

INTERNATIONAL STANDARD

NORME INTERNATIONALE



INTERNATIONAL SPECIAL COMMITTEE ON RADIO INTERFERENCE
COMITÉ INTERNATIONAL SPÉCIAL DES PERTURBATIONS RADIOÉLECTRIQUES

AMENDMENT 1
AMENDEMENT 1

Limits and methods of measurement of radio disturbance characteristics of electrical lighting and similar equipment

Limites et méthodes de mesure des perturbations radioélectriques produites par les appareils électriques d'éclairage et les appareils analogues



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INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

COMMISSION
ELECTROTECHNIQUE
INTERNATIONALE

ICS 33.100.10

ISBN 978-2-8322-2387-1

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FOREWORD

This amendment has been prepared by subcommittee CISPR F: Interference relating to household appliances tools, lighting equipment and similar apparatus.

The text of this amendment is based on the following documents:

FDIS	Report on voting
CIS/F/654/FDIS	CIS/F/660/RVD

Full information on the voting for the approval of this amendment can be found in the report on voting indicated in the above table.

The committee has decided that the contents of this amendment and the base publication will remain unchanged until the stability date indicated on the IEC website 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- withdrawn,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
- amended.

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1 Scope

Add, at the beginning of the second existing list, the following new item:

- auxiliaries intended to be built into lighting equipment;

Replace the last existing item of the list and the existing note by the following new text:

- apparatus for which the electromagnetic compatibility requirements in the radio-frequency range are explicitly formulated in other CISPR standards, even if they incorporate a built-in lighting function.

NOTE 1 Examples of exclusions are:

- built-in lighting devices for display back lighting and signalling;
- range hoods, refrigerators, freezers;
- photocopiers, projectors;
- lighting equipment for road vehicles.

Add, after the fourth existing paragraph of this subclause starting with "Multi-function equipment..", the following new paragraph and new note:

For equipment outside the scope of this standard and which includes lighting as a secondary function, there is no need to separately assess the lighting function against this standard, provided that the lighting function was operative during the assessment in accordance with the applicable standard.

NOTE 2 Examples of equipment with a secondary lighting function may be range hoods, fans, refrigerators, freezers, ovens and TV with ambient lighting.

2 Normative references

Add, to the existing list, the following new references:

IEC 60061-1, *Lamp caps and holders together with gauges for the control of interchangeability and safety – Part 1: Lamp caps*

IEC 60921:2004, *Ballasts for tubular fluorescent lamps – Performance requirements*

CISPR 16-2-1:2014, *Specification for radio disturbance and immunity measuring apparatus and methods – Part 2-1: Methods of measurement of disturbances and immunity – Conducted disturbance measurements*

3 Terms and definitions

Add, after the existing definition 3.1, the following new terms and definitions:

3.2

convertor

electrical device to transform the mains voltages, and/or current levels and/or frequency for light sources

3.3

base of the luminaire

side opposite of the optical window of the luminaire or mounting surface in normal use

3.4

optical window

side of the lighting equipment from which the light emanates

3.5

ELV

extra-low voltage

voltage which does not exceed 50 V a.c. or 120 V ripple free d.c. between conductors or between any conductor and earth (voltage band 1 of IEC 60449).

Note 1 to entry: Ripple free is conventionally defined for sinusoidal ripple voltage as ripple content of not more than 10 % r.m.s.: the maximum peak value does not exceed 140 V for a nominal 120 V ripple-free d.c. system.

[SOURCE: IEC 61347-1:2007/AMD1:2010, 3.27]

3.6

restricted ELV lamp

ELV lamp with specific restrictions on the type of control gear and the cable length that can be applied to it as provided by the manufacturer

Note 1 to entry: ELV lamps without detailed description of restrictions are non-restricted.

3.7

passive circuit

electronic circuit not containing any active switching electronic components

Note 1 to entry: A passive circuit is not likely to produce any electromagnetic disturbances. E.g. a mains rectifying diode is considered a passive component.

