

**BS EN 55015:2013+A1:2015**

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**BSI Standards Publication**

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

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## National foreword

This British Standard is the UK implementation of EN 55015:2013+A1:2015. It is identical to CISPR 15:2013, incorporating interpretation sheets 1:2013 and 2:2013 and amendment 1:2015. It supersedes BS EN 55015:2013 which will be withdrawn on 1 May 2018.

The start and finish of text introduced or altered by amendment is indicated in the text by tags. Tags indicating changes to CISPR text carry the number of the CISPR amendment. For example, text altered by CISPR amendment 1 is indicated by A1 A1.

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

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| 30 June 2015     | Implementation of CISPR amendment 1:2015 with CENELEC endorsement A1:2015. Annex ZA amended. |
| 30 November 2015 | CISPR Interpretation Sheets in annex deleted.                                                |

EUROPEAN STANDARD  
NORME EUROPÉENNE  
EUROPÄISCHE NORM

**EN 55015:2013+A1**

May 2015

ICS 33.100.10

English version

**Limits and methods of measurement of radio disturbance characteristics  
of electrical lighting and similar equipment**  
(CISPR 15:2013 + IS1:2013 + IS2:2013)

Limites et méthodes de mesure des  
perturbations radioélectriques produites  
par les appareils électriques d'éclairage et  
les appareils analogues  
(CISPR 15:2013 + IS1:2013 + IS2:2013)

Grenzwerte und Messverfahren für  
Funkstörungen von elektrischen  
Beleuchtungseinrichtungen und ähnlichen  
Elektrogeräten  
(CISPR 15:2013 + IS1:2013 + IS2:2013)

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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

The text of document CISPR/F/598/FDIS, future edition 8 of CISPR 15, prepared by CIS/F, "Interference relating to household appliances tools, lighting equipment and similar apparatus", of IEC CISPR, "International special committee on radio interference" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN 55015:2013.

The following dates are fixed:

- latest date by which the document has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2014-03-12
- latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2016-06-12

This document supersedes EN 55015:2006 + A1:2007 + A2:2009.

EN 55015:2013 includes the following significant technical changes with respect to EN 55015:2006:

- inclusion of LED light sources and luminaires, clarification of test supply voltage and frequency, and improvements to Clause 5 relating to the application of limits to the various types of lighting equipment covered under the scope of EN 55015;
- notes relating to Japan in Tables 2a and 3a have been removed;
- introduction of requirements for flashing type emergency lighting luminaires utilizing xenon lamps;
- introduction of requirements for neon and other advertising signs;
- clarification of the requirement for radiated disturbances between 30 MHz and 300 MHz in case the operating frequency of the light source is below 100 Hz.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CENELEC [and/or CEN] shall not be held responsible for identifying any or all such patent rights.

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For the relationship with EU Directive(s) see informative Annex ZZ, which is an integral part of this document.

## Endorsement notice

The text of the International Standard CISPR 15:2013 was approved by CENELEC as a European Standard without any modification.

In the official version, for Bibliography, the following notes have to be added for the standards indicated:

- |                   |      |                                                 |
|-------------------|------|-------------------------------------------------|
| IEC 60598-1:2008  | NOTE | Harmonised as EN 60598-1:2008 (modified).       |
| CISPR 16-2-1:2008 | NOTE | Harmonised as EN 55016-2-1:2009 (not modified). |

## Foreword to amendment A1

The text of document CIS/F/654/FDIS, future CISPR 15:2013/A1, prepared by CISPR SC F "Interference relating to household appliances tools, lighting equipment and similar apparatus" of CISPR "International special committee on radio interference" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN 55015:2013/A1:2015.

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For the relationship with EU Directive 2004/108/EC, see informative Annex ZZ, included in EN 55015:2013.

## Endorsement notice

The text of the International Standard CISPR 15:2013/A1:2015 was approved by CENELEC as a European Standard without any modification.

