British Standard

BRITISH STANDARD

BS EN 61547:1996
IEC 61547:1995
Incorporating Amendment No. 1

Equipment for general lighting purposes — EMC immunity requirements

The European Standard EN 61547:1995 with the incorporation of amendment A1:2000 has the status of a British Standard

ICS 29.020; 29.140.00

Committees responsible for this British Standard

The preparation of this British Standard was entrusted to Technical Committee CPL/34, Lamps and related equipment, upon which the following bodies were represented:

British Sign Association
BSI Testing Product Certification
Consumer Policy Committee of BSI
Department of Trade and Industry (Consumer Safety Unit, CA Division)
Electrical Installation Equipment Manufacturers' Association (BEAMA Ltd.)
Electricity Association
Institution of Civil Engineers
Institution of Lighting Engineers
Lighting Association
Lighting Industry Federation
Trinity House Lighthouse Service
Coopted members

This British Standard, having been prepared under the direction of the Electrotechnical Sector Board, was published under the authority of the Standards Board and comes into effect on 15 April 1996

The following BSI references relate to the work on this standard:
Committee reference CPL/34
Draft for comment 93/2126311 DC

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Amendments issued since publication

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13126	September 2001	See national foreword

Contents

National foreword

This British Standard has been prepared by Technical Committee CPL/34 and is the English language version of EN 61547:1995, *Equipment for general purposes EMC immunity requirements,* including amendment A1:2000, published by the European Committee for Electrotechnical Standardization (CENELEC). It is identical with IEC 61547, including amendment 1:2000, published by the International Electrotechnical Commission (IEC) which has the same title.

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

From 1 January 1997, all IEC publications have the number 60000 added to the old number. For instance, IEC 27-1 has been renumbered as IEC 60027-1. For a period of time during the change over from one numbering system to the other, publications may contain identifiers from both systems.▌A1⟩ ⟨A1▌

Cross-references

The British Standards which implement international or European publications referred to in this document may be found in the BSI Standards Catalogue under the section entitled International Standards Correspondence Index, or by using the find facility of the BSI Standards Electronic Catalogue.

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Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, the EN title page, pages 2 to 12, an inside back cover and a back cover.

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EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN 61547
October 1995
+ A1
December 2000

ICS 29.020; 29.140.00

Descriptors: Lighting equipment, luminaire, lamp, connection, electric supply, low voltage, electromagnetic immunity, test, performance, electrostatic discharge test, conformity assessment, test conditions

English version

Equipment for general lighting purposes EMC immunity requirements

(includes amendment A1:2000)
(IEC 61547:1995 + A1:2000)

Equipements pour l'éclairage à usage général
Prescriptions concernant l'immunité CEM
(inclut l'amendement A1:2000)
(CEI 61547:1995 + A1:2000)

Einrichtung für allgemeine Beleuchtungszwecke
EMV-Störfestigkeitsanforderungen
(enthält Änderungen A1:2000
(IEC 61547:1995 +A1:2000)

This European Standard was approved by CENELEC on 1995-09-20. Amendment A1 was approved by CENELEC on 2000-11-01. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CENELEC member.

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CENELEC

European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

Central Secretariat: rue de Stassart 35, B-1050 Brussels

Foreword

The text of document 34/39/DIS, future edition 1 of IEC 1547, prepared by IEC TC 34, Lamps and related equipment, was submitted to the IEC-CENELEC parallel vote and was approved by CENELEC as EN 61547 on 1995-09-20.

The following dates were fixed:

- latest date by which the EN has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 1996-07-01
- latest date by which the national standards conflicting with the EN have to be withdrawn (dow) 1996-07-01

Annexes designated "normative" are part of the body of the standard. In this standard, Annex ZA is normative. Annex ZA has been added by CENELEC.

Foreword to amendment A1

The text of document 34/66/FDIS, future amendment 1 to IEC 61547:1995, prepared by IEC TC 34, Lamps and related equipment, was submitted to the IEC-CENELEC parallel vote and was approved by CENELEC as amendment A1 to EN 61547:1995 on 2000-11-01.

The following dates were fixed:

- latest date by which the amendment has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2001-08-01
- latest date by which the national standards conflicting with the amendment have to be withdrawn (dow) 2003-11-01

Contents

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1 Scope

This International Standard for electromagnetic immunity requirements applies to lighting equipment which is within the scope of IEC technical committee 34, such as lamps, auxiliaries and luminaires, intended either for connecting to a low voltage electricity supply or for battery operation.

