



JAPANESE
INDUSTRIAL
STANDARD

Translated and Published by
Japanese Standards Association

JIS C 8159-1 : 2013

(JLMA/JSA)

**Non-integrated linear LED lamps
with GX16t-5 cap for general
lighting services—Part 1: Safety
specifications**

ICS 29.140.01;31.260

Reference number : JIS C 8159-1 : 2013 (E)

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Date of Establishment: 2013-04-22

Date of Public Notice in Official Gazette: 2013-04-22

Investigated by: Japanese Industrial Standards Committee
Standards Board

Technical Committee on Electricity Technology

JIS C 8159-1:2013, First English edition published in 2013-11

Translated and published by: Japanese Standards Association
4-1-24, Akasaka, Minato-ku, Tokyo, 107-8440 JAPAN

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Foreword

This translation has been made based on the original Japanese Industrial Standard established by the Minister of Economy, Trade and Industry through deliberations at the Japanese Industrial Standards Committee according to the proposal for establishment of Japanese Industrial Standard submitted by Japan Electric Lamp Manufacturers Association (JLMA)/Japanese Standards Association (JSA) with the draft being attached, based on the provision of Article 12 Clause 1 of the Industrial Standardization Law.

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- Power supply device for lighting, and luminaire 2011-07-29 Patent number 4788400: P
- Straight tube LED lamp and lamp socket used for it, and lighting fixture for straight tube LED lamp using them 2011-11-11 Patent number 4862102: P, T
- Straight tube LED lamp and lamp socket used for it, as well as lighting fixture for straight tube LED lamp using them 2011-11-11 Patent number 4862103: P, T
- LED lamp and lighting fixture 2011-11-18 Patent number: 4866975: P, T
- Straight tube lamp, socket, and lighting system 2012-02-03 Patent number 4915603: P, T
- Illumination apparatus 2012-07-27 Patent number 5046067: T
- Illumination apparatus 2012-07-27 Patent number 5046068: T
- LED driving device, lighting system, and luminaire (patent being applied for) Unexamined patent application publication number 2010-055824: P
- LED lamp and lighting fixture (patent being applied for) Unexamined patent application publication number 2012-009379: P, T
- LED lighting device (patent being applied for) Unexamined patent application publication number 2012-009391: P, T
- Straight tube LED lamp and lamp socket used for it (patent being applied for) Unexamined patent application publication number 2012-009392: P, T
- Lighting system (patent being applied for) Unexamined patent application publication number 2012-009397: P, T
- Straight tube type lamp, socket, and lighting system (patent being applied for) Unexamined patent application publication number 2012-009399: P, T
- LED lamp system (patent being applied for) Unexamined patent application publication number 2012-009400: P, T
- Power supply unit for LED lamp and LED lamp system (patent being applied for) Unexamined patent application publication number 2012-028222: P, T

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Non-integrated linear LED lamps with GX16t-5 cap for general lighting services— Part 1: Safety specifications

Introduction

This Japanese Industrial Standard has been established in order to ensure safety of non-integrated linear light emitting diode (LED) lamps with GX16t-5 cap for general lighting services incorporating a linear LED module part without cap and control gear.

1 Scope

This Standard specifies the safety requirements of non-integrated linear LED lamps with GX16t-5 cap for general lighting services (hereafter referred to as “linear LED lamp”).

This Standard is applicable to the following linear LED lamps:

- Rated wattage: 60 W or less
- Lamp voltage: 120 V ripple free d.c. or less
- Cap: GX16t-5

This Standard is not applicable to linear LED lamps that use the conventional caps for a fluorescent lamp and integrate a control gear. The linear LED lamps covered by this Standard are applicable to Class I luminaire and Class II luminaire which are the insulating classes of luminaire defined in **JIS C 8105-1**.

NOTE 1 The information for the design of control gear of linear LED lamp targeted in this Standard is given in Annex E, the information for the design of a lamp socket in Annex F, and the information for the design of a lamp luminaire in Annex G. Furthermore, the relation between the positioning of a linear LED lamp and that of other LED modules, LED lamps, etc. is described in Annex H.

NOTE 2 “120 V ripple free d.c.” means a DC system of 120 V DC of maximum peak voltage 140 V or less based on the definition of the sine wave ripple component of not more than 10 % (effective value).

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this Standard. The most recent editions of the standards (including amendments) indicated below shall be applied.