In the Bibliography of EN 55015:2013, the following note has to be deleted for the standard indicated:

|                   |      |                                                 |
|-------------------|------|-------------------------------------------------|
| CISPR 16-2-1:2008 | NOTE | Harmonised as EN 55016-2-1:2009 (not modified). |
|-------------------|------|-------------------------------------------------|

In the Bibliography of EN 55015:2013, the following notes have to be added for the standards indicated:

|                                            |      |                                                                                                   |
|--------------------------------------------|------|---------------------------------------------------------------------------------------------------|
| IEC 60449                                  | NOTE | Harmonized as HD 193.                                                                             |
| IEC 61347-1:2007<br>+ A1:2010<br>+ A2:2012 | NOTE | Harmonized as EN 61347-1:2008 (modified)<br>+ A1:2011 (not modified)<br>+ A2:2013 (not modified). |

## Annex ZA (normative)

### Normative references to international publications with their corresponding European publications

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.

NOTE 1 When an International Publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

NOTE 2 Up-to-date information on the latest versions of the European Standards listed in this annex is available here: [www.cenelec.eu](http://www.cenelec.eu).

| Publication                                       | Year                         | Title                                                                                                                                                                                                           | EN/HD                  | Year                 |
|---------------------------------------------------|------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|----------------------|
| IEC 60050-161                                     | -                            | International Electrotechnical Vocabulary (IEV) - Chapter 161: Electromagnetic compatibility                                                                                                                    | -                      | -                    |
| IEC 60061-1                                       | -                            | Lamp caps and holders together with gauges for the control of interchangeability and safety - Part 1: Lamp caps                                                                                                 | EN 60061-1             | -                    |
| IEC 60155                                         | -                            | Glow-starters for fluorescent lamps                                                                                                                                                                             | EN 60155               | -                    |
| IEC 60921                                         | 2004                         | Ballasts for tubular fluorescent lamps - Performance requirements                                                                                                                                               | EN 60921               | 2004                 |
| IEC 61000-4-6                                     | 2008                         | Electromagnetic compatibility (EMC) - Part 4-6: Testing and measurement techniques - Immunity to conducted disturbances, induced by radio-frequency fields                                                      | EN 61000-4-6           | 2009                 |
| CISPR 11 (mod) + A1                               | 2009<br>2010                 | Industrial, scientific and medical equipment - Radio-frequency disturbance characteristics - Limits and methods of measurement                                                                                  | EN 55011 + A1          | 2009<br>2010         |
| CISPR 16-1-1 + corr. October + corr. October + A1 | 2010<br>2010<br>2011         | Specification for radio disturbance and immunity measuring apparatus and methods - Part 1-1: Radio disturbance and immunity measuring apparatus - Measuring apparatus                                           | EN 55016-1-1 + A1      | 2010<br>2010         |
| CISPR 16-1-2 + corr. January + A1 + A2            | 2003<br>2009<br>2004<br>2006 | Specification for radio disturbance and immunity measuring apparatus and methods - Part 1-2: Radio disturbance and immunity measuring apparatus - Ancillary equipment - Conducted disturbances                  | EN 55016-1-2 + A1 + A2 | 2004<br>2005<br>2006 |
| CISPR 16-1-4 + corr. December + A1                | 2010<br>2010<br>2012         | Specification for radio disturbance and immunity measuring apparatus and methods - Part 1-4: Radio disturbance and immunity measuring apparatus - Antennas and test sites for radiated disturbance measurements | EN 55016-1-4 + A1      | 2010<br>2012         |
| CISPR 16-4-2                                      | 2011                         | Specification for radio disturbance and immunity measuring apparatus and methods - Part 4-2: Uncertainties, statistics and limit modelling - Measurement instrumentation uncertainty                            | EN 55016-4-2           | 2011                 |

| <u>Publication</u>                          | <u>Year</u>          | <u>Title</u>                                                                                                                                                                             | <u>EN/HD</u>          | <u>Year</u>  |
|---------------------------------------------|----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|--------------|
| CISPR 16-2-1                                | 2014                 | Specification for radio disturbance and immunity measuring apparatus and methods -<br>Part 2-1: Methods of measurement of disturbances and immunity - Conducted disturbance measurements | EN 55016-2-1          | 2014         |
| CISPR 32<br>+ corr. August<br>+ corr. March | 2012<br>2012<br>2012 | Electromagnetic compatibility of multimedia equipment - Emission requirements                                                                                                            | EN 55032<br>+ AC:2012 | 2012<br>2012 |

## **Annex ZZ** (informative)

### **Coverage of Essential Requirements of EU Directives**

This European Standard has been prepared under a mandate given to CENELEC by the European Commission and the European Free Trade Association and within its scope the standard covers protection requirements of Annex I Article 1(a) of the EU Directive 2004/108/EC.

