

Enacted	KATS Public Notice No. 2000 – 54 (Apr. 06, 2000)
Revised	KATS Public Notice No. 2006 – 956 (Dec. 28, 2006)

Safety Standard of Electrical Appliances

K61547

[IEC 61547 Ed.1:1995-09 + A1:2008-08]

Equipment for General Lighting Purposes – EMC Immunity Requirements

Table of Contents

1. Scope	3
2. Referenced Standards	4
3. Definitions of Terms	5
4. Performance Standards	5
5. Test Standards	6
5.1. General matters	6
5.2. Electrostatic discharge	7
5.3. Electromagnetic waves radiation immunity	7
5.4. Power frequency magnetic field	7
5.5. Electrical fast transient	8
5.6. Immunity to conducted disturbances	9
5.7. Surge	10
5.8. Voltage dips and short interruptions	10
5.9. Voltage Variations	10
6. Applying Test Standards	11
6.1. General matters	11
6.2. Non-electronic lighting equipment	11
6.3. Electronic lighting equipment	11
7. Test Conditions	12
8. Evaluating Compatibility	13

Safety Standard of Electrical Appliances (K 61547)

[IEC 61547 Ed.1:1995-09 + A1:2000-08]

Equipment for General Lighting Purposes – EMC Immunity Requirements

Introduction

This technical standard for safety certification had been prepared by directly translating IEC 61547 (Ed.1; published September, 1995) and IEC 61547 Amd.1 (Equipment for general lighting purposes – EMC immunity requirements; published August, 2000) without changing their technical contents and the forms for the standards. This standard was prepared in order to promptly accept and conform to the changes in the international standards, and to improve the current safety standard of electrical appliances management systems and standardization technology.

1. Scope

The EMC immunity requirements apply to lighting equipment which is within the scope of IEC Technical Committee 34, such as lamps, auxiliaries and luminaires, intended either for connecting to low voltage electricity supply or for battery operation.

Equipment listed below for which the immunity requirements are formulated in other IEC or CISPR standards are excluded from the scope of this standard.

- Lighting equipment for vehicles
- Special purpose entertainment lighting controllers
- Lighting equipment that will be equipped to other instruments
 - Lighting equipment for measuring or indicators
 - Optical copying machines
 - Slides and overhead projectors
 - Visual display units

But the parts of the multi-purpose lighting equipment, in which the accessories are working independently from other parts, should follow the requirements in this standard.

The requirements in this standard are based on equipment as presented in the K 61000-6-1, Generic Standard – Immunity for Residential, Commercial and Light Industrial Environments, but are currently being amended to practice illumination engineering.

The lighting equipment compatible with the requirements in this standard are deemed to work properly in the other environments. In some special cases, the measurement may require a little more immunity. It is not possible to deal with all possibilities. Such requirements may be established by the agreement between the supplier and the consumer.

This standard should be applied in conjunction with the related basic standards and/or product standards.

2. Referenced Standards

The following referenced standards are indispensable when applying this standard. For the standards with specified date, only quoted ones are applied. For the standards without specified date, the latest version of the existing document (including proposal for revision) is applied.

KS C IEC 60050 (161): 1990, International Electrotechnical Vocabulary (IEV) – Chapter 161, Electromagnetic compatibility

KS C IEC 60050 (845): 1987, International Electrotechnical Vocabulary (IEV) – Chapter 845, Lighting

KS C IEC 60598-1: 1992, Luminaires – Part 1: General requirements and tests

KS C IEC 60598-2-22: 1990, Luminaires – Part 2~ Part 22: Luminaires for emergency lighting - Particular requirements

K61000-4-2: 1995, Electromagnetic compatibility – Part 4: Testing and Measurement Techniques – Clause 2: Electrostatic Discharge Immunity Test – Basic EMC standard publications

K61000-4-3: 1995, Electromagnetic compatibility – Part 4: Testing and Measurement Techniques – Clause 3: Radiated, Radio -frequency, Electromagnetic field immunity Test – Basic EMC standard publications

K61000-4-4: 1995, Electromagnetic compatibility – Part 4: Testing and Measurement Techniques – Clause 4: Electrical fast transient/burst immunity test – Basic EMC standard publications

K61000-4-5: 1995, Electromagnetic compatibility – Part 4: Testing and Measurement Techniques – Clause 5: Surge immunity test – Basic EMC standard publications

K61000-4-6: 1996, Electromagnetic compatibility – Part 4: Testing and Measurement Techniques – Clause 6: Immunity to conducted disturbances, induced by radio -frequency fields