3.8

secondary function

any function of an equipment not being essential for fulfilling the primary function, defined by the manufacturer

3.9

primary function

function of an equipment which is defined as such by the manufacturer

3.10

semi luminaire

devices (sometimes called adaptors) equipped, on the one side, with any IEC-standardised lamp cap system to allow mounting in a standard incandescent lampholder and, on the other side, with a lampholder to allow the insertion of a replaceable light source with a non-standard cap

Note 1 to entry: A semi luminaire is to be treated as a self-ballasted lamp with a replaceable light source.

4.1 Frequency ranges

Delete the existing note of this subclause.

Table 3b – Radiated disturbance limits in the frequency range 30 MHz to 300 MHz at a measuring distance of 10 m

Replace the existing table and title by the following new table and title:

Table 3b – Radiated disturbance limits in the frequency range 30 MHz to 300 MHz at a measuring distance of 3 m or 10 m

Frequency range MHz	Quasi-peak limits dB(μ V/m) ^a	
	3 m ^{b,c}	10 m ^b
30 to 230	40	30
230 to 300	47	37

^a At the transition frequency, the lower limit applies.

^b Either of the two measurement distances and the associated limits can be applied to demonstrate compliance.

^c Care should be taken when measuring a large EUT at 3 m and at frequencies near 30 MHz due to near field effects.

5.1 General

Replace the second existing paragraph of this subclause by the following new paragraph:

No emission requirements apply to:

- lamps, with the exception of self-ballasted lamps, double-capped self-ballasted lamps and ELV lamps,
- auxiliaries to be built into lighting equipment (see, however, NOTE 2 of 5.3.1 in this respect).

5.3.3.3 Independent convertors

Replace the existing text of this subclause by the following new text:

Independent electronic convertors for incandescent lamps or LED light sources shall comply with the terminal voltage limits given in Tables 2a and 2b; and with the radiated disturbance limits of Table 3b, and if the light is regulated by an external device with separate control lines, the disturbance voltage at the control terminals shall comply with the terminal voltage limits given in Table 2c.

Where the convertor has a non-detachable load supply cable, or where the manufacturer gives strict installation instructions which define the position, type and maximum length of cable(s) to be connected to the lamp(s), then (under these conditions) instead of the terminal voltage limits given in Table 2b, the radiated disturbance limits given in Tables 3a shall be complied with.

5.3.5 Semi-luminaires

Replace in the first existing paragraph of this subclause “with an Edison screw or bayonet cap” by “with an IEC 60061-1 standardized lamp cap”.

5.4 Self-ballasted lamps

Replace in the first existing paragraph of this subclause “with Edison screw or bayonet caps” by “with IEC 60061-1 standardized lamp caps”.

Add, at the end of the existing Subclause 5.11, the following new subclauses:

5.12 Rope lights

5.12.1 General

Rope lights (e.g. Christmas lights, lighting chains), are used for different applications both indoor and outdoor in the areas of general and effect lighting. Depending upon the application and construction, different light sources may be applied e.g. incandescent lamps or LED lamps. The control gear for rope lights may be independent or integrated. Also rope lights without control gear are feasible.

5.12.2 Rope lights without active switching electronic components

Rope lights without active switching electronic components are deemed to comply with the disturbance requirements of this standard without testing.

5.12.3 Rope lights with active switching electronic components

Rope lights with active switching electronic components shall comply with the disturbance voltage limits at mains terminals given in Table 2a. Where the operating frequency of the active switching electronic components exceeds 100 Hz, the EUT shall also comply with the radiated disturbance limits given in Table 3a and Table 3b.

If the rope light is capable of being used in different operating modes e.g. flashing, running illumination, colour shifting etc., then measurements shall be performed in the worst case mode of operation. The worst case shall be found by prescanning every mode of operation over at least one repetition interval of the specific mode.