Compliance with this standard provides one means of conformity with the specified essential requirements of the Directives concerned.

**WARNING:** Other requirements and other EU Directives may be applicable to the products falling within the scope of this standard.

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# LIMITS AND METHODS OF MEASUREMENT OF RADIO DISTURBANCE CHARACTERISTICS OF ELECTRICAL LIGHTING AND SIMILAR EQUIPMENT

## 1 Scope

This standard applies to the emission (radiated and conducted) of radiofrequency disturbances from:

- all lighting equipment with a primary function of generating and/or distributing light intended for illumination purposes, and intended either for connection to the low voltage electricity supply or for battery operation;
- the lighting part of multi-function equipment where one of the primary functions of this is illumination;
- independent auxiliaries exclusively for use with lighting equipment;
- UV and IR radiation equipment;
- neon advertising signs;
- street/flood lighting intended for outdoor use;
- transport lighting (installed in buses and trains).

Excluded from the scope of this standard are:

-  auxiliaries intended to be built into lighting equipment; 
- lighting equipment operating in the ISM frequency bands (as defined in Resolution 63 (1979) of the ITU Radio Regulation);
- lighting equipment for aircraft and airports;
-  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. 

The frequency range covered is 9 kHz to 400 GHz.

Multi-function equipment which is subjected simultaneously to different clauses of this standard and/or other standards shall meet the provisions of each clause/standard with the relevant functions in operation.

 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. 

The limits in this standard have been determined on a probabilistic basis to keep the suppression of disturbances within economically reasonable limits while still achieving an adequate level of radio protection and electromagnetic compatibility. In exceptional cases, additional provisions may be required.

## 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.

IEC 60050-161, *International Electrotechnical Vocabulary (IEV) – Chapter 161: Electromagnetic compatibility*

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

IEC 60155, *Glow-starters for fluorescent lamps*

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

IEC 61000-4-6:2008, *Electromagnetic compatibility (EMC) – Part 4-6: Testing and measurement techniques – Immunity to conducted disturbances, induced by radio-frequency fields*

CISPR 11, *Industrial, scientific and medical equipment – Radio-frequency disturbance characteristics – Limits and methods of measurement*  
Amendment 1:2010

CISPR 16-1-1:2010, *Specification for radio disturbance and immunity measuring apparatus and methods – Part 1-1: Radio disturbance and immunity measuring apparatus – Measuring apparatus*  
Amendment 1:2010

CISPR 16-1-2:2003, *Specification for radio disturbance and immunity measuring apparatus and methods – Part 1-2: Radio disturbance and immunity measuring apparatus – Ancillary equipment – Conducted disturbances*  
Amendment 1:2004  
Amendment 2:2006

CISPR 16-1-4:2010, *Specification for radio disturbance and immunity measuring apparatus and methods – Part 1-4: Radio disturbance and immunity measuring apparatus – Antennas and test sites for radiated disturbance measurements*  
Amendment 1:2012

Ⓐ 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* Ⓐ

CISPR 16-4-2:2011, *Specification for radio disturbance and immunity measuring apparatus and methods – Part 4-2: Uncertainties, statistics and limit modelling – Uncertainty in EMC measurements*

CISPR 32:2012, *Electromagnetic compatibility of multimedia equipment – Emission requirements*

### 3 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 60050-161, as well as the following apply.

#### 3.1

##### **LED light source**

device containing an LED or collection of LEDs used for the purpose of illumination

#### 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 

### **A1** 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. **A1**

## **4 Limits**

### **4.1 Frequency ranges**

In 4.2, 4.3 and 4.4, limits are given as a function of frequency range. No measurements need to be performed at frequencies where no limits are specified.