JIS B 7516 *Metal rules*

JIS B 7601 *Trip balances*

JIS C 0920 *Degrees of protection provided by enclosures (IP Code)*

JIS C 1302 *Insulation resistance testers*

- JIS C 7550 *Photobiological safety of lamps and lamp systems*
- JIS C 7709-1 *Lamp caps and holders together with gauges for the control of interchangeability and safety Part 1: Lamp caps*
- JIS C 7709-2 *Lamp caps and holders together with gauges for the control of interchangeability and safety Part 2: Lampholders*
- JIS C 7709-3 *Lamp caps and holders together with gauges for the control of interchangeability and safety Part 3: Gauges*
- JIS C 8105-1 *Luminaires—Part 1: General requirements for safety*
- JIS C 8121-1 *Miscellaneous lampholders—Part 1: General requirements and tests*
- JIS C 8147-1 *Lamp controlgear—Part 1: General and safety requirements*
- JIS C 8154 *LED modules for general lighting—Safety specifications*
- JIS C 60695-2-10 *Fire hazard testing—Glow-wire apparatus and common test procedure*
- JIS P 0001 *Paper, board and pulp—Vocabulary*
- JIS Z 8113 *Lighting vocabulary*
- JIS Z 9015-1 *Sampling procedures for inspection by attributes—Part 1: Sampling schemes indexed by acceptance quality limit (AQL) for lot-by-lot inspection*

3 Terms and definitions

For the purpose of this Standard, the terms and definitions given in **JIS Z 8113**, clause 2 of **JIS C 8121-1** and the following apply.

3.1 LED (Light Emitting Diode)

solid state device embodying a p-n junction, emitting optical radiation when excited by an electron current

3.2 LED package

integrating an LED with the terminal for external connection so that the LED can be mounted on a printed circuit board, etc. in order to connect the LED to other circuits, parts, etc., or such integrated package

3.3 LED module

device composed by mounting LED packages on a substrate, or arranging two or more LEDs in a plane or in three dimensions so that they can be treated as one unit, consisting of many mechanical, electrical and optical elements, or its aggregate

3.4 non-integrated LED lamp

LED lamp provided with a cap and an LED package or an LED module but not having an integrated control gear required for stable lighting operation, which would lose its functions once they are disassembled permanently

3.5 non-integrated linear LED lamp

non-integrated LED lamp of which the shape is linear

NOTE : Linear LED lamp includes “non-integrated linear LED lamp” that is without integrated control gear and “integrated linear LED lamp” that is outside of the scope of this Standard

3.6 non-integrated linear LED lamp with GX16t-5 cap

non-integrated linear LED lamp equipped with GX16t-5 cap

3.7 type

lamps of the same group having the same light source colour

3.8 group

lamps having the same cap, same electric characteristics, same dimensions and same lighting method

3.9 rated value

quantity value for a characteristic of a linear LED lamp for specified operating conditions, assigned by the manufacturer or responsible vendor (hereafter referred to as “the manufacturer, etc.”) or specified in the applicable product standard

NOTE : “The manufacturer or responsible vendor” as stated in this Standard is equivalent to “Notifying Supplier” as given in the Electrical Appliances and Materials Safety Act, and is defined as the manufacturer of products in Japan and the vendor (wholesale, etc.) who performs import enterprises.

3.10 cap surface temperature rise, Δt_s

surface temperature rise, from the ambient temperature, of a cap equipped with the power feeding part of a lamp

It is expressed in kelvin (K).

3.11 live part

conductive part which may cause an electric shock in normal use

3.12 type test

one or a series of inspection that is performed using type test samples in order to check that the design of a product conforms to the requirements of related standards

3.13 type test sample

one sample or samples comprised of population of the same group that are submitted by the manufacturer, etc. for the purpose of a type test

4 General requirements

The general requirements shall be as follows.

- a) The linear LED lamps shall be so designed and manufactured that in normal use they function safely without causing any danger to the user or surroundings.
- b) The structure of a linear LED lamp shall be such that it cannot be easily disassembled since disassembly may impair safety and performance.

5 Marking

5.1 Marking on body

The following matters shall be marked conspicuously and indelibly on the linear LED lamp. Furthermore, the marking, when the test is performed in accordance with **19.2 a)**, shall be readable, and when the test is performed in accordance with **19.2 b)**, shall be legible.

- a) Name of the manufacturer or responsible vendor, or its abbreviation
- b) Rated wattage (it is expressed in “W” or “watts”)
- c) Type

5.2 Marking on package, etc.

The following matters shall be marked on the package or stated in the operation manual. Furthermore, the marking, when the test is performed in accordance with **19.2 a)**, shall be readable.

