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Project No. 2021/02480

Responsible committee: GEL/210 EMC Policy and Standards Committee

Interested committees:

Title: Draft BS EN IEC 61000-6-3 Amendment 1 Electromagnetic compatibility (EMC) - Part 6-3: Generic standards - Emission standard for equipment in residential environments

Please notify the secretary if you are aware of any keywords that might assist in classifying or identifying the standard or if the content of this standard

- i) has any issues related to 3rd party IPR, patent or copyright
- ii) affects other national standard(s)
- iii) requires additional national guidance or information

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Introduction

This draft standard is based on national and international discussions. Your comments on this draft are invited and will assist in the preparation of the consequent standard.

For international standards, comments will be reviewed by the relevant UK national committee before sending the consensus UK vote and comments to the international committee, which will then decide appropriate action. If the international standard is approved, it is usual for the text to be published as a British Standard.

For national standards, comments will be reviewed by the relevant UK national committee and the resulting standards published as a British Standard.

UK Vote

Please indicate whether you consider the UK should submit a negative (with supporting technical reasons) or positive vote on this draft. Please indicate if you are aware of any reason why this draft standard should not be published as a British Standard.

Submission of Comments

- **Annotated drafts are not acceptable and will be rejected.**
- All comments should be submitted online at <https://standardsdevelopment.bsigroup.com/>. You will need to register in order to comment.

Template for comments and secretariat observations

Date: xx/xx/20xx	Document: ISO/DIS xxxx
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1	2	(3)	4	5	(6)	7
MB	Clause No./ Subclause No./Annex (e.g. 3.1)	Paragraph/Figure/ Table/Note	Type of comment	Commend (justification for change) by the MB	Proposed change by the MB	Secretariat observations on each comment submitted
	3.1	Definition 1	ed	Definition is ambiguous and needs clarifying.	Amend to read '...so that the mains connector to which no connection...'	
	6.4	Paragraph 2	te	The use of the UV photometer as an alternative cannot be supported as serious problems have been encountered in its use in the UK.	Delete reference to UV photometer.	



CIS/H/451/CD

COMMITTEE DRAFT (CD)

PROJECT NUMBER:

IEC 61000-6-3/AMD1/FRAG2 ED3

DATE OF CIRCULATION:

2022-03-11

CLOSING DATE FOR COMMENTS:

2022-06-03

SUPERSEDES DOCUMENTS:

CIS/H/440/CD, CIS/H/447B/CC

IEC CIS/H : LIMITS FOR THE PROTECTION OF RADIO SERVICES	
SECRETARIAT: Korea, Republic of	SECRETARY: Mr Jung Hwan Hwang
OF INTEREST TO THE FOLLOWING COMMITTEES: SC 77A,CIS/A,CIS/B,CIS/D,CIS/F,CIS/I	PROPOSED HORIZONTAL STANDARD: ☐ Other TC/SCs are requested to indicate their interest, if any, in this CD to the secretary.
FUNCTIONS CONCERNED: ☒ EMC ☐ ENVIRONMENT ☐ QUALITY ASSURANCE ☐ SAFETY	

This document is still under study and subject to change. It should not be used for reference purposes.

Recipients of this document are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.

TITLE:

Amendment 1/Fragment 2: Electromagnetic compatibility (EMC) - Part 6-3: Generic standards - Emission standard for equipment in residential environments

NOTE FROM TC/SC OFFICERS:

Fragment 2 "Conducted Emission Requirements in the frequency Range 9 kHz - 150 kHz" of a total of 4 fragments, which make up maintenance to amendment 1 as explained in CIS/H/439/RR

This CD is circulated in parallel as DC in SC77A.

INTRODUCTION

This introduction is for information of the National Committees only and will not be part of the final standard.

The project for this amendment to IEC 61000-6-3 is based on the following documents:

CIS/H/342/Q, CIS/H/369/RQ on CIS/H/342/Q, 77A/991/Q, 77A/995/RQ on 77A/991/Q.