**A1** text deleted **A1**

### **4.2 Insertion loss**

The minimum values of the insertion loss for the frequency range 150 kHz to 1 605 kHz are given in Table 1.

**Table 1 – Minimum values of insertion loss**

| Frequency range<br>kHz                                            | Minimum values<br>dB  |
|-------------------------------------------------------------------|-----------------------|
| 150 to 160                                                        | 28                    |
| 160 to 1 400                                                      | 28 to 20 <sup>a</sup> |
| 1 400 to 1 605                                                    | 20                    |
| <sup>a</sup> Decreasing linearly with the logarithm of frequency. |                       |

### **4.3 Disturbance voltages**

#### **4.3.1 Mains terminals**

The limits of the mains terminal disturbance voltages for the frequency range 9 kHz to 30 MHz are given in Table 2a.

**Table 2a – Disturbance voltage limits at mains terminals**

| Frequency range                                                                                                                                             | Limits<br>dB(μV) <sup>a</sup> |                       |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|-----------------------|
|                                                                                                                                                             | Quasi-peak                    | Average               |
| 9 kHz to 50 kHz                                                                                                                                             | 110                           | –                     |
| 50 kHz to 150 kHz                                                                                                                                           | 90 to 80 <sup>b</sup>         | –                     |
| 150 kHz to 0,5 MHz                                                                                                                                          | 66 to 56 <sup>b</sup>         | 56 to 46 <sup>b</sup> |
| 0,5 MHz to 5,0 MHz                                                                                                                                          | 56 <sup>c</sup>               | 46 <sup>c</sup>       |
| 5 MHz to 30 MHz                                                                                                                                             | 60                            | 50                    |
| <sup>a</sup> At the transition frequency, the lower limit applies.                                                                                          |                               |                       |
| <sup>b</sup> The limit decreases linearly with the logarithm of the frequency in the ranges 50 kHz to 150 kHz and 150 kHz to 0,5 MHz.                       |                               |                       |
| <sup>c</sup> For electrodeless lamps and luminaires, the limit in the frequency range of 2,51 MHz to 3,0 MHz is 73 dB(μV) quasi-peak and 63 dB(μV) average. |                               |                       |

### 4.3.2 Load terminals

The limits of the load terminal disturbance voltage for the frequency range 150 kHz to 30 MHz are given in Table 2b.

**Table 2b – Disturbance voltage limits at load terminals**

| Frequency range<br>MHz | Limits<br>dB(μV) <sup>a</sup> |         |
|------------------------|-------------------------------|---------|
|                        | Quasi-peak                    | Average |
| 0,15 to 0,50           | 80                            | 70      |
| 0,50 to 30             | 74                            | 64      |

<sup>a</sup> At the transition frequency, the lower limit applies.

### 4.3.3 Control terminals

The limits of the control terminal disturbance voltage for the frequency range 150 kHz to 30 MHz are given in Table 2c.

**Table 2c – Disturbance voltage limits at control terminals**

| Frequency range<br>MHz | Limits<br>dB(μV) |          |
|------------------------|------------------|----------|
|                        | Quasi-peak       | Average  |
| 0,15 to 0,50           | 84 to 74         | 74 to 64 |
| 0,50 to 30             | 74               | 64       |

NOTE 1 The limits decrease linearly with the logarithm of the frequency in the range 0,15 MHz to 0,5 MHz.

NOTE 2 The voltage disturbance limits are derived for use with an Asymmetric Artificial Network (AAN) which presents a common mode (asymmetric mode) impedance of 150 Ω to the control terminal.

## 4.4 Radiated electromagnetic disturbances

### 4.4.1 Frequency range 9 kHz to 30 MHz

The quasi-peak limits of the magnetic component of the radiated disturbance field strength in the frequency range 9 kHz to 30 MHz, measured as a current in 2 m, 3 m or 4 m loop antennas around the lighting equipment, are given in Table 3a.

The limits for the 2 m loop diameter apply to equipment not exceeding a length of 1,6 m, those for the 3 m loop diameter for equipment having a length in between 1,6 m and 2,6 m and those for the 4 m loop diameter for equipment having a length in between 2,6 m and 3,6 m.