- a) Name of the manufacturer or responsible vendor, or its abbreviation
- b) Rated wattage (it is expressed in “W” or “watts”)
- c) Type
- d) Restrictions, if any, e.g. lighting direction
- e) Rated lamp current (the unit is expressed in “A” or “ampere”)
- f) Matters that are relevant among those in Annex B and matters in Annex C

6 Structure, mass and dimensions

6.1 Structure of cap of linear LED lamp

6.1.1 General

The cap used for a linear LED lamp shall be the GX16t-5 cap specified in **JIS C 7709-1**, and shall consist of GX16t-5 (A) having a current-carrying terminal (hereafter referred to as “cap for energization”) and GX16t-5 (B) having the function of only holding mechanically (hereafter referred to as “cap for non-energization”).

6.1.2 Adhesion strength of cap (torsion moment)

The cap and the body of a linear LED lamp shall be adhered with structure such that they are not separated during use.

The adhesion strength between the component of both caps of the unused linear LED lamp and the part handled when detaching and attaching the linear LED lamp, when tested in accordance with **19.3.1.2**, shall endure the test and there shall be no rotational movement exceeding an angular displacement of 6°.

Furthermore, the sample shall satisfy the requirement for the protection against electric shock specified in clause **7** after the cap adhesive strength test.

6.1.3 Polarity of feeding terminal of cap

The feeding terminal of a cap shall have a function that can light normally either when current is flowed between cap pins forward or when current is flowed backward. Generally, this function can be realized by forming a full wave rectifying circuit using a bridge diode.

The linear LED lamp, when tested in accordance with **19.3.1.3**, shall light normally.

6.2 Structure of linear LED lamp

The structure of a linear LED lamp shall satisfy the following.

- a) **Insulating material** The insulating material of the outline and inner part in a linear LED lamp shall be in accordance with clause **15** of **JIS C 8154**.
- b) **Strength of lamp** The physical strength of a linear LED lamp against deformation shall be such that safety during use is not impaired. The physical strength against deformation shall satisfy the following.
 - 1) **Change of length due to temperature change** When a linear LED lamp is measured in accordance with **19.3.2 a)**, the change of the distance between cap faces (dimension A shown in table 1) shall not exceed 2.0 mm.

NOTE : The information for the design of a lamp luminaire concerning the change of length due to temperature change of the linear LED lamp is given in Annex G.

- 2) **Deflection of lamp** The deflection due to dead weight of a linear LED lamp, when the test is performed in accordance with **19.3.2 b)**, shall not exceed 10 mm in the central part.

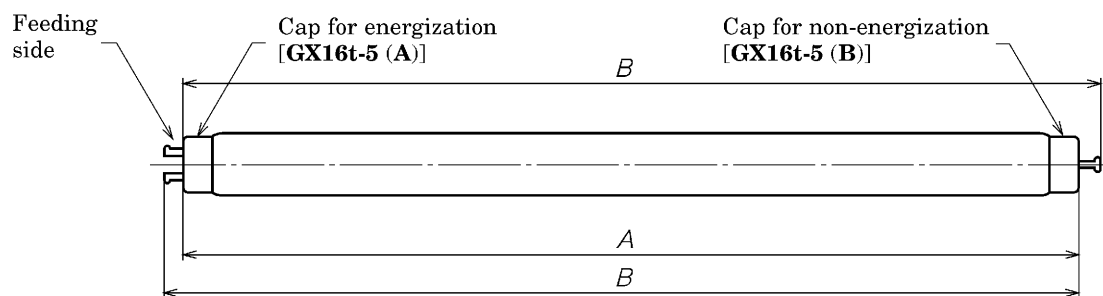
6.3 Mass of linear LED lamp

The mass of a linear LED lamp, when the measurement is performed in accordance with **19.3.3**, shall not exceed 500 g.

6.4 Dimensions of linear LED lamp

In order for a linear LED lamp to be securely mounted on a luminaire, the dimensions of a linear LED lamp, when measured in accordance with **19.3.4**, shall conform to the values stated in table 1.

Table 1 Dimensions of linear LED lamp



Unit: mm

Division of lamp length	A	B	
	Maximum	Minimum	Maximum
580	581.3	586.0	588.4
1 198	1 199.4	1 204.1	1 206.5

7 Protection against electric shock

The protection against electric shock of a linear LED lamp shall be as follows.

- The linear LED lamp shall be of such a structure that, when it is tested in accordance with **19.4** with the lamp installed as in normal use and with the luminaire opened for lamp replacement if it cannot be opened by hand but can be opened using a tool, no live parts are accessible.
- Excluding electric contacts of a linear LED lamp, exposed metal part on the surface of the lamp shall not be live parts.
- The linear LED lamp shall satisfy either of the following.
 - For a translucent lamp cover, no easily broken material such as glass shall be used.
 - When a material easily broken such as glass is used for the translucent lamp cover, the accessible live parts shall not be exposed when it is broken, or energization shall be interrupted.
- When the test is performed in accordance with **19.5.1** and **19.5.2** with the conductive parts of a linear LED lamp placed on the position with the highest possibility of electric shock within the range where it moves without using a tool, the requirements of **8.2** and **8.3** shall be satisfied.