Excluded from the scope of this standard is equipment for which the immunity requirements are formulated in other IEC or CISPR standards such as:

— lighting equipment for use in transport vehicles;

— entertainment lighting control equipment for professional purposes;

— lighting devices built-in other equipment such as:

- scale illumination or indicators;
- photocopiers;
- slide and overhead projectors;
- video display units.

However, in multi-function equipment where the lighting part operates independently from other parts, the lighting part shall comply with the requirements of this standard.

The requirements of this standard are based on the requirements for domestic, commercial and light-industrial environments as given in the future IEC 1000-6-1[1)], but modified to lighting engineering practice.

It can be expected that lighting equipment complying with the requirements of this standard will operate satisfactorily in other environments. In some special cases measures have to be taken to provide greater immunity. It is impracticable to deal with all these possibilities. Such requirements may be established by contractual agreement between supplier and purchaser.

This standard shall be read in conjunction with the relevant basic and/or product standard(s).

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the editions indicated were valid. All normative documents are subject to revision, and parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions to the normative documents indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

IEC 50(161):1990, *International Electrotechnical Vocabulary — (IEV) Chapter 161: Electromagnetic Compatibility.*

IEC 50(845):1987, *International Electrotechnical Vocabulary — (IEV) Chapter 845: Lighting.*

IEC 598-1:1992, *Luminaires — Part 1: General requirements and tests.*

IEC 598-2-22:1990, *Luminaires — Part 2: Particular requirements — Section 22: Luminaires for emergency lighting.*

IEC 1000-4-2:1995, *Electromagnetic compatibility (EMC) — Part 4: Testing and measurement techniques — Section 2: Electrostatic discharge immunity tests.*

IEC 1000-4-3:1995, *Electromagnetic compatibility (EMC) — Part 4: Testing and measurement techniques — Section 3: Radiated, radio frequency, electromagnetic field immunity tests.*

IEC 1000-4-4:1995, *Electromagnetic compatibility (EMC) — Part 4: Testing and measurement techniques — Section 4: Electrical fast transient/burst immunity tests.*

IEC 1000-4-5:1995, *Electromagnetic compatibility (EMC) — Part 4: Testing and measurement techniques — Section 5: Surge immunity tests.*

IEC/DIS 1000-4-6, *Electromagnetic compatibility (EMC) — Part 4: Testing and measurement techniques — Section 6: Immunity to conducted disturbances, induced by radio-frequency fields.*

[1)] At present at stage of document 77(sec)141

IEC 1000-4-8:1993, *Electromagnetic compatibility (EMC) — Part 4: Testing and measurement techniques — Section 8: Power frequency magnetic field immunity tests.*

IEC 1000-4-11:1994, *Electromagnetic compatibility (EMC) — Part 4: Testing and measurement techniques — Section 11: Voltage dips, short interruptions and voltage variations immunity tests.*

3 Definitions

For the purpose of this International Standard, the definitions of IEC 50(161) and IEC 50(845) apply, together with the following definitions:

3.1
port
particular electrical interface of the specified equipment with the external electromagnetic environment

3.2
enclosure port
the physical boundary of the equipment through which electromagnetic fields may radiate or penetrate

4 Performance criteria

4.1 A functional description of performance criteria, during or as a consequence of the immunity testing, shall be provided by the manufacturer and noted in the test report.

The performance of lighting equipment shall be assessed by monitoring:

— the luminous intensity of the luminaire or of the lamp(s);

— the functioning of the control in case of equipment which includes a regulating control or concerns the regulating control itself;

— the functioning of the starting device, if any.

4.2 The following performance criteria apply to lighting equipment:

Performance criterion A:

During the test no change of the luminous intensity shall be observed and the regulating control, if any, shall operate during the test as intended.

Performance criterion B:

During the test the luminous intensity may change to any value. After the test the luminous intensity shall be restored to its initial value within 1 min.

Regulating controls need not function during the test, but after the test the mode of the control shall be the same as before the test provided that during the test no mode changing commands were given.

Performance criterion C:

During and after the test any change of the luminous intensity is allowed and the lamp(s) may be extinguished. After the test, within 30 min, all functions shall return to normal if necessary by temporary interruption of the mains supply and/or operating the regulating control.