**Table 3a – Radiated disturbance limits in the frequency range 9 kHz to 30 MHz**

| Frequency range<br>MHz | Limits for loop diameter<br>dB(μA) <sup>a</sup> |                       |                       |
|------------------------|-------------------------------------------------|-----------------------|-----------------------|
|                        | 2 m                                             | 3 m                   | 4 m                   |
| 9 kHz to 70 kHz        | 88                                              | 81                    | 75                    |
| 70 kHz to 150 kHz      | 88 to 58 <sup>b</sup>                           | 81 to 51 <sup>b</sup> | 75 to 45 <sup>b</sup> |
| 150 kHz to 3,0 MHz     | 58 to 22 <sup>b</sup>                           | 51 to 15 <sup>b</sup> | 45 to 9 <sup>b</sup>  |
| 3,0 MHz to 30 MHz      | 22                                              | 15 to 16 <sup>c</sup> | 9 to 12 <sup>c</sup>  |

<sup>a</sup> At the transition frequency, the lower limit applies.

<sup>b</sup> Decreasing linearly with the logarithm of the frequency. For electrodeless lamps and luminaires, the limit in the frequency range of 2,2 MHz to 3,0 MHz is 58 dB(μA) for 2 m, 51 dB(μA) for 3 m and 45 dB(μA) for 4 m loop diameter.

<sup>c</sup> Increasing linearly with the logarithm of the frequency.

#### 4.4.2 Frequency range 30 MHz to 300 MHz

The quasi-peak limits of the electric component of the radiated disturbance field strength in the frequency range 30 MHz to 300 MHz, measured in accordance with the method specified in Table A.1 of CISPR 32: 2012, are given in Table 3b.

NOTE For reasons of repeatability, is it advised to terminate the mains supply cable with a CDN positioned on the ground plane and terminated with a 50 Ω impedance.

**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<br>MHz | Quasi-peak limits<br>dB(μV/m) <sup>a</sup> |                   |
|------------------------|--------------------------------------------|-------------------|
|                        | 3 m <sup>b,c</sup>                         | 10 m <sup>b</sup> |
| 30 to 230              | 40                                         | 30                |
| 230 to 300             | 47                                         | 37                |

<sup>a</sup> At the transition frequency, the lower limit applies.

<sup>b</sup> Either of the two measurement distances and the associated limits can be applied to demonstrate compliance.

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

Tests in the frequency range 30 MHz to 300 MHz may be conducted by the test specified in Annex B with the limits of Table B.1. If the lighting equipment complies with the requirements of Annex B, it is deemed to comply with the limits of this subclause.

## 5 Application of the limits

### 5.1 General

The application of limits for the various kinds of lighting equipment as mentioned in the scope of this standard is given in 5.2 to 5.11. Further guidance on the application of limits and measurement methods is given in Annex D.

**A1** 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). **A1**

The disturbance caused by manual or automatic operation of a switch (external or included in equipment) to connect or disconnect the mains shall be disregarded. This includes manual on/off switches or, for example, switches activated by sensors or ripple control receivers. However, switches which will be repeatedly operated (e.g. such as those of advertising signs) are not included in this exception.

## 5.2 Indoor luminaires

### 5.2.1 General

The following conditions apply to all kinds of indoor luminaires irrespective of the environment in which they are used.

### 5.2.2 Incandescent lamp luminaires

Incandescent lamp luminaires where the lamps are a.c. mains or d.c. operated, or which do not incorporate a light regulating device or electronic switch, are not expected to produce electromagnetic disturbances. Therefore, they are deemed to fulfil all relevant requirements of this standard without further testing.

NOTE Where, in this standard, the term "incandescent lamp" is used, all types of incandescent lamps including halogen lamps are meant.

### 5.2.3 Fluorescent lamp luminaires

The minimum values of insertion loss of Table 1 shall apply where a fluorescent lamp luminaire is a starter switch operated type and designed for one of the following lamp types:

- linear fluorescent lamps with a nominal diameter of 15 mm, 25 mm or 38 mm;
- circular fluorescent lamps with a nominal diameter of 28 mm or 32 mm;
- U-type fluorescent lamps with a nominal diameter of 15 mm, 25 mm or 38 mm;
- single-capped fluorescent lamps, without integrated starter and with a nominal diameter of 15 mm;
- single-capped fluorescent lamps, linear shaped, twin and quad tube, with integrated starter and having a nominal tube diameter of 12 mm.