5.13 Double-capped lamp adapters, double-capped self-ballasted lamps, double-capped semi-luminaires and double-capped retrofit lamps

Requirements and test methods for double-capped lamp adapters, double-capped self-ballasted lamps, double-capped semi-luminaires and double-capped retrofit lamps used in luminaires for linear fluorescent lamps are specified in Annex E.

5.14 Extra-low voltage lamps

ELV lamps shall comply with one of the following requirements:

- a) Extra-low voltage (ELV) lamps without active circuit, as declared by the manufacturer, are deemed to comply with the requirements of this standard without testing.
- b) Extra-low voltage (ELV) lamps with active circuit, intended for connection to symmetrical ELV networks, shall comply with the mains disturbance voltage limits of Table 2a plus 26 dB at the ELV terminals, measured in accordance with the method specified in 8.11, and with the radiated disturbance limits of Tables 3a and 3b, measured in accordance with the method specified in 9.10.

NOTE 1 The insertion loss of the applied control gear is assumed to be 26 dB based on measurements on real configurations.

NOTE 2 Special care is taken that no overloading of the receiver occurs.

NOTE 3 The 26 dB addition shall not be applied to the assessment of radiated disturbances

- c) Restricted ELV lamps with active circuit shall comply with the mains disturbance voltage limits of Table 2a, measured in accordance with the method specified in 8.11, and with the radiated disturbance limits of Tables 3a and 3b, measured in accordance with the method specified in 9.10.

NOTE 4 ELV lamps with active circuit are not intended for the connection to unsymmetrical ELV networks.

8.1.1 Mains terminal voltage measurement

Replace the first existing paragraph of this subclause by the following new paragraph:

The disturbance voltage shall be measured at the mains terminals of the lighting equipment by means of the circuits and arrangements described in Figures 5, 6 and 8 for the relevant type of equipment.

Replace, in the second existing paragraph of this subclause, "20 %" by "0,05 m".

Add, after the second paragraph of this subclause, the following new paragraph:

In case there is a conflict between the distances indicated in Figure 5 to Figure 11 and the cable length specified in this paragraph, then the cable length takes precedence.

8.2 Indoor and outdoor luminaires

Replace the first existing paragraph of this subclause by the following new paragraph:

The measuring circuit is given in Figure 6a and the measurement arrangements in Figure 8.

Replace the fifth existing paragraph of this subclause by the following new text:

One of the following three options for the arrangement of the luminaire can be used:

- a) The luminaire shall be placed on an insulating table, such that the base of the luminaire (the opposite side of the optical window) is on the insulating table at 0,4 m from a horizontal reference ground plane and the light output (optical window) is directed upwards. See Figure 8a;
- b) As a) but rotated 90° around the main axis of the luminaire, the light output directed horizontally away from the reference ground plane. See Figure 8b;
- c) The luminaire shall be placed on an insulating table, such that the base of the luminaire is on the insulating table at least 0,8 m from the floor. The longest side of the luminaire is positioned in parallel with a vertical reference ground plane at a distance of 0,4 m. The light output is directed upwards. See Figure 8c.

For all three arrangements in addition the following applies.

All conductive surfaces other than the reference ground plane shall be separated by at least 0,8 m from the EUT. The reference ground plane shall have dimensions of at least 2 m × 2 m. The reference ground plane shall be bonded to the reference earth of the artificial V-network by a low impedance connection (see CISPR 16-2-1). The cables that run from the AMN and the AAN to the EUT shall be separated 10 cm ± 5 cm except close to the EUT connector.

Delete the sixth existing paragraph starting with "If the measurement is made...".

8.3.1 Directly operating devices

Replace the first existing sentence of the first paragraph by the following new sentence:

The measuring circuit of the regulating device is given in Figure 5 and the measuring arrangement is shown in Figure 8.

