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Interested committees:

Title: BS EN 55037 ED1 Industrial, scientific and medical equipment – Radio-frequency disturbance characteristics – Limits and methods for measurements in situ and at defined sites

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

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- 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 Please indicate if you are aware of any reason why this draft standard should not be published as a British Standard.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

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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/B/783/CD

COMMITTEE DRAFT (CD)

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CIS/B/720/NP, CIS/B/721/RVN

IEC CIS/B : INTERFERENCE RELATING TO INDUSTRIAL, SCIENTIFIC AND MEDICAL RADIO-FREQUENCY APPARATUS, TO OTHER (HEAVY) INDUSTRIAL EQUIPMENT, TO OVERHEAD POWER LINES, TO HIGH VOLTAGE EQUIPMENT AND TO ELECTRIC TRACTION

SECRETARIAT:

Japan

SECRETARY:

Mr Hirokazu Tokuda

OF INTEREST TO THE FOLLOWING COMMITTEES:

CIS/A,CIS/H,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

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TITLE:

Industrial, scientific and medical equipment – Radio-frequency disturbance characteristics – Limits and methods for measurements in situ and at defined sites

NOTE FROM TC/SC OFFICERS:

Project title has been changed. Original title: Industrial, scientific and medical equipment - Limits and methods of in situ measurements and measurements of large size/high power equipment

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INTERNATIONAL ELECTROTECHNICAL COMMISSION
INTERNATIONAL SPECIAL COMMITTEE ON RADIO INTERFERENCE

**INDUSTRIAL, SCIENTIFIC AND MEDICAL EQUIPMENT –
RADIO-FREQUENCY DISTURBANCE CHARACTERISTICS –
LIMITS AND METHODS FOR MEASUREMENTS IN SITU
AND AT DEFINED SITES**

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International Standard CISPR 37 has been prepared by CISPR Subcommittee B: Interference relating to industrial, scientific and medical radio-frequency apparatus, to other (heavy) industrial equipment, to overhead power lines, to high voltage equipment and to electric traction.

This International Standard CISPR 37 has the status of a Product Family EMC standard in accordance with IEC Guide 107, *Electromagnetic compatibility – Guide to the drafting of electromagnetic compatibility publications* (2014).

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

The committee has decided that the contents of the base publication and its amendments will remain unchanged until the stability date indicated on the IEC web site under "<http://webstore.iec.ch>" in the data related to the specific publication. At this date, the publication will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or

- 133 • amended.

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INDUSTRIAL, SCIENTIFIC AND MEDICAL EQUIPMENT – RADIO-FREQUENCY DISTURBANCE CHARACTERISTICS – LIMITS AND METHODS FOR MEASUREMENTS IN SITU AND ON DEFINED SITES

1 Scope

This International Standard applies to industrial, scientific and medical electrical equipment, operating in the frequency range 0 Hz to 400 GHz and to domestic and similar appliances designed to generate and/or use locally radio-frequency energy.

NOTE 1 This includes equipment connected to high voltage supply network (greater than 1 000 V ac or 1 500 V d.c.), as well as power electronics and energy saving/production equipment. For a non-exhaustive list of equipment types that are in the scope of CISPR 37, see Annex A.

This standard sets out limits and test methods applicable when the measurements are performed in situ or at a defined site.

NOTE 2 In situ means the final installation site (the equipment's location of use), while the defined site is usually on the manufacturer's premises. These two terms are defined in 3.1.5 and 3.1.2, respectively.

CISPR 37 can be used, instead of CISPR 11, for example, for:

- testing equipment that cannot be evaluated on a standard test site (e.g., because of very large size or very high input power requirements); such as atypical equipment (see definition 3.1.1) connected to a low-voltage or high-voltage power supply network, including energy-saving and energy-production equipment;
- evaluation of the equipment's emissions at the intended location of operation;
- measurements on the equipment at its actual installation following an interference complaint;
- measurements on a defined site, when using a standard test site or performing in situ measurements are both impractical.

NOTE 3 For requirements applicable to measurements on defined sites, see Clause 8.

This standard covers emission requirements related to radio-frequency (RF) disturbances in the frequency range of 9 kHz to 400 GHz. Measurements need only be performed in frequency ranges where limits are specified in Clause 6.

For ISM RF applications in the meaning of the definition found in the ITU Radio Regulations (see definition 3.13 of CISPR 11:2015/AMD1:2016/AMD2:2019), this standard covers emission requirements related to radio-frequency disturbances in the frequency range of 9 kHz to 18 GHz.