Additional requirement for lighting equipment incorporating a starting device:

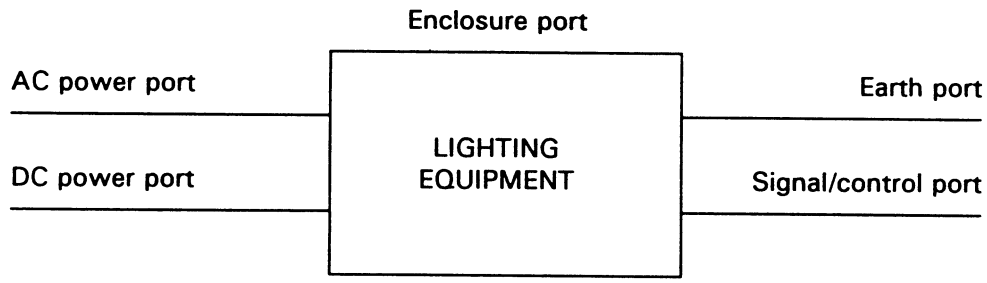
After the test the lighting equipment is switched off. After half an hour it is switched on again. The lighting equipment shall start and operate as intended.

4.3 A change of luminous intensity may be checked by visual observation but in case of doubt the following applies:

The luminous intensity of a luminaire or of the lamp(s) shall be measured by means of a illuminance (lux) meter which is positioned in an axis perpendicular to the main plane of the luminaire or lamp(s), in its centre and at a distance for proper operation of the lux meter. The luminous intensity shall be deemed to be unchanged if the measured intensities do not deviate by more than 15 %.

Care shall be taken that the ambient light level does not influence the measuring result.

Precautions to achieve reproducible results given in the relevant lamp performance standards shall be observed.



NOTE For the purpose of this standard, d.c. power ports for supplying regulating controls are considered to be signal ports.

Figure 1 — Examples of ports

4.4 Effects of electromagnetic phenomena as described in this standard on the life of the light sources, are excluded from this standard.

5 Test specifications

5.1 General

Immunity requirements for equipment defined in the scope concern:

— electrostatic discharges;
— continuous and transient disturbances;
— radiated and conducted disturbances;
— radio frequency and mains supply related disturbances.

They are given in subclauses **5.2** to **5.9** on a port by port basis.

Tests are applied to the relevant ports of the equipment as indicated in the respective subclauses.

Tests shall be conducted in a well-defined and reproducible manner.

Tests shall be carried out as single tests in sequence. The sequence of testing is optional.

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

The description of the test, the test generator, the test methods and the test set-up are given in the basic standards which are referred to in the relevant subclauses.

Test levels are generally based on level 2 values as recommended in the basic standards.

5.2 Electrostatic discharges

These tests are carried out according to IEC 1000-4-2, with test levels as given in Table 1 of this standard. Contact discharge is the preferred test method. Twenty discharges (10 with positive and 10 with negative polarity) shall be applied on each accessible metallic part of the enclosure, terminals are excluded. Air discharges shall be used where contact discharges cannot be applied. Discharges shall be applied on the horizontal or vertical coupling planes as specified in IEC 1000-4-2.

NOTE "accessible" means accessible under normal operating conditions including user maintenance.

Table 1 — Electrostatic discharges — Test levels at enclosure port

Characteristics	Test levels
Air discharge	8 kv
Contact discharge	4 kv

5.3 Radio frequency electromagnetic fields

These tests are carried out according to IEC 1000-4-3, with test levels as given in Table 2 of this standard.

Table 2 — Radio frequency electromagnetic fields — Test levels at enclosure port

Characteristics	Test levels
Frequency range	80 MHz to 1 000 MHz
Test level	3 V/m (unmodulated)
Modulation	1 kHz, 80 % AM, sine wave

5.4 Power frequency magnetic fields

These tests are carried out according to IEC 1000-4-8, with test levels as given in Table 3 of this standard and need only to be applied to equipment containing components susceptible to magnetic fields, such as Hall elements or magnetic field sensors.

In case of mains operated devices the test frequency shall be locked to the mains frequency.

Table 3 — Power frequency magnetic fields — Test levels at enclosure port

Characteristics	Test levels
Field frequency	50/60 Hz
Test level	3 A/m

5.5 Fast transients

These tests are carried out according to IEC 1000-4-4, with test levels as given in Table 4, Table 5 and Table 6 of this standard.

Fast transients are carried out during 2 min with a positive polarity and during 2 min with a negative polarity.

Table 4 — Fast transients — Test levels at ports for signal and control lines

Characteristics	Test levels
Test level	0,5 kV (peak)
Rise time/hold time	5/50 ns
Repetition frequency	5 kHz
NOTE 1 Only applicable to ports interfacing with cables whose total length according to the manufacturer's specification may exceed 3 m.	
NOTE 2 Change of state commands are not applied during the test.	

Table 5 — Fast transients — Test levels at input and output d.c. power ports

Characteristics	Test levels
Test level	0,5 kV (peak)
Rise time/hold time	5/50 ns
Repetition frequency	5 kHz
NOTE Not applicable to equipment not connected to the mains while in use.	