As a result of these questionnaires a Joint Working Group (CIS/H/JWG-6) between CISPR SC/H and IEC SC/77A has been set up with the objective of preparing fragment 2 of the amendment, with CIS SC/H as leading committee and the following Terms of Reference:

- Developing equipment emission limits in the frequency range 9 kHz – 150 kHz to accommodate the latest amendments to IEC 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 - Basic EMC publication” for this frequency range.
- Developing the methodology for emission measurements against the newly developed limits, possibly using measuring equipment and methods from the CISPR 16 series for both differential mode and common mode disturbances. The suitability of the methodology shall be shown.
- Preparing appropriate implementation in standards, i.e. proposing an amendment to the generic standard – which has a pilot function for the product standards– and preparing the implementation into Product/Product Family standards.

JWG-6 had a number of meetings since 2018.

Additional work has been done in a TF1.

This second CD is based on CIS/H/440/CD (circulated in IEC SC 77A as 77A/1125/DC) and results from the discussion in JWG-6 during its web-meetings December 2021 and February 2022. For detailed comments and observations to the first CD see CIS/H/447B/CC (77A/1135A/INF).

After long, intensive and controversial discussions JWG-6 reached consensus on proposing the following amendment to IEC 61000-6-3, which contains the following main parts:

- Addition of normative requirements for conducted emissions at the low voltage AC mains port in the frequency range 9 kHz – 150 kHz
- Addition of an informative annex (numbered XX in this CD) providing background information about the newly proposed normative limits; the annex contains the following subclauses:
 - XX-1 Background information about the derivation of the normative limits
 - XX-2 Radio Protection Analysis for common mode disturbance injections
 - XX-3 Radio Protection Analysis for differential mode disturbance injections
- Addition of an informative annex (numbered YY in this CD) with recommendations to limit the spectral density of non-intentional emissions (NIE); the annex contains the following subclauses:
 - YY-1 Abbreviations
 - YY-2 Introduction of Integral Voltage Levels (IVL) for the limitation of the spectral density of NIE
 - YY-3 Recommended maximum IVL for NIE
 - YY-4 Rationale for the recommendation of additional limitations on the spectral density of NIE
- Inclusion of all used references to the bibliography

TEXT OF THE AMENDMENT

3.1 Terms and definitions

Add the following new definitions:

3.1.xx**primary function**

any function of an EUT considered essential for the user or for the majority of users

Note 1 to entry: An EUT may have more than one primary function. For example, the primary functions of a basic television set include broadcast reception, audio reproduction and display.

3.1.yy**UPS function**

a part of EUT that provides supplemental power during unintentional mains power supply interruptions

Note 1 to entry: An UPS is an Uninterruptible Power Supply.

3.1.zz**Adjustable speed electric power drive function**

a power drive system function which provides adjustable speed AC or DC motor drives and can convert input and/or output voltages (line-to-line voltage).

3.2 Abbreviated terms

Add the following abbreviations (keeping an alphabetic order):

AV	CISPR-Average detector according to CISPR 16-1-1
BPSK	Binary Phase-Shift Keying
CM	common mode
DM	differential mode
FSK	Frequency-Shift Keying
IVL	Integral Voltage Level
MCE	Mains Communicating Equipment
MCS	Mains Communicating System
NEC2	Numerical Electromagnetics Code 2
NIE	Non-Intentional Emission
OFDM	Orthogonal Frequency-Division Multiplexing
QP	Quasi-Peak detector according to CISPR 16-1-1
UPS	Uninterruptible Power Supply

11 Emission test details

In Table 4 "Requirements for conducted emissions, low voltage AC mains port" replace the row of table clause 4.3 with the following row and add footnote ^a at the end of the table.