Requirements for ISM RF lighting equipment and UV irradiators operating at frequencies within the ISM frequency bands defined by the ITU Radio Regulations are contained in this standard (if measured in situ or at a defined site).

Equipment covered by other CISPR product and product family emission standards are excluded from the scope of this standard.

2 Normative references

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

CISPR 11:2015, *Industrial, scientific and medical equipment – Radio-frequency disturbance characteristics – Limits and methods of measurement*

CISPR 11:2015/AMD 1:2016

CISPR 11:2015/AMD 2:2019

- 185 CISPR 16-1-1:2019, *Specification for radio disturbance and immunity measuring apparatus and*
186 *methods – Part 1-1: Radio disturbance and immunity measuring apparatus – Measuring*
187 *apparatus*
- 188 CISPR 16-1-2:2014, *Specification for radio disturbance and immunity measuring apparatus and*
189 *methods – Part 1-2: Radio disturbance and immunity measuring apparatus – Coupling devices*
190 *for conducted disturbance measurements*
191 CISPR 16-1-2:2014/AMD 1:2017
- 192 CISPR 16-1-4:2019, *Specification for radio disturbance and immunity measuring apparatus and*
193 *methods – Part 1-4: Radio disturbance and immunity measuring apparatus – Antennas and test*
194 *sites for radiated disturbance measurements*
195 CISPR 16-1-4:2019/AMD 1:2020
- 196 CISPR 16-2-1:2014, *Specification for radio disturbance and immunity measuring apparatus and*
197 *methods – Part 2-1: Methods of measurement of disturbances and immunity – Conducted*
198 *disturbance measurements*
199 CISPR 16-2-1:2014/AMD 1:2017
- 200 CISPR 16-2-3:2016, *Specification for radio disturbance and immunity measuring apparatus and*
201 *methods – Part 2-3: Methods of measurement of disturbances and immunity – Radiated*
202 *disturbance measurements*
203 CISPR 16-2-3:2016/AMD 1:2019
- 204 CISPR TR 16-2-5:2008, *Specification for radio disturbance and immunity measuring apparatus*
205 *and methods – Part 2-5: In situ measurements for disturbing emissions produced by physically*
206 *large equipment*
- 207 CISPR 16-4-2:2011, *Specification for radio disturbance and immunity measuring apparatus and*
208 *methods – Part 4-2: Uncertainties, statistics and limit modelling – Measuring instrumentation*
209 *uncertainty*
210 CISPR 16-4-2:2011/AMD 1:2014
211 CISPR 16-4-2:2011/AMD 2:2018
- 212 IEC 60050-161:1990, *International Electrotechnical Vocabulary (IEV) – Chapter 161:*
213 *Electromagnetic compatibility*
214 IEC 60050-161:1990/AMD 1:1997
215 IEC 60050-161:1990/AMD 2:1998
216 IEC 60050-161:1990/AMD 3:2014
217 IEC 60050-161:1990/AMD 4:2014
218 IEC 60050-161:1990/AMD 5:2015
219 IEC 60050-161:1990/AMD 6:2016
220 IEC 60050-161:1990/AMD 7:2017
221 IEC 60050-161:1990/AMD 8:2018
222 IEC 60050-161:1990/AMD 9:2019
223 IEC 60050-161:1990/AMD 10:2021
- 224 IEC 60601-1-2:2014, *Medical electrical equipment – Part 1-2: General requirements for basic*
225 *safety and essential performance – Collateral standard: Electromagnetic disturbances –*
226 *Requirements and tests*
227 IEC 60601-1-2:2014/AMD 1:2020
- 228 IEC 60601-2-2:2017, *Medical electrical equipment – Part 2-2: Particular requirements for the*
229 *basic safety and essential performance of high frequency surgical equipment and high*
230 *frequency surgical accessories*
- 231 ITU Radio Regulations (2020), *Radio regulations, Volume 3 – Resolutions and*
232 *recommendations, Resolution no. 63* (available at <https://www.itu.int/pub/R-REG-RR-2020>)

3 Terms, definitions and abbreviations

3.1 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 60050-161, in Clause 3 of CISPR 11:2015/AMD1:2016/AMD2:2019 (except that definition 3.4 therein is replaced by definition 3.1.3 below) and the following apply.

3.1.1

atypical equipment

equipment that cannot be tested on a standard test site because of various reasons, such as excessive size, excessive weight or excessive electrical power requirements

EXAMPLE Large size equipment or high power equipment.

Note 1 to entry: Additional examples of atypical equipment are given in 5.2.