### 5.2.4 Other luminaires

Indoor luminaires other than described in 5.2.2 or 5.2.3 shall comply with the mains terminal voltage limits given in Table 2a and the radiated disturbance limits given in Table 3b.

Where the luminaire supplies the lamp(s) with a current having an operation frequency in excess of 100 Hz, it shall also comply with the radiated disturbance limits given in Table 3a.

Where the light output of the luminaire is regulated by an external device with separate control lines, the disturbance voltage at the control terminals shall comply with the requirements of 4.3.3.

### 5.3 Independent auxiliaries exclusively for use with lighting equipment

#### 5.3.1 General

Independent auxiliaries are electric or electronic devices designed to be applied external to a luminaire and used to control the current or voltage of a discharge, incandescent lamp, or LED light source. Examples are dimmers, transformers and convertors for incandescent lamps or LED light sources, ballasts for discharge lamps (including fluorescent lamps) and semi-luminaires for compact fluorescent lamps, incandescent lamps or LED light sources.

NOTE 1 The requirements described in this subclause 5.3 are for the sole purpose of checking the electromagnetic emission characteristics of the auxiliary itself. Due to the variety of wiring circuits, it is impossible to describe requirements for the installation. In this respect, it is recommended that the manufacturer give guidelines for the proper use of the auxiliary.

NOTE 2 The requirements of this subclause 5.3 can be used for testing auxiliaries intended to be built into a luminaire. However, there is no obligation for such testing. Moreover, even when the auxiliary complies with the requirements of this subclause, the luminaire will always be tested.

#### 5.3.2 Independent light regulating devices

##### 5.3.2.1 Types of devices

There are two types of light regulating devices: those like dimmers which directly regulate the lamps, and those which have a remote control function to regulate the light output via a ballast or convertor.

##### 5.3.2.2 Independent directly operating light regulating devices

Where such devices incorporate semiconductors, they shall comply with the terminal voltage limits given in Tables 2a and 2b, otherwise no limits apply.

When several light regulating devices are contained in one product or enclosure, and when each individual device consists of an entirely self-contained regulating circuit (including all suppression components) and operates independently of the others (i.e. does not control, either by design or fortuitously, any load controlled by another individual regulator), then each device is tested separately.

##### 5.3.2.3 Independent remote control devices

Where such devices generate a d.c. or low-frequency (<500 Hz) control signal, no limits apply. For radiofrequency or infrared operating devices, this standard does not apply. Other independent remote control devices shall comply with the requirements of 4.3.1 and 4.3.3.

#### 5.3.3 Independent transformers and convertors for incandescent lamps or LED light sources

##### 5.3.3.1 General

Transformers change only the voltage and do not convert the mains frequency, whereas convertors also convert the frequency. Both kinds of devices can incorporate means for regulating the light output of the light source.

##### 5.3.3.2 Independent transformers

For voltage transformers which do not regulate the voltage by means of active electronic components, the condition of 5.2.2 applies. Other independent transformers shall comply with the terminal voltage limits given in Tables 2a and 2b.

### 5.3.3.3 Independent convertors

ⓘ 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. ⓘ

### 5.3.4 Independent ballasts for fluorescent and other discharge lamps

**5.3.4.1** Independent ballasts designed for a type of fluorescent lamp as mentioned in 5.2.3 and operated with starter shall comply with the minimum values of insertion loss given in Table 1.

**5.3.4.2** Other independent ballasts shall comply with the mains terminal voltage limits given in Table 2a and the radiated disturbance limits given in Table 3b.

Where the ballast supplies the lamp with a current having a frequency in excess of 100 Hz, it shall also comply with the radiated disturbance limits given in Table 3a.

Where the light is regulated by an external device with separate control lines, the disturbance voltage at the control terminals shall comply with the requirements of 4.3.3.

