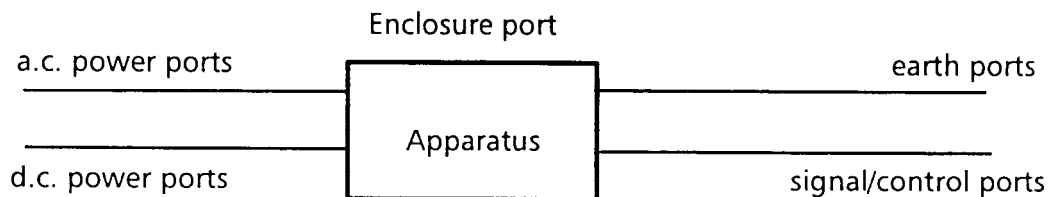


Figure 1: Examples of ports

5 Electromagnetic environment

Sets of requirements are specified in clause 9 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 8.1).

- E1 Residential (including both of the location types class 1 and 2 found in IEC 1000-2-5)
- E2 Commercial and light industrial (including, for example, theatres)
- E3 Urban outdoors (based on the definition of location type class 6 in IEC 1000-2-5)
- 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: Some studio environments correspond to E2.

- E5 Heavy industrial (see EN 50082-2); 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 mitigative measures may have to be employed.

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6 Disturbing phenomena

This standard sets requirements for the following disturbing phenomena (see tables 1 and 2)

- 1 enclosure port; amplitude modulated r.f. electromagnetic fields, 80 MHz to 1 000 MHz;
- 2 enclosure port; electrostatic discharge;
- 3 enclosure port; magnetic fields, 50 Hz to 10 kHz;

NOTE: The inhomogeneous test is specifically intended to test immunity to fields acting on the surface of rack mounted apparatus and investigates poor screening.
- 4 signal and control ports; fast transients, common mode;
- 5 signal and control ports; 50 Hz to 10 kHz, audio frequency common mode;
- 6 signal and control ports; a.m. r.f. common mode; 0,15 MHz to 80 MHz;
- 7 input and output d.c. power ports; fast transients, common mode;
- 8 input and output d.c. power ports; a.m. r.f. common mode, 0,15 MHz to 80 MHz;
- 9 input and output a.c. power ports; fast transients, common mode;
- 10 input a.c. power ports; voltage dips;
- 11 input a.c. power ports; voltage interruptions;
- 12 input a.c. power ports; surges, common mode and differential mode;
- 13 input and output a.c. power ports; a.m. r.f. common mode, 0,15 MHz to 80 MHz;
- 14 functional earth port; a.m. r.f. common mode, 0,15 MHz to 80 MHz;
- 15 functional earth port; fast transients, common mode.

7 Testing

7.1 Performance Criteria

The variety and diversity of the apparatus within the scope of this standard make it difficult to define precise criteria for the evaluation of the immunity test results. Guidance as to the characteristics of apparatus which may be degraded by inadequate immunity is given in annex D.

Apparatus shall not become dangerous or unsafe as a result of the application of the tests defined in this standard.

The manufacturer shall provide details, which shall be noted in the test report, of any degradation of performance or loss of function, during or as a consequence of each test, based on the following criteria:

Performance criterion A: The apparatus shall continue to operate as intended. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended. The performance level may be replaced by a permissible loss of performance. If the minimum performance level or the permissible performance loss is not specified by the manufacturer, then either of these may be derived from the product description and documentation (including leaflets and advertising) and what the user may reasonably expect from the apparatus if used as intended.

Performance criterion B: The apparatus shall continue to operate as intended after the test. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended. The performance level may be replaced by a permissible loss of performance. During the test, degradation of performance is, however, allowed. No change of actual operating state or stored data is allowed. If the minimum performance level or the permissible performance loss is not specified by the manufacturer, then either of these may be derived from the product description and documentation (including leaflets and advertising) and what the user may reasonably expect from the apparatus if used as intended.

Performance criterion C: Temporary loss of function is allowed, provided that normal function is automatically restored when the test stimulus is removed, or can be restored by operation of the controls.

It is permissible for the manufacturer to specify loss of performance by using the five point impairment scale defined in ITU/R Recommendations 500-4 or 562-3.

NOTE: Examples and further information are given in annex D.

7.2 General

In this standard, reference is made to reproducible laboratory conditions which may not always accurately represent conditions found in practice.

It may be determined from consideration of the electrical characteristics and usage of a particular apparatus that some tests are inappropriate and therefore unnecessary. In such a case it is required that the decision and justification not to test shall be recorded in the test report.