3.1.2

defined site

measurement site with a controlled environment, which does not fully meet the requirements of CISPR 16-1-4, and which is used for measurements on atypical equipment

EXAMPLE A controlled factory environment used for measurements on large medical equipment.

Note 1 to entry: Minimum requirements applicable to defined sites are specified in Clause 8.

Note 2 to entry: Defined sites are usually, but not necessarily, on the manufacturer's premises.

3.1.3

equipment under test (EUT) boundary

imaginary straight line periphery consisting of the smallest simple, convex, geometric figure encompassing the footprint of the equipment under test onto the floor of the radiated disturbance measurement site

Note 1 to entry: All interconnecting cables are included within this boundary.

Note 2 to entry: A plane geometric figure with straight line edges is convex if no line exists that intersects it at more than two points, except when that line includes one of the straight line segments that are the edges of the figure.

Note 3 to entry: The radiated disturbance measurement site can be a standard test site, a defined site, or an in situ location.

Note 4 to entry: For in situ measurements from the outside surface of the wall of the building, structure, or room (see 9.3.4.6), the EUT is that entire building, or room, or structure. In this case, the EUT boundary is the footprint of the exterior walls of the building, structure, or room.

[SOURCE: CISPR 11:2015/AMD1:2016/AMD2:2019, 3.4, modified – addition of the restricting characteristics: *smallest*, *convex*, and *footprint*; addition of three more notes]

3.1.4

EUT volume

right prism with the two bases defined by the EUT boundary and having the smallest height such that it fully encompasses all portions of the actual EUT, including its cables

Note 1 to entry: The test volume is one of several criteria limiting the EUT volume.

[SOURCE: CISPR 16-2-3:2016/AMD1:2019, modified – definition was adapted for radiated disturbance measurements at defined sites]

3.1.5

in situ

in position, at the location where the equipment is permanently installed and used or intended to be used, with the equipment arranged, configured and operational in the exact same manner as for its subsequent, final use

3.1.6

test volume

validated volume within a test facility in which an EUT may be positioned

Note 1 to entry: For defined sites, validation procedures to determine the test volume are specified in this standard.

282 [SOURCE: CISPR 16-2-3:2016/AMD1:2019, modified – removal of the two notes and addition
283 of a new note]

284 **3.2 Abbreviated terms**

285 The following abbreviations, not already provided in 3.1, are used in this standard.

286	EDM	electro-discharge machining
287	EMC	electromagnetic compatibility
288	EUT	equipment under test
289	ISM	industrial, scientific or medical
290	ITU	International Telecommunication Union
291	LPDA	log-periodic dipole array
292	MRT	magnetic resonance tomography
293	OATS	open area test site
294	RF	radio frequency
295	SAC	semi-anechoic chamber

296 **4 Frequencies designated for ISM use**

297 Clause 4 of CISPR 11:2015/AMD1:2016/AMD2:2019 shall apply.

298 **5 Classification of equipment**

299 **5.1 General**

300 Clause 5 of CISPR 11:2015/AMD1:2016/AMD2:2019 shall apply.

301 **5.2 Atypical equipment**

302 Per definition 3.1.1, equipment is classified as atypical if it cannot be tested on a standard test
303 site.

304 NOTE 1 A standard test site is one that complies with the requirements specified in CISPR 16-1-4, such as an open
305 area test site (OATS) or a semi-anechoic chamber (SAC).

306 Some examples of atypical equipment are:

- 307 a) equipment that cannot be tested on a standard test site because of excessive size and/or
308 weight;

309 NOTE 2 For example, equipment with a footprint wider than 7 m and/or a height greater than 7 m, such as
310 some types of high intensity therapeutic ultrasound equipment or wind turbines.

- 311 b) equipment that cannot be tested on a standard test site because of excessive electric power
312 supply requirements;

313 NOTE 3 For example, equipment requiring a power supply voltage greater than 1000 V or power supply current
314 greater than 400 A, such as charging stations for vehicles having a power of 200 kVA or greater.

- 315 c) equipment requiring safety-related accommodations, such as for explosive, chemical or
316 radiation hazards, which are not available and cannot be provided on a standard test site.

317 NOTE 4 For example, some types of X-ray equipment, medical proton and heavy ion accelerators.

318 **6 Limits of electromagnetic disturbances**

319 **6.1 General**

320 Measuring apparatus and methods of measurement are specified in Clauses 7, 8 and 9.

321 Where this standard gives options for testing particular requirements with a choice of test
322 methods, compliance may be shown against any of the test methods, using the specified limits
323 with the restrictions provided in the relevant tables. In any situation where it is necessary to

verify an original compliance assessment result, the option originally chosen should be used, for avoiding uncertainties due to applying different test methods.