Replace the second existing paragraph of this subclause by the following new paragraph:

Unless otherwise specified by the manufacturer, the regulating device shall be measured with one of the following maximum load conditions:

- independent directly operating light regulating devices (e.g. wall dimmers) which are suitable for incandescent lamps and other types of lighting equipment (e.g. self-ballasted lamps) shall be tested with incandescent lamps, or
- independent directly operating light regulating devices which are only suitable for lighting equipment other than incandescent lamps, shall be tested with the appropriate lighting equipment as provided by the manufacturer.

Add, at the end of the existing Subclause 8.9, the following new subclauses:

8.10 Rope lights

The rope lights (not the mains cord, if applicable) are folded on the insulating support as depicted in Figure 9. The support consists of a square insulating plate with dimensions 1 250 mm × 1 250 mm and two rows of 24 circular insulating sticks and positioned as shown in Figure 9. The starting point (mains connection) of the rope is in the middle between the two rows on the left side of the plate.

The insulating support with the rope lights shall be considered a luminaire and shall be arranged as specified in 8.1 and 8.2.

8.11 Extra-low voltage lamps

ELV lamps with active circuit shall be tested as follows:

- a) ELV lamps with active circuit: The extra-low voltage terminals of the ELV lamp shall be connected to the AMN. The mains input side of the AMN is connected to the output of a suitable power supply. See Figure 10.
- b) Restricted ELV lamps with active circuit: The ELV lamp shall be connected to the power supply of the same model/type as specified by the manufacturer. The combination shall be measured using the arrangement as shown in Figure 11.

In both cases, the ELV lamp is mounted in a conical metal housing as described in Figure 7.

Add, at the end of the existing Subclause 9.8, the following new subclauses:

9.9 Rope lights

Rope lights are arranged on the insulating support as specified in 8.10 and Figure 9.

The insulating support with the rope lights shall be considered a luminaire and shall be arranged as specified in 9.1 and 9.2 or Annex B.

9.10 Extra-low voltage lamps

Radiated disturbance measurements of an ELV lamp (if applicable; see 5.14) shall be performed in accordance with 9.1, 9.2 and 9.6. However the lamp shall not be mounted in a conical metal housing.

For any assessment method of the radiated disturbances, the following applies:

- for ELV lamps, only the lamp shall be assessed;
- for restricted ELV lamps, both the lamp and the specific power source shall be assessed.