The tests shall be made in the most susceptible operating mode for the phenomenon being investigated in accordance with the manufacturer's instructions. The configuration of the test sample shall be varied to achieve maximum susceptibility.

If the apparatus is part of a system, or can be connected to auxiliary apparatus, then the apparatus shall be tested while connected to the minimum configuration of auxiliary apparatus necessary to exercise the ports in a similar manner to that described in EN 55022.

In cases where a manufacturer's specification specifically requires external protection devices or measures which are clearly specified in the user's manual, then the test requirements of this standard shall be applied with the external protection devices or measures in place.

The configuration and mode of operation during testing shall be precisely noted in the test report. It is not always possible to test every function of the apparatus, in such cases the most critical mode of operation shall be selected. Where applicable, test programs and software shall be chosen so as to exercise all normal modes of operation of the apparatus under test. The use of special exercising software is permitted provided that it can be shown that the apparatus under test is being comprehensively exercised in its normal operating modes.

Tests shall be performed in well-defined and reproducible conditions for each type of test stimulus. The tests shall be carried out one by one in sequence, the sequence being optional. Each test or series of associated tests of one phenomenon shall be carried out under a single set of environmental conditions within the specified operating environmental range of the apparatus and at its rated supply voltage, unless otherwise specified in this standard or the relevant Basic Standard.

NOTE 1: The test methods and stimuli are given in the standards (Basic Standards, where they exist) which are referred to in table 1. Any necessary modifications or additional information needed for the practical application of the tests are specified in this standard.

Audio frequency interference voltages shall be measured using the quasi-peak meter and psophometric weighting specified in HD 483.1 unless the manufacturer's specification states these voltages as A-weighted values or A-weighted levels in decibels (see HD 483.1).

NOTE 2: The two methods of measurement may give differences in values which range, when expressed in decibels, from nearly zero to 14 dB or more, depending on the waveform of the voltage.

If a magnetic or common mode signal/control port disturbance within the effective frequency range of the apparatus under test can cause the rated output level of the apparatus under test to be exceeded at the test level specified in this standard, the controls of the apparatus under test shall be set, or its operating mode chosen, so as to prevent this overloading (if possible) and the manufacturer shall state these settings or choice. If such a setting or choice is not possible, the manufacturer shall state that special precautions may be necessary to reduce the level of the relevant disturbance impinging on the apparatus, and shall state the highest level of disturbance that the apparatus can tolerate, together with the performance, or degradation from undisturbed performance, which that level produces.

7.3 Ports

Tests shall be made on the relevant ports of the apparatus in accordance with table 1. Tests shall only be carried out if the relevant port exists. If the apparatus has a large number of ports or ports with many similar connections, then a sufficient number shall be selected to simulate actual operating conditions and to ensure that all the different types of termination are covered.

Interconnecting cables should be of the type specified in the individual apparatus requirements. The manufacturer should specify a maximum length for cables. Where it is reasonable, this length shall be used for testing.

Where there are multiple interface ports all of the same type, connecting a cable to just one of that type of port is sufficient provided it can be shown that additional cables do not significantly affect the results. It is important that where any simulator is used instead of an actual interfacing apparatus, it properly represents the electrical and, if necessary, the mechanical characteristics of the interfacing apparatus, especially in respect of r.f. signals and impedances.

7.4 Sub-assemblies

If the apparatus contains sub-assemblies which are provided with connectors so that they can be moved about within it, an attempt shall be made to minimise the immunity by moving the sub-assemblies, using only configurations specified, or not prohibited, by the manufacturer.

Sub-assemblies intended to be housed in a frame shall be tested while installed in a frame in the manner specified by the manufacturer. The frame shall be populated with a typical collection of sub-assemblies.

A sub-assembly of the types described in the above paragraphs which has been tested and has satisfied the relevant requirements of this standard, shall be deemed to conform to this standard when supplied separately, provided that the manufacturer's documentation states the conditions under which the sub-assembly conforms to this standard.

One module of each type shall be operative in each apparatus evaluated in a test unit; and for system test units, one of each type of apparatus that can be included in the possible system configuration shall be included in the test unit. The results of an evaluation of test units having one of each type of module are deemed to apply to configurations having more than one of those modules or apparatus.

7.5 Racks and cabinets

The combining of items of apparatus individually conforming to this standard into a rack or cabinet does not give rise to additional requirements or a requirement for additional testing.