NOTE The limits have been determined on a probabilistic basis taking into account the likelihood of interference. In cases of interference, additional provisions can be necessary.

The lower limit shall apply at all transition frequencies.

6.2 Group 1 equipment

6.2.1 Limits for conducted disturbances

6.2.1 of CISPR 11:2015/AMD1:2016/AMD2:2019 shall apply.

NOTE While 6.2.1 of CISPR 11:2015/AMD1:2016/AMD2:2019 is specific for standard test sites, the same limits and requirements also apply for measurements in situ and at defined sites.

6.2.2 Limits of electromagnetic radiation disturbance

6.2.2.1 General

The equipment under test shall meet the quasi-peak limits when using a quasi-peak detector.

6.2.2.2 Frequency range 9 kHz to 150 kHz

In the frequency range 9 kHz to 150 kHz limits are not specified.

6.2.2.3 Frequency range 150 kHz to 1 GHz

In the frequency range 150 kHz to 30 MHz limits are not specified.

In the frequency range above 30 MHz the limits refer to the electric field strength component of the electromagnetic radiation disturbance.

The electromagnetic radiation disturbance limits for the frequency range 30 MHz to 1 GHz for group 1, classes A and B equipment are specified in Table 1. Recommendations for the protection of specific safety-related radio services are given in Annex E.

**Table 1 – Electromagnetic radiation disturbance limits
for group 1 equipment measured at the reference distance of 10 m**

Frequency range MHz	class A		class B
	rated power of $\leq 20 \text{ kVA}^a$	rated power of $> 20 \text{ kVA}^{a, b}$	
	Quasi-peak dB($\mu\text{V}/\text{m}$)	Quasi-peak dB($\mu\text{V}/\text{m}$)	Quasi-peak dB($\mu\text{V}/\text{m}$)
30 – 230	40	50	30
230 – 1 000	47	50	37
In case of measurements at a separation distance other than the reference distance of 10 m, the measured data shall be extrapolated to the reference distance using the factors specified in 6.5 for determining compliance. At the transition frequency, the more stringent limit shall apply.			
^a Selection of the appropriate set of limits shall be based on the rated a.c. power stated in the equipment's documentation (e.g. in the installation instructions). ^b These limits apply to equipment with a rated power of $> 20 \text{ kVA}$ and intended to be used at locations where there is a distance greater than 30 m between the equipment and third-party sensitive radio communications. The technical documentation of the equipment shall indicate that this equipment is intended to be used at locations where the separation distance to third party sensitive radio services is $> 30 \text{ m}$. If these conditions are not met, then the limits for $\leq 20 \text{ kVA}$ apply.			

For medical electrical equipment intended to be permanently installed in shielded locations, further provisions with regard to the measurement arrangement and load conditions are found in IEC 60601-1-2.

6.2.2.4 Frequency range 1 GHz to 18 GHz

In the frequency range 1 GHz to 18 GHz limits are not specified.

6.2.2.5 Frequency range 18 GHz to 400 GHz

In the frequency range 18 GHz to 400 GHz limits are not specified.

6.3 Group 2 equipment**6.3.1 Limits for conducted disturbances**

6.3.1 of CISPR 11:2015/AMD1:2016/AMD2:2019 shall apply.

NOTE While 6.3.1 of CISPR 11:2015/AMD1:2016/AMD2:2019 is specific for standard test sites, the same limits and requirements also apply for measurements in situ and at defined sites.

6.3.2 Limits of electromagnetic radiation disturbance**6.3.2.1 General**

The equipment under test shall meet the limits when using a measuring instrument with a peak, quasi-peak or average detector as indicated in the appropriate table.

Up to 30 MHz the limits refer to the magnetic component of the electromagnetic radiation disturbance. Above 30 MHz the limits refer to the electric field strength component of the electromagnetic radiation disturbance.

6.3.2.2 Frequency range 9 kHz to 150 kHz

In the frequency range 9 kHz to 150 kHz limits are not specified.

6.3.2.3 Frequency range 150 kHz to 1 GHz

Except for the designated frequency range listed in Table 1 of CISPR 11:2015/AMD1:2016/AMD2:2019, the electromagnetic radiation disturbance limits for the frequency range 150 kHz to 1 GHz for group 2 class A and class B equipment are specified in Table 2.

For resistance welding equipment, the limits of Table 2 apply in the frequency range 30 MHz to 1 GHz in active mode of operation. In stand-by (or idle) mode, the limits of Table 1 apply.