11 Measurement uncertainty

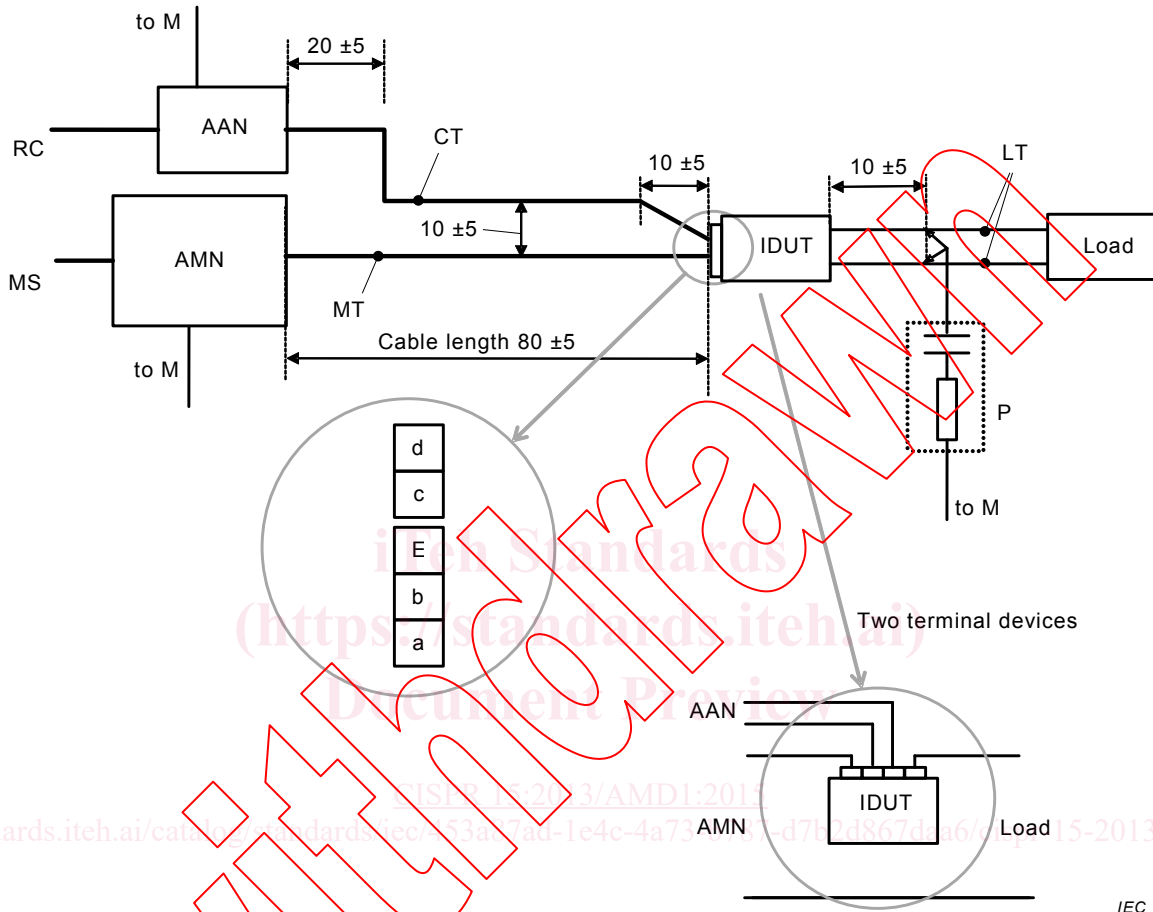
Replace the existing text of this clause by the following new text:

Where guidance for the calculation of the instrumentation uncertainty of a measurement is specified in CISPR 16-4-2 this shall be followed, and for these measurements the determination of compliance with the limits in this standard shall take into consideration the measurement instrumentation uncertainty in accordance with CISPR 16-4-2. Calculations to determine the measurement result and any adjustment of the test result required when the test laboratory uncertainty is larger than the value for U_{CISPR} given in CISPR 16-4-2 shall be included in the test report.

Figure 5 – Measuring arrangements for an independent light regulating device, transformer or convertor

Replace the existing figure, including the key and the title as follows:

Dimensions in centimetres



Key

- MS Mains supply
- AMN 50 Ω/50 μH + 5 Ω (or 50 Ω/50 μH) artificial mains V-network as specified in CISPR 16-1-2
- AAN Asymmetric artificial network
- M CISPR measuring receiver (replaced by 50 Ω if not connected)
- MT Mains terminals
- LT Load terminals
- P Probe ($R \geq 1\,500\ \Omega$ and $C \geq 0,005\ \mu\text{F}$)
- a – b Supply terminals
- E Earth terminal
- IDUT Independent device under test
- CT Control terminals
- RC Remote control (if any)
- c – d Control terminals

The earth of the measuring receiver shall be connected to the artificial mains V-network.

For load terminal voltage measurement the length of the coaxial cable between the probe and the measuring receiver shall not exceed 2 m.

Where a two-terminal device is inserted in only one lead of the supply, measurements shall be made by connecting the second supply lead as indicated in the lower figure.