### 5.3.5 Semi-luminaires

Semi-luminaires for compact fluorescent lamps and for incandescent lamps, sometimes called adaptors, are devices equipped, on the one side, ⓘ with an IEC 60061-1 standardized lamp cap ⓘ 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.

Semi-luminaires shall comply with the terminal voltage limits given in Table 2a and the radiated disturbance limits given in Table 3b.

Where the light source is operated at a frequency exceeding 100 Hz, the unit shall also comply with the radiated disturbance limits given in Table 3a.

### 5.3.6 Independent starters and igniters

Independent starters and igniters for fluorescent and other discharge lamps are tested in a circuit as described in 8.9. They shall comply with the terminal voltage limits given in Table 2a.

## 5.4 Self-ballasted lamps

For self-ballasted lamps, the ballasting and starting arrangements are encapsulated with the lamp into one single unit. These lamps are fitted with Edison screw or bayonet caps and can be inserted directly into an appropriate holder.

Self-ballasted lamps shall comply with the terminal voltage limits given in Table 2a and the radiated disturbance limits given in Table 3b.

Where the light source is operated at a frequency exceeding 100 Hz, the unit shall also comply with the radiated disturbance limits given in Table 3a.

## 5.5 Outdoor lighting appliances

### 5.5.1 General

For the purpose of this standard, the term "outdoor lighting" is used for the general lighting of public areas such as streets, walkways, cycle paths, motorways, tunnels, car parks, service stations and outdoor sports and recreational areas, for security and floodlighting of buildings and the like. Moreover, requirements described in this subclause (5.5) apply to the (outdoor) lighting appliances on private grounds, industrial estates and the like.

However, such lighting equipment may be subject to specific emission requirements which are not covered by this standard, for example airport lighting.

This subclause (5.5) does not apply to neon and other advertising signs.

### 5.5.2 Mounting system

Generally, an outdoor lighting appliance is built up of a support and one or more luminaires. The support could be:

- a pipe (bracket) or the like;
- a mast (column) arm;
- a post top;
- a span or suspension wires;
- a wall or ceiling.

Unless otherwise stated, the emission requirements described in this subclause (5.5) apply to the luminaire (including the lamp) and no requirements apply to the luminaire support.

### 5.5.3 Integrated switching devices

Disturbances caused by the operation of integrated switching devices such as ripple control receivers shall be disregarded.

### 5.5.4 Incandescent lamp luminaires

The condition of 5.2.2 applies.

### 5.5.5 Fluorescent lamp luminaires

Luminaires using a type of fluorescent lamp as mentioned in 5.2.3 and operating with a starter shall comply with the minimum values of insertion loss given in Table 1.

### 5.5.6 Other luminaires

Outdoor luminaires other than described in 5.5.4 or 5.5.5 shall comply with the mains terminal voltage limits given in Table 2a and the radiated disturbance limits given in Table 3b.

Where the lamp(s) in the luminaire is (are) supplied with a current having a frequency in excess of 100 Hz, the electronic ballast shall be incorporated in the luminaire. The luminaire shall also comply with the radiated disturbance limits given in Table 3a.

## 5.6 UV and IR radiation appliances

### 5.6.1 General

Ultraviolet and infrared radiation appliances are appliances used for medical and cosmetic care, for industrial purposes and for instant zone heating.

This subclause 5.6 applies to appliances which are mainly used in the residential environment. For other appliances, CISPR 11 applies.

#### **5.6.2 IR radiation appliances**

For appliances which only contain mains frequency operated incandescent radiation sources (infrared emitters) and which do not include any active electronic components, the condition of 5.2.2 applies.

#### **5.6.3 UV fluorescent lamp appliances**

UV appliances using UV lamps identical to those types of fluorescent lamp mentioned in 5.2.3 and operating with a replaceable starter shall comply with the minimum values of insertion loss given in Table 1.

#### **5.6.4 Other UV and/or IR appliances**

UV and IR appliances other than described in 5.6.2 or 5.6.3 shall comply with the mains terminal voltage limits given in Table 2a and the radiated disturbance limits given in Table 3b.

Appliances supplying the radiation source(s) with a current having a (modulating) frequency in excess of 100 Hz shall also comply with the radiated disturbance limits given in Table 3a.