K61000-4-8: 1993, Electromagnetic compatibility – Part 4: Testing and Measurement Techniques – Clause 8: Power frequency magnetic field immunity test – Basic EMC standard publications

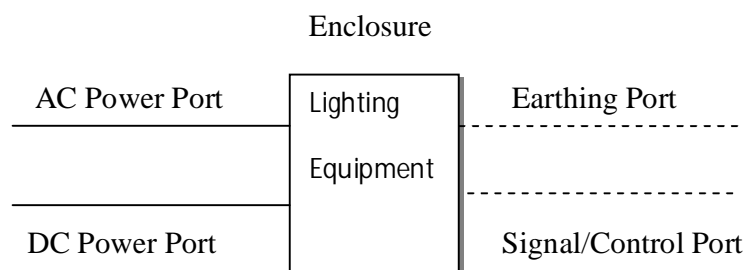
K61000-4-11: 1994, Electromagnetic compatibility – Part 4: Testing and Measurement Techniques – Clause 11: Voltage dips, short interruptions and voltage variations immunity tests

3. Definitions of Terms

The following definitions are used along with the ones defined in KS C IEC 60050(161) and KS C IEC 60050(845).

3.1 Port: An electrical connecting terminal that interconnects the given equipment and the outside electronic system.

3.2 Enclosure: The physical boundary of the equipment where electromagnetic waves radiate from or seep into.



<Figure 1> Port Example

Note – In this standard, the DC power port to control power supply is considered as a signal port.

4. Performance Standards

4.1 The immunity test result or functional description on the performance standards during the test should be provided by the manufacturer, and should be recorded on the test report.

The following are evaluated for the performance of lighting equipment.

- The brightness of lamp or lighting equipment
- The control component, if the subject contains any control system or it is a control system itself
- Function of the starting device

4.2 The following performance standards are applied to the lighting equipment.

Performance standard A

The brightness should be consistent, and the control device should work as expected throughout the testing.

Performance standard B

The brightness may change while testing. However, it should be recovered to its initial brightness within 1 minute after completion of the test.

The control device does not need to perform any control action while testing. However, it must have the same control modes before and after the test. It is because the control modes before and after the test are same if there was no change to the given mode for the control action while testing.

Performance standard C

Some brightness changes may be allowed and the lamp may be turned off during and after the test. All of the original functionalities must return to its normal conditions within 30 minutes after completion of the test, and the test sample may be retested or the control device may be retried if necessary.

Additional requirement for lighting equipment with attached starting devices:

Turn the switch off once the test has completed, and when the switch is turned back on after 30 minutes, the lighting equipment should work as expected.

4.3 The change in the brightness should be checked by visual observations, however, the following method may be used when there are any uncertainties;

The intensity of illumination should be measured by placing an illuminometer either at the centre of the main plane that is perpendicular to the lighting equipment or the lamp, or at the distance for appropriate operation. If the measured intensity of illumination did not exceed 15%, it is deemed unchanged.

Make sure the intensity of ambient light does not affect the result of measurement.

The directions should be followed so that the given performance standard of the lamp can get recursive results.

4.4 The phenomena of electromagnetic waves, by which the lifetime of light source will be affected, are excluded from this standard.

5. Test Standards

5.1 General matters

Immunity requirements for the applicable equipment;

- Electrostatic discharge
- Persistent and electrical fast transient interference
- Electromagnetic waves radiation and conduction interference
- Interferences related to radio-frequency and main power supply

More details are described in Clauses 5.2 through 5.9.

The test is applicable to the port relevant to the specific lighting equipment.
 The test system should be well defined and recursively connected.
 The testing is conducted as a singular test in order, and the order of the test is option al.

Inapplicable tests or unnecessary tests are determined in consideration of electrical characteristics of the particular equipment.
 In this case, the decision indicating the equipment will not be tested should be written on the test report.

The descriptions regarding the test, test generator, testing techniques and the placement of equipment under test are provided in the basic standard, which is referenced by the corresponding Clause.

5.2 Electrostatic Discharge

This test is conducted in accordance with the K 61000–4–2, and the test levels are specified in the Table 1. 20 times of discharges (10 times for discharges on positive (+) polarity, 10 times for discharges on negative (-) polarity) should be confirmed at the connectable metal part of the enclosure, but ports are excluded. Air discharge is used where contact discharge is not applicable. The discharge should be confirmed at the horizontal or vertical coupling surface, as described in K 61000–4–2.

Note – “contactable” means the places where the user is able to contact under the regular operating conditions (including repair).

<Table 1> Electrostatic Discharge – Test levels at the Enclosure

Mode	Test Level
Air Discharge	8kV
Contact Discharge	4kV

5.3 Electromagnetic waves radiation immunity

This test is conducted in accordance with the K 61000 –4–3, and the test levels are specified in the Table 2.