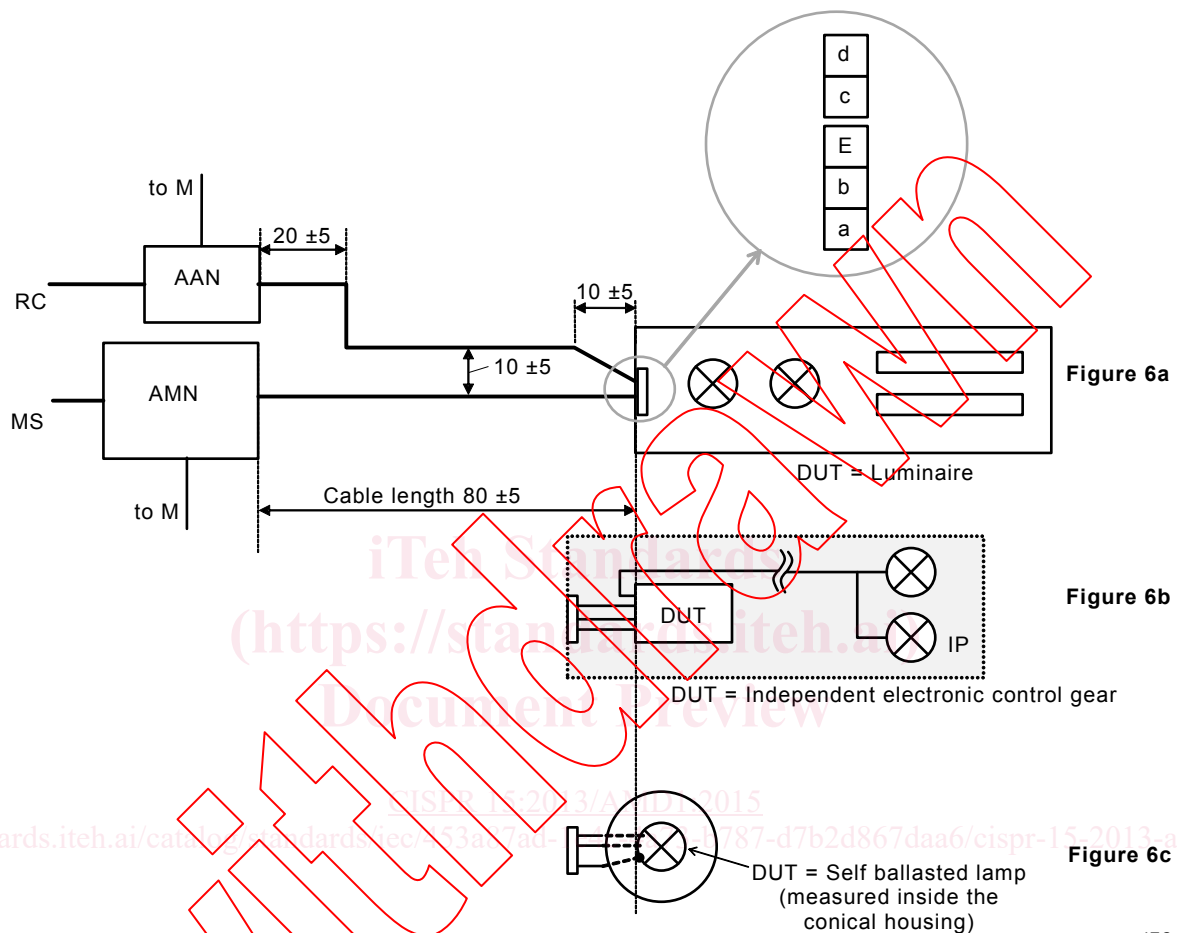
See Figure 8 for details on the arrangement.

Figure 5 – Measuring circuits for an independent light regulating device, transformer or convertor

Figure 6 – Measuring arrangements for measuring a luminaire (Figure 6a), an independent ballast (Figure 6b) and a self-ballasted lamp (Figure 6c)

Replace the existing figure, including the key and the title as follows:

Dimensions in centimetres



Key

- | | | | |
|-------|--|-------|-----------------------|
| AMN | 50 Ω/50 μH + 5 Ω (or 50 Ω/50 μH) artificial mains V-network as specified in CISPR 16-1-2 | M | Measuring receiver |
| AAN | Asymmetric artificial network | C | Conical metal housing |
| MS | Mains supply | | |
| RC | Remote light control | | |
| IP | Piece of insulating material | | |
| a – b | Supply terminals | c – d | Control terminals |
| E | Earth terminal | | |

See Figure 8 for details on the arrangement.