Table 6 — Fast transients — Test levels at input and output a.c. power ports

Characteristics	Test levels
Test level	1 kV (peak)
Rise time/hold time	5/50 ns
Repetition frequency	5 kHz

5.6 Injected currents

These tests are carried out according to IEC/DIS 1000-4-6[2)], with test levels as given in Table 7, Table 8 and Table 9 of this standard. The preferred coupling and decoupling devices are:

AC mains:	CDN 801-M1/-M2/-M3
Screened signal cables:	Direct injection (CDN 801-S)
Unscreened signal cables:	Clamp injection.

Table 7 — Injected currents — Test levels at ports for signal and control lines

Characteristics	Test levels
Frequency range	0,15 MHz to 80 MHz
Test level	3 V r.m.s. (unmodulated)
Modulation	1 kHz, 80 % AM, sine wave
Source impedance	150 Ω
NOTE Only applicable to ports interfacing with cables whose total length according to the manufacturer's specification may exceed 1 m.	

Table 8 — Injected currents — Test levels at input and output d.c. power ports

Characteristics	Test levels
Frequency range	0,15 MHz to 80 MHz
Test level	3 V r.m.s. (unmodulated)
Modulation	1 kHz, 80 % AM, sine wave
Source impedance	150 Ω
NOTE Not applicable to equipment not connected to the mains while in use.	

Table 9 — Injected currents — Test levels at input and output a.c. power ports

Characteristics	Test levels
Frequency range	0,15 MHz to 80 MHz
Test level	3 V r.m.s. (unmodulated)
Modulation	1 kHz, 80 % AM, sine wave
Source impedance	150 Ω
NOTE Only applicable to ports interfacing with cables whose total length according to the manufacturer's specification may exceed 1 m.	

5.7 Surges

[A1] These tests are carried out according to IEC 61000-4-5, with test levels as given in Table 10 of this standard. Five positive and five negative pulses shall be applied at the peak value and zero crossing points of the a.c. voltage wave. Two test levels are given for different types of lighting equipment.

Table 10 — Surges — Test levels at input a.c. power ports

Characteristics		Test levels		
		Device		
		Self-ballasted lamps and semi-luminaires	Luminaires and independent auxiliaries	
			Input power	
			⩽25 W	>25 W
Wave-shape data		1,2/50 µs	1,2/50 µs	1,2/50 µs
Test level	line to line	0,5 kV	0,5 kV	1,0 kV
	line to ground	1,0 kV	1,0 kV	2,0 kV

[/A1]

[2)] At present at the stage of Draft International Standard.

5.8 Voltage dips and interruptions

These tests are carried out according to IEC 1000-4-11, with test levels as given in Table 11 and Table 12 of this standard.

Table 11 — Voltage dips and interruptions — Test levels at input a.c. power ports

Characteristics	Test levels
Voltage reduction Number of periods	30 % 10

Table 12 — Voltage dips and interruptions — Test levels at input a.c. power ports

Characteristics	Test levels
Voltage reduction Number of periods	100 % 0,5

5.9 Voltage fluctuations

Tests regarding voltage fluctuations are part of equipment product standards.

6 Application of test specifications

6.1 General

The test requirements apply to the following lighting equipment:

— luminaires or equivalent appliances;

— independent auxiliaries;

— self-ballasted lamps.

Immunity requirements do not apply to lamps other than self-ballasted lamps, nor to auxiliaries incorporated in luminaires, in self-ballasted lamps or in semi-luminaires. However, if separate tests have proven that built-in auxiliaries such as ballasts or convertors comply with the requirements set for independent auxiliaries, the luminaire is deemed to comply and need not be tested.

As a result of the application of the tests defined in this standard, the lighting equipment shall not become dangerous or unsafe as defined in the relevant product standard.

6.2 Non-electronic lighting equipment

Lighting equipment, with the exception of emergency lighting luminaires, in which the light source is mains frequency or battery operated and which does not contain any active electronic component is deemed to fulfil the immunity requirements without testing.

6.3 Electronic lighting equipment

For lighting equipment containing active electronic components which e.g. convert or regulate the operating voltage and/or the frequency of the light source, the requirements are given in sub-clauses **6.3.1** to **6.3.3**.

6.3.1 *Self-ballasted lamps*

Electronic self-ballasted lamps shall be tested in accordance with clause **5** and comply with the performance criteria of Table 13.

6.3.2 *Independent auxiliaries*

Those auxiliaries which are independent as defined in their relevant product standard shall be tested in accordance with clause **5** and comply with the performance criteria of Table 14.