Where the radiation of the appliance is regulated by an external device with separate control lines, the disturbance voltage at the control terminals shall comply with the requirements of 4.3.3.

### **5.7 Transport lighting**

#### **5.7.1 General**

Light sources are used in transport vehicles for:

- external lighting and signalling purposes;
- lighting of on-board instruments;
- lighting of interior cabins and rooms.

This subclause 5.7 sets requirements for lighting equipment used on board ships and rail vehicles. Lighting equipment used in/on aircraft is subject to special conditions and falls outside the scope of this standard.

NOTE Requirements for lighting equipment used in road vehicles are dealt with by CISPR subcommittee D.

#### **5.7.2 External lighting and signalling**

Where devices for lighting or signalling are equipped with incandescent lamps, they are deemed to fulfil all relevant requirements of this standard without further testing. If gas-discharge lamps are used, the lamp and its ballast shall be mounted in one unit, which shall comply with the terminal voltage limits given in Table 2a and the radiated disturbance limits given in Tables 3a and 3b.

#### **5.7.3 Lighting of on-board instruments**

Lighting of on-board instruments is considered to be subject to the requirements for the instruments.

#### **5.7.4 Lighting of interior cabins and rooms**

Equipment for the interior lighting of ships and passenger rail vehicles is considered as indoor lighting equipment and the relevant requirements of 5.2 apply.

## **5.8 Requirements for luminaires for cold cathode tubular discharge lamps (e.g. neon tubes) used, for example, for advertising purposes**

Neon and other advertising signs shall comply with the mains terminal disturbance voltage limits given in Table 2a and the radiated disturbance limits given in Table 3b.

Where the sign supplies the lamp(s) with a current having an operation frequency in excess of 100 Hz, it shall also comply with the radiated disturbance limits given in Table 3a.

## **5.9 Self-contained emergency lighting luminaires**

### **5.9.1 General**

Luminaires, designed for the purpose of providing emergency lighting in the event of disruption of the mains supply shall be measured in both the mains on mode and emergency mode (mains off) of operation, as detailed in 5.9.2 and 5.9.3.

- Mains on mode: the state of a self-contained emergency luminaire which is ready to operate while the public network supply is on. In the case of a supply failure, the luminaire automatically changes over to the emergency mode.
- Emergency mode: the state of a self-contained emergency luminaire which provides lighting when energized by its internal power source, the public network supply having failed (mains off).

### **5.9.2 Measurement in the mains on mode, i.e. operating condition prior to the disruption of the mains supply**

The luminaire shall comply with the mains terminal disturbance voltage limits given in Table 2a and the radiated disturbance limits given in Table 3b.

Where the luminaire supplies the lamp(s) with a current having an operation frequency in excess of 100 Hz, it shall also comply with the radiated disturbance limits given in Table 3a. Where the light output of the luminaire is regulated by an external device with separate control lines, the disturbance voltage at the control terminals shall comply with the requirements of 4.3.3.

### **5.9.3 Measurement in emergency mode, i.e. operating condition after disruption of the mains supply**

The luminaire shall comply with the mains terminal disturbance voltage limits given in Table 2a and the radiated disturbance limits given in Table 3b.

Luminaires which supply the lamp(s) with a current having an operation frequency in excess of 100 Hz while in the emergency mode shall also comply with the radiated electromagnetic disturbance limits given in Table 3a.

## **5.10 Replaceable starters for fluorescent lamps**

Replaceable starters shall either:

- incorporate a capacitor having a value between 0,005  $\mu\text{F}$  and 0,02  $\mu\text{F}$  and which is connected parallel to the contact pins of the starter;

or comply with the following insertion loss test:

the starter is tested in a luminaire according to the instructions of 7.1.4. The manufacturer shall specify the type of the luminaire and associated fitting which shall be used during the test. Over the whole frequency range given in Table 1, the insertion loss of the luminaire when measured with the starter to be tested shall be equal to or higher than the insertion loss of the luminaire when tested with a starter fitted with a capacitor having a value of  $0,005 \mu\text{F} \pm 5 \%$ ;