For cable lengths of the mains terminals refer to 8.1.1.

Figure 6 – Measuring circuits for measuring a luminaire (Figure 6a), an independent ballast (Figure 6b) and a self-ballasted lamp (Figure 6c)

Add, after the existing Figure 7, the following new figures:

Dimensions in centimetres

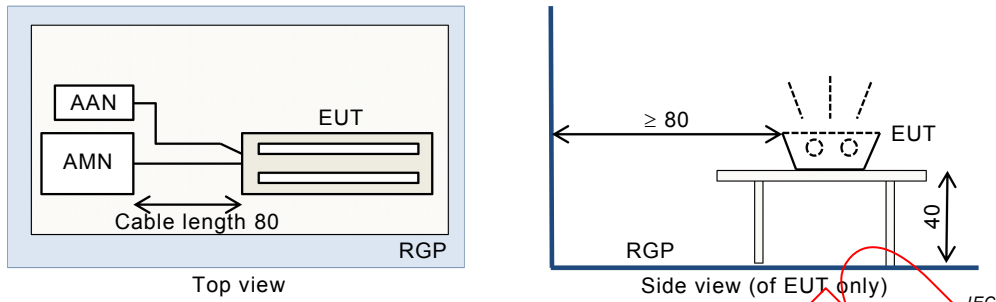


Figure 8a – Horizontal RGP setup (option 1)

Dimensions in centimetres

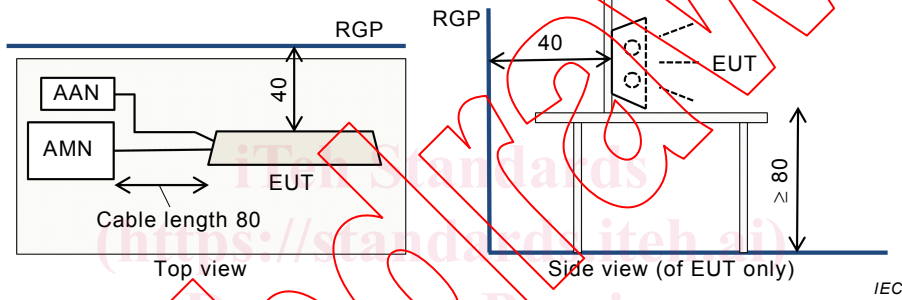


Figure 8b – Vertical RGP setup (option 2)

Dimensions in centimetres

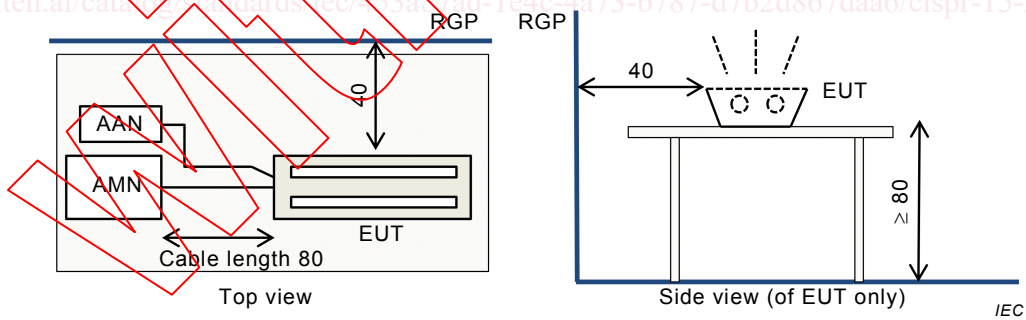


Figure 8c – Vertical RGP setup (option 3)

Figure 8 – Measuring arrangements for conducted disturbances