<Table 2> Electromagnetic Waves Radiation Immunity – Test levels at the Enclosure

Attribute	Test Level
Frequency Range	80 MHz ~ 1000 MHz
Test Level	3V/m (No modulation)
Modulation Degree	1 kHz, 80% AM, Sinusoidal current

5.4 Power frequency magnetic field

This test is conducted in accordance with the K 61000 –4–8, and the test levels are specified in the Table 3. In addition, this test is only applicable for equipment with elements capable of accepting a magnetic field such as Hall sensor or magnetic field sensor. For devices that are powered by electricity, the test frequency should be fixed to the power frequency.

<Table 3> Power Frequency Magnetic Field – Test levels of Enclosure

Attribute	Test Level
Magnetic field Frequency	50/60 Hz
Test Level	3A/m

5.5 Electrical fast transient

This test is conducted in accordance with the K 61000 –4–4, and the test levels are specified in the Table 4 ~ Table 6. Electrical fast transient immunity test is conducted for 2 minutes each on the positive (+) polarity and on the negative (-) polarity.

<Table 4> Electrical Fast Transient – Test levels at the port for signal line and control line

Attribute	Test Level
Test Level	0.5 kV (peak)
Rising time/Holding time	5/50 ns
Repetition frequency	5 kHz
Remarks: 1. Applies only to ports that is available to be connected with cables that are longer in length than 3 m , according to the specification provided by the manufacturer. 2. The changes of the control system commands during the testing are not applied.	

<Table 5> Electrical Fast Transient – Test levels at the Input/Output DC power port

Attribute	Test Level
Test Level	0.5 kV (peak)
Rising time/Holding time	5/50 ns
Repetition Frequency	5 kHz
Remarks: Not applicable for equipment that was not connected to power supply when in use.	

<Table 6> Electrical Fast Transient – Test levels at the Input/Output AC power port

Attribute	Test Level
Test Level	1 kV (peak)

Rising time/Holding time	5/50 ns
Repetition frequency	5 kHz

5.6 Immunity to conducted disturbances

This test is conducted in accordance with the K 61000 –4–6, and the test levels are specified in the Table 7 ~ Table 9. The preferred coupling and decoupling system is as follows.

AC Power source: CDN 801 –M1/–M2/–M3

Shielded signal cable: Direct injection (CDN 801 –S)

Unshielded signal cable: Inject clamps

<Table 7> Conducted Disturbances – Test levels at the port for signal line and control line

Attribute	Test Level
Frequency Range	From 0.15 MHz to 80 MHz
Test Level	3Vr.m.s (No modulation)
Modulation	1 kHz, 80% AM, Sinusoidal current
Source Impedance	150 •
Remarks: Applies only to ports that are available to be connected with cables longer than 1 m, according to the specification provided by the manufacturer.	

<Table 8> Conducted Disturbances – Test levels at the Input/Output DC power port

Attribute	Test Level
Frequency Range	From 0.15 MHz to 80 MHz
Test Level	3Vr.m.s (No modulation)
Modulation	1 kHz, 80% AM, Sinusoidal current
Source impedance	150 •
Remarks: Not applicable for equipment that was not connected to power supply when in use.	

<Table 9> Conducted Disturbances – Test levels at the Input/Output AC power port

Attribute	Test Level
Frequency Range	From 0.15 MHz to 80 MHz
Test Level	3Vr.m.s (No modulation)
Modulation	1 kHz, 80% AM, Sinusoidal current
Source impedance	150 •
Remarks: Applies only to ports that are available to be connected with cables longer than 1 m, according to the specification provided by the manufacturer.	

5.7 Surge

This test is conducted in accordance with the K 61000 –4–5, and the test levels are specified in the Table 10. 5 times of positive (+) pulses and 5 times of negative (-) pulses should be confirmed at both the peak values of AC waveforms (90 °and 270°) and the zero intersection (0). The test levels are applied to two different cases of lighting equipment.

<Table 10> Surge – Test levels at the Input AC power port

Attribute	Test Levels		
	Products		
	Self-ballasted Lamps & Luminaries	Lighting Equipment & independent auxiliaries	
		Input Power	
	• 25 W	> 25 W	
Waveform Data	1.2/50 • s	1.2/50 • s	1.2/50 • s
Test Level			
- Between Lines	0.5 kV	0.5 kV	1.0 kV
- Between Line and Earth	1.0 kV	1.0 kV	2.0 kV

5.8 Voltage dips and short interruptions

This test is conducted in accordance with the K 61000 -4-11, and the test levels are specified in the Table 11 and Table 12.