Table Clause	Measurement Network	Frequency range MHz	Limits dB(μV)	Measurement Specifications	Limitations and restrictions
			Detector		
...					
4.3	V-AMN	0,009 – 0,05	120,5 – 110 Quasi-peak	Instrumentation, CISPR 16-1-1, Clauses 4 & 6 Networks, CISPR 16-1-2, Clause 4 Method, CISPR 16-2-1, Clause 7 Set-up, CISPR 16-2-1, Clause 7	Impulse noise (clicks) shall be measured and assessed in the frequency range 150 kHz to 30 MHz according to CISPR 14-1.
			104 – 80 ^a Quasi-peak		
		0,15 – 0,5	66 - 56 Quasi-peak		
			56 - 46 Average		
		0,5 – 5	56 Quasi-peak		
			46 Average		
		5 – 30	60 Quasi-peak		
			50 Average		
...					
^a For equipment with a primary function according to 3.1.yy or 3.1.zz, the following limits may be applied: 110 dB(μV) to 82,5 dB(μV) Quasi-peak. When these relaxed limits are applied, it shall be mentioned in the test report and a notification shall be added in the user manual of the equipment, that such equipment has a higher risk of interference and specific measures might be required for its installation and operation, or it might be necessary to disconnect the equipment.					

Renumber the note before table 3 as Note 1.

Add the following note below Table 4:

NOTE 2 See Annex XX for background information about the normative limits in the frequency range 9 kHz – 150 kHz and Annex YY for recommendations to improve compatibility with Mains Communicating Equipment by additional assessments.

Add the following new informative Annex XX

Annex XX (informative)

Background information on the normative limits in the frequency range 9 kHz – 150 kHz

XX.1 Derivation of the normative limits

Starting point for the derivation of limits in the frequency range 9 kHz – 150 kHz in this generic emission standard for residential environment are Amendments 1 and 2 to 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”, published in 2018..

Compatibility levels from 9 kHz to 150 kHz have been defined, after long controversial discussions in IEC SC77A/WG8, under direct supervision of ACEC, to improve EMC for equipment such as mains communicating systems, electricity meters and clocks supplied by public low voltage AC mains supply systems against disturbances generated by equipment such as switching power converters, switch mode power supplies, photovoltaic inverters, etc.

As explained in Annex D of IEC 61000-2-2, the defined compatibility level curve represents the best currently achievable compromise supported by all stakeholders and has been defined for voltage distortion in differential mode.

The task to derive emission limits from these compatibility levels has been given to a Joint Working Group between CISPR SC/H and IEC SC77A (CIS/H/JWG6) with the following Terms of Reference:

- Developing equipment emission limits in the frequency range 9 kHz – 150 kHz to accommodate the latest amendments to IEC 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 – Basic EMC publication” for this frequency range.
- Developing the methodology for emission measurements against the newly developed limits, possibly using measuring equipment and methods from the CISPR 16 series for both differential mode and common mode disturbances. The suitability of the methodology shall be shown.
- Preparing appropriate implementation in standards, i.e. proposing an amendment to the generic standard – which has a pilot function for the product standards – and preparing the implementation into Product/Product Family standards.

Measurements in the 9 kHz to 150 kHz frequency range have been based on the established quasi-peak detector in a 200 Hz bandwidth, as defined in CISPR 16-1-1, with the measuring methods specified in the CISPR 16 series. Accordingly, the same measuring equipment can be used to evaluate both the protection requirements for Mains Communicating Systems and the protection requirements for radio services.

Since the CISPR method is based on the measurement of unsymmetrical voltages (i.e. voltage referenced to earth using the V-AMN, see figure XX.1), the calculation of the limit values is based on the recommendations from the Note in 4.12.1 of IEC 61000-2-2:2002+A1:2017+A2:2018, which is quoted as follows:

“NOTE Based on the following assumptions, an emission margin equal to or higher than 3 dB between the equipment emission limits in differential mode for non-intentional emissions and the corresponding compatibility levels, or a difference

equal to or higher than 9 dB (3 dB for the emission margin + 6 dB for the conversion factor between the unsymmetrical voltages and the voltage in differential mode) between the equipment emission limits for unsymmetrical voltage distortion and the compatibility levels in differential mode given in 4.12.2 and 4.12.3, is sufficient:

- 148 – for each bandwidth of 200 Hz, the probability that the compatibility level is exceeded is lower than 5 %;
- 149 – at a given location, the disturbance level in a same bandwidth of 200 Hz does not result from more than two pieces
- 150 of equipment generating non-intentional emissions close to the emission limit at the same time;
- 151 – non-intentional emissions from different equipment are generated independently from each other.”