For class A arc welding equipment, the limits of Table 3 apply in active mode of operation. In stand-by (or idle) mode, the class A limits of Table 1 apply. For class B arc welding equipment, the class B limits of Table 1 apply in active mode of operation and in stand-by (or idle) mode.

For class A EDM equipment the limits of Table 3 apply.

For ISM RF lighting devices operating in dedicated ISM frequency bands (defined by the ITU and listed in Table 1 of CISPR 11:2015/AMD1:2016/AMD2:2019) the class B limits of Table 2 apply.

For high-frequency (HF) surgical equipment, the limits of Table 1 apply. HF surgical equipment shall meet the respective limits when tested in stand-by mode of operation.

Recommendations for the protection of specific safety services are given in Annex E.

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**Table 2 – Electromagnetic radiation disturbance limits
for group 2 equipment measured at the reference distance of 10 m**

Frequency range MHz	class A		class B		
	Electric field	Magnetic field	Electric field		Magnetic field ^b
	Quasi-peak	Quasi-peak	Quasi-peak	Average ^a	Quasi-peak
	dB(µV/m)	dB(µA/m)	dB(µV/m)	dB(µV/m)	dB(µA/m)
0,15 – 0,49	–	57,5	–	–	12,4 to –12,1
0,49 – 1,705	–	47,5	–	–	
1,705 – 2,194	–	52,5	–	–	
2,194 – 3,95	–	43,5	–	–	
3,95 – 5,5	–	18,5	–	–	
5,5 – 14,4	–	18,5	–	–	–12,1 to –0,4
14,4 – 20	–	18,5	–	–	–0,4 to –5,4
20 – 30	–	8,5	–	–	
30 – 47	68	–	30	25	–
47 – 68	50	–	30	25	–
68 – 80,872	63	–	30	25	–
80,872 – 81,848	78	–	50	45	–
81,848 – 87	63	–	30	25	–
87 – 134,786	60	–	30	25	–
134,786 – 136,414	70	–	50	45	–
136,414 – 156	60	–	30	25	–
156 – 174	74	–	30	25	–
174 – 188,7	50	–	30	25	–
188,7 – 190,979	60	–	30	25	–
190,979 – 230	50	–	30	25	–
230 – 400	60	–	37	32	–
400 – 470	63	–	37	32	–
470 – 1 000	60	–	37	32	–
In case of measurements at a separation distance other than the reference distance of 10 m, the measured data shall be extrapolated to the reference distance using the factors specified in 6.5 for determining compliance. At the transition frequency, the more stringent limit shall apply.					
^a The average limit applies to magnetron driven equipment and microwave ovens only. If magnetron driven equipment or microwave ovens exceed the quasi-peak limit at certain frequencies, then the measurement shall be repeated at these frequencies with the average detector and the average limit specified in this table applies. ^b The limit decreases or increases linearly with the logarithm of frequency.					

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**Table 3 – Electromagnetic radiation disturbance limits
for class A EDM and arc welding equipment measured at the reference distance of 10 m**

Frequency range MHz	Quasi-peak dB(µV/m)
30 – 230	80 Decreasing linearly with logarithm of frequency to 60
230 – 1 000	60
In case of measurements at a separation distance other than the reference distance of 10 m, the measured data shall be extrapolated to the reference distance using the factors specified in 6.5 for determining compliance.	

6.3.2.4 Frequency range 1 GHz to 18 GHz

6.3.2.4 of CISPR 11:2015/AMD1:2016/AMD2:2019 shall apply.

NOTE While 6.3.2.4 of CISPR 11:2015/AMD1:2016/AMD2:2019 is specific for standard test sites, the same limits and requirements also apply for measurements in situ and at defined sites.

The reference distance for this frequency range is 3 m. In case of measurements at a separation distance other than the reference distance of 3 m, the measured data shall be extrapolated to the reference distance using the factors specified in 6.5 for determining compliance.

6.3.2.5 Frequency range 18 GHz to 400 GHz

In the frequency range 18 GHz to 400 GHz limits are not specified.

6.4 Group 1 and group 2 equipment measured in situ from the building/structure/room wall

The limits in this subclause only apply to in situ radiated disturbance measurements performed from the outer surface of the exterior wall of the building or structure or room in which the equipment is installed, where this is permitted (see 9.3.4.6). These limits and associated test procedure shall not be used for class B equipment.

Conducted disturbances shall comply with the applicable limits in 6.2.1 or 6.3.1.

The limits given in Table 4 apply to class A group 1 equipment and the limits given in Table 5 apply to class A group 2 equipment.