6.3.3 *Luminaires*

Luminaires shall be tested in accordance with clause **5** and comply with the performance criteria of Table 15.

Table 13 — Application of tests for self-ballasted lamps

Test (subclause)	**5.2**	**5.3**	**5.4**	**5.5**	**5.6**	**5.7**	**5.8**, Table 11	**5.8**, Table 12
Performance criterion	B	A	A	B	A	C	C	B

Table 14 — Application of tests for independent auxiliaries

Type of independent electronic auxiliary	Test (subclause) and performance criterion							
	5.2	**5.3**	**5.4**	**5.5**	**5.6**	**5.7**	**5.8,** Table 11	**5.8,** Table 12
Ballast	B	A	A	B	A	C	C	B[a]
Convertor	B	A	A	B	A	C	C	B
Starting device	B	A	A	B	A	C	C	B
Semi-luminaire	B	A	A	B	A	C	C	B
Regulating device for ballast or convertor	B	A	A	B	A	B	C	B

[a] Applies only to fluorescent lamp ballasts, for other discharge lamp ballasts performance criteria C applies.

Table 15 — Application of tests for luminaires

Type of luminaire	Test (subclause) and performance criterion							
	5.2	**5.3**	**5.4**	**5.5**	**5.6**	**5.7**	**5.8,** Table 11	**5.8,** Table 12
Luminaire with electronic convertor	B	A	A	B	A	C	C	B
Luminaire with electronic ballast for fluorescent lamps	B	A	A	B	A	C	C	B
Luminaire with electronic ballast for discharge lamps	B	A	A	B	B	C	C	C
Luminaire for emergency lighting	A	A	A	B	A	B	[a]	[a]

[a] These tests do not apply as they are covered by the test in IEC 598-2-22.

7 Conditions during testing

The test shall be applied while the equipment is operated as intended under the normal operating conditions laid down in the relevant product standard at stabilized luminous (radiant) flux and at normal laboratory conditions.

For starting devices the operating conditions are under consideration.

Equipment including a regulating control shall be tested in three operating modes at about 20 %, 60 % and 100 % luminous intensity. The load shall be the maximum allowed.

Luminaires and independent auxiliaries shall be tested with lamps for which they are intended. In case the equipment is suitable for lamps of different wattages, lamps of maximum wattage shall be applied. Lamps shall be test lamps as described in Annex B of IEC 598-1.

For independent auxiliaries the length of the cables between device and lamp shall be 3 m unless the manufacturer prescribes another length.

The configuration and mode of operation during the tests shall be precisely noted in the test report.

8 Assessment of conformity

Equipment manufactured in series shall be verified by performing type-testing on one representative model or on one series-produced equipment.

The manufacturer or supplier shall ensure by means of his quality control system that the tested model or equipment is representative for the series-produced equipment.

All equipment not produced in series shall be tested on an individual basis.

Annex ZA (normative)
Normative references to international publications with their corresponding European publications

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

NOTE When the international publication has been modified by CENELEC common modifications, indicated by (mod), the relevant EN/HD applies.

Publication	Year	Title	EN/HD	Year
IEC 50(161)	1990	*International electrotechnical vocabulary (IEV) Chapter 161: Electromagnetic compatibility*	—	—
IEC 50(845)	1987	*Chapter 845: Lighting*	—	—
IEC 598-1	1992	*Luminaires*	EN 60598-1	1993
(mod)		*Part 1: General requirements and tests*		
IEC 598-2-22:1990	1990	*Part 2: Particular requirements*	EN 60598-2-22	1990
(mod)		*Section 22: Luminaires for emergency lighting*		
IEC 1000-4-2	1995	*Electromagnetic compatibility (EMC)*	EN 61000-4-2	1995
		Part 4: Testing and measurement techniques — Section 2: Electrostatic discharge immunity test		
IEC 1000-4-3	1995	*Section 3: Radiated, radio-frequency, electromagnetic field immunity test*	—	—
IEC 1000-4-4	1995	*Section 4: Electrical fast transient/burst immunity test*	EN 61000-4-4	1995
IEC 1000-4-5	1995	*Section 5: Surge immunity test*	EN 61000-4-5	1995
IEC/DIS 1000-4-6	—	*Section 6: Immunity to conducted disturbances, induced by radio-frequency fields*	—	—
IEC 1000-4-8	1993	*Section 8: Power frequency magnetic field immunity test*	EN 61000-4-8	1993
IEC 1000-4-11	1994	*Section 11: Voltage dips, short interruptions and voltage variations immunity tests*	EN 61000-4-11	1994

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