The 6 dB conversion factor is based on the very worst-case assumption that the EUT produces only differential mode emission. The compatibility levels in IEC 61000-2-2 are given only for symmetrical voltage (line to neutral) and in this case the measured unsymmetrical voltage is only half of a hypothetically produced 100% symmetrical disturbance voltage. In reality, the unsymmetrical voltage is made by the combination of both differential mode and common mode disturbance voltages. Accordingly, the fixed 6 dB conversion factor gives an additional margin for the protection of mains communicating systems.

159

160 In summary, the normative limits for unsymmetrical voltage in the frequency range 9 kHz – 150 kHz
161 have been set 9 dB lower than the compatibility levels for this frequency range, as suggested in IEC
162 61000-2-2.

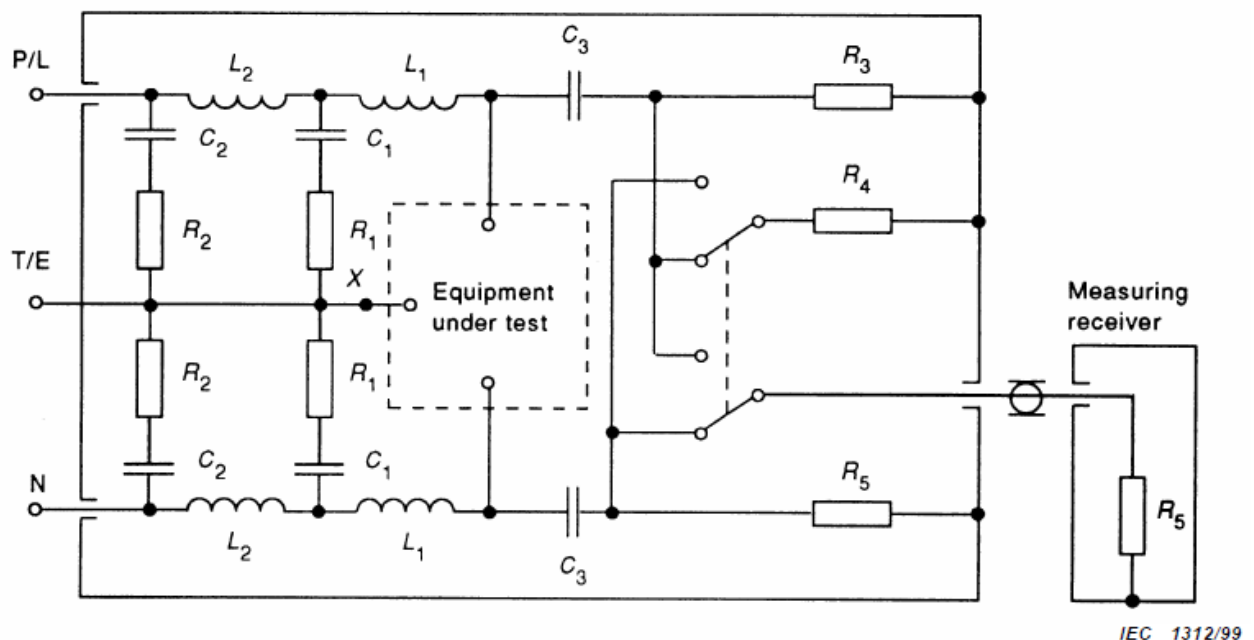


Figure XX.1
Example of a V-AMN according to CISPR 16-1-2, Figure 5

Footnote ^a in Table 4 gives a slight relaxation of the limits for some equipment. This relaxation of the limits is based on the assumption that all of such equipment is not used by more than 5% of all customers connected to the same medium voltage / low voltage transformer. In case of interference generated by equipment, using this relaxation, the supply utility can restrict the connection of such equipment.

For equipment widely used in household environment and consequently expected to be present in a high percentage of residential installations and with several units per household (e.g. lighting equipment), it is recommended to apply the following limits from 50 kHz to 150 kHz: 90 dB(μV) to 80 dB(μV) Quasi-peak, in line with existing limits for lighting equipment in CISPR 15.