<Table 11> Voltage Dips and Short Interruptions – Test levels at the Input AC power port

Attribute	Test Level
Voltage Dips	30 %
Cycle	10

<Table 12> Voltage Dips and Short Interruptions – Test levels at the Input AC power port

Attribute	Test Level
Voltage Dips	100 %
Cycle	0.5

5.9 Voltage Variations

Testing for the voltage variations are performed according to the product standard of the lighting equipment.

6. Applying Test Standards

6.1 General matters

The testing requirements are applied to the following lighting equipment.

- Lighting equipment or similar applications
- Individual accessories
- Self-ballasted lamps
- LED Lighting equipment or similar applications

Immunity requirements are not applied to any lamps other than self -ballasted lamps. These are also not applied to accessories that are included in lighting equipment, self -ballasted lamps or luminaries. However, if the built-in accessories such as ballast and converter have been proved to conform to the requirements for individual accessories, the lighting equipment in question is deemed to satisfy this standard and does not need to be tested.

After being tested with the techniques specified in this standard, the lighting equipment should not be dangerous or unsafe as defined in the related product standard.

6.2 Non-electronic lighting equipment

Except emergency lighting, any lighting equipment that has power frequency as the lighting source or is operated by batteries, and lighting equipment that works without any active electric sensor is considered to satisfy the immunity requirements without testing.

6.3 Electronic lighting equipment

Requirements for lighting equipment that has active electric sensors, by which voltage and/or frequency is converted or adjusted, should follow the Clauses 6.3.1 through 6.3.3.

6.3.1 Self-ballasted lamps (Including self-ballasted lamps for LED lamps)

Testing for electronic self-ballasted lamps should be done according to the Clause 5, and the performance standards specified in Table 13 should be applied.

<Table 13> Applicable tests for self-ballasted lamps

Test (Clause)	5.2	5.3	5.4	5.5	5.6	5.7	5.8 Table 11	5.8 Table 12
Performance Standard	B	A	A	B	A	C	C	B

6.3.2 Individual accessories

Testing for individual accessories defined in the related product standard should be done according to the Clause 5, and the performance standards specified in Table 14 should be applied.

<Table 14> Applicable tests for Individual Accessories

Type of the Individual Electronic Accessory	Test (Clause) and Performance Standard							
	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*
Converter	B	A	A	B	A	C	C	B
LED lamp Converter	B	A	A	B	A	C	C	B
Starter	B	A	A	B	A	C	C	B
Luminary	B	A	A	B	A	C	C	B
Control System for ballast or converter	B	A	A	B	A	B	C	B

* Applies only to ballast for florescent lamps. Apply performance standard C to ballast for discharge lamps.

6.3.3 Lighting equipment

Testing for lighting equipment should be done according to the Clause 5, and the performance standards specified in Table 15 should be applied.

<Table 15> Applicable tests for Lighting Equipment

Type of the Lighting Equipment	Test (Clause) and Performance Standard							
	5.2	5.3	5.4	5.5	5.6	5.7	5.8 Table 11	5.8 Table 12
Lighting Equipment with electronic converter	B	A	A	B	A	C	C	B
Lighting Equipment with LED lamp	B	A	A	B	A	C	C	B
Lighting Equipment with electronic ballast for florescent lamp	B	A	A	B	A	C	C	B
Lighting Equipment with electronic ballast for discharge lamp	B	A	A	B	B	C	C	B
Emergency Lighting Equipment	A	A	A	B	A	B	*	*

* These tests are included in KS C IEC 60598 -2-22 test, therefore not applicable in here .

7. Test Conditions

The testing is applicable while the lighting equipment is working in the speed of light and in normal condition for the testing as described in the related product standard.

The working condition for starting devices is currently in review.

The lighting equipment, including controllers, should be tested in 3 working modes; brightness of approximately 20%, 60%, and 100% respectively. The maximum allowable load should be used.

Lighting equipment and its individual accessories are tested along with the lamp. In the case the lighting equipment that can be used with various lamps, the lamp of the maximum capacity is used. The lamps that are available for testing are specified in the Attachment B of KS C IEC 60598-1.

The length of cable between the lighting equipment and the lamp should be 3m, unless specified by the manufacturer.

Working mode and configuration of the test should be accurately recorded in the test report.

8. Evaluating Compatibility

If the lighting equipment has been manufactured as one of a product series, the major model or one from the series should be tested and evaluated.

The manufacturer or supplier should assure through the quality management system that the tested model or lighting equipment is representing mass-produced lighting equipment.

All lighting equipment that is not mass-produced should be tested individually.