8 Insulation resistance and withstand voltage

8.1 General

The insulation resistance and withstand voltage shall be maintained between the current-carrying part of a linear LED lamp and the part accessible to human hands (accessible part). Furthermore, the accessible part also includes the metal part in the cap for non-energization.

NOTE : The reason that the metal part in the cap for non-energization is included in the accessible part is to ensure safety even in a state of not being normally mounted (when only the cap for energization is mounted).

8.2 Insulation resistance

The insulation resistance value between the current-carrying part of the cap for energization and the accessible part of a linear LED lamp, when the test is performed in accordance with **19.5.1**, shall be 4 MΩ or more.

8.3 Withstand voltage

On the creepage surface between the current-carrying part of a linear LED lamp and the accessible part, when the test is performed in accordance with **19.5.2**, dielectric breakdown, flashover, etc. shall not occur.

9 Cap surface temperature rise

The surface temperature rise of cap for energization (Δt_s), when the test is performed in accordance with **19.6**, including during test, shall not exceed the value specified in table 2.

Table 2 Surface temperature rise of cap for energization

Unit: K

Cap for energization	Cap surface temperature rise (Δt_s)
GX16t-5(A)	95

10 Heat resistance

10.1 General

The body of a linear LED lamp and both caps shall have sufficient heat resistance. Furthermore, the insulator that constitutes the outline for protection against electric shock and the insulator that holds the conductive part at the predetermined position shall have sufficient heat resistance.

The heat resistance shall be in accordance with **10.2** and **10.3**.

10.2 Heat resistance of insulator

For the insulating material for protection against electric shock of a linear LED lamp and the insulating part holding the live part, when the test is performed in accordance with **19.7.1**, the diameter of the trace shall not exceed 2 mm.

10.3 Heat resistance of cap

The heat resistance of both caps, when the test is performed in accordance with **19.7.2**, shall satisfy the following.

- a) There shall be no visible looseness, cracking, expansion or contraction of the cap pin.

- b) The dimensions of a cap shall satisfy the provision of **6.1.1** even after the test.
- c) The insulation resistance shall satisfy the provision of **8.2**.
- d) The withstand voltage shall satisfy the provision of **8.3**.

11 Burning resistance

Parts of insulating material retaining live parts in positions and external parts of insulating material providing protection against electric shock shall be sufficiently resistant to heat.

When the test is performed in accordance with **19.8**, any flame or glowing of the specimen shall extinguish within 30 s of withdrawing the glow-wire, and any flaming drop shall not ignite a piece of the tissue paper, specified in 6228 in **JIS P 0001**, spread out horizontally 200 mm ± 5 mm below the specimen.

12 Ingress of dust, solid objects and moisture

Linear LED lamps shall be given a symbol mark warning against installing the lamp in a luminaire in an environment with much dust, or exposed to water splash, etc. (symbol marks are under consideration in **IEC**).

NOTE : The above specification is provided for necessity of symbol mark of prohibition against using a lamp in an environment subjected to water splashes, since not all the linear LED lamps within the scope of this Standard can withstand use in such environment.

13 Creepage distance and clearance

The creepage distance and clearance, when the test is performed in accordance with **19.10**, shall conform to Chapter 11 of **JIS C 8105-1**.

Unless otherwise specified, the creepage distance and clearance of the light source circuit board incorporated in the inside of a linear LED lamp and the inside conductive parts shall be in accordance with **JIS C 8147-1** and the related standards of parts.

14 Safety under fault conditions

The linear LED lamp shall not impair safety under fault conditions that may occur in normal use. For the safety under fault conditions, when the test is performed in accordance with **19.11**, the linear LED lamp shall operate safely and shall satisfy the following.

- a) It shall be safe for 15 min under the overpower condition in **19.11 a**).
- b) Flame, smoke or combustible gas shall not be generated. Whether the gas that is generated from the parts of equipment is combustible shall be checked by a high frequency spark generating device. The misty jet of electrolyte due to safety valve operation of an electrolytic capacitor is not regarded as smoking.
- c) After the test of **a**), when the test is performed using the test finger in **19.4**, the accessible parts shall not become a live part.
- d) When the linear LED lamp has an automatic protective element or a power limit function, they shall work normally.