

JIS

JAPANESE INDUSTRIAL STANDARD

Luminaires

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In the event of any doubt arising,
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Luminaires

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1. Scope

This Japanese Industrial Standard specifies basic requirements for general luminaires with a rated voltage of a.c. 600 V or less employing incandescent lamps (including tungsten halogen lamps), fluorescent lamps, HID lamps and/or low pressure sodium vapour lamps as the light source.

- Remarks 1. Luminaires shall comply with the Ministerial Order which determines technical standards for electrical appliances and materials.
2. If there is a provision for the same item in a detail specification of luminaire, the detail specification precedes.
 3. In general, the following luminaires are excluded from the general luminaires covered by this standard:
 - (1) Luminaires which are used in areas where the ambient temperature is normally very high or very low.
 - (2) Luminaires which are used in very dusty areas.
 - (3) Luminaires which are used in areas where corrosive gas or the like comes out.
 - (4) Luminaires which are used in areas where inflammable gas or the like comes out.
 - (5) Luminaires which are used in areas where they are subjected to severe vibration.
 - (6) Luminaires which are submerged in water while in service.
 - (7) Luminaires and signal lights for vehicles.
 - (8) Luminaires for emergency lighting based on the Building Standard Law, and luminaires for guide lamps based on the Fire Service Law.
 - (9) Luminaires for taking-off and landing of aircraft and obstruction light for aircraft.
 - (10) Luminaires for medical use.
 - (11) Luminaires intended to be incorporated in machinery, furniture, etc.
 - (12) Luminaires for photography.
 4. If there is the same item in the JIS for component, the standard may be followed.

Applicable Standards and Corresponding International Standard: See page 47.

2. Definitions

For the purpose of this standard, in addition to the definitions specified in JIS Z 8113, the following principal definitions apply:

- (1) main part (of luminaire) That which is fixed to the mounting surface, or is directly suspended from it, or standing on it or furniture. It may or may not carry the lamps, lampholders and auxiliary gear (starter, lighting gear, etc.).

Remark: In general, the part carrying the lampholders in a luminaire for incandescent lamps is the main part.

- (2) ordinary luminaire A luminaire without special protection against dust or moisture.
- (3) general purpose luminaire A luminaire which is not designed for a special purpose.

Remark: General purpose luminaires mean suspended ones, directly fixed ones and spot lights, etc., and do not include special purpose ones such as those for rough usage at building construction site or factories, for photography and for use in water.

- (4) fixed luminaire A luminaire which cannot easily be moved from one place to another, either because the fixing is such that the luminaire can only be removed with the aid of a tool, or because it is intended for use out of easy reach.
- (5) portable luminaire A luminaire which can easily be moved from one place to another while connected to the supply. A luminaire which is connected to the supply by the plug and fixed to the support by means of an easily removable device, is included. It is also called transferable luminaire.
- (6) incandescent lamp luminaire A luminaire which employs incandescent lamp(s) as the main light source.
- (7) discharge lamp luminaire A luminaire which employs discharge lamp(s) as the main light source.
- (8) fluorescent lamp luminaire A luminaire which employs fluorescent lamp(s) as the main light source.
- (9) HIS luminaire A luminaire which employs HID lamp(s) (high pressure mercury lamp, high pressure sodium lamp and metal halide lamp) as the main light source.
- (10) luminaire for incandescent and auxiliary discharge lamps A luminaire which employs incandescent lamp(s) as the main light source and discharge lamp(s) is built into it as the auxiliary.
- (11) luminaire for discharge and auxiliary incandescent lamps A luminaire which employs discharge lamp(s) as the main light source and incandescent lamp(s) (excluding all-night lamps) is built into it as the auxiliary.

Remark: A luminaire accommodating incandescent lamp(s) as the stabilizing element of fluorescent lamp(s) is not called a luminaire for discharge and auxiliary incandescent lamps.

- (12) cord suspended luminaire A fixed luminaire suspended by cord(s). It is also called a cord pendant.
- (13) chain suspended luminaire A fixed luminaire suspended by chain(s). It is also called a chain pendant.
- (14) pipe suspended luminaire A fixed luminaire suspended by pipe(s). It is also called a pipe pendant.
- (15) surface mounted or suspended luminaire A luminaire which can be used in both ways, namely as surface mount type and pendant type by means of suitable fixtures.
- (16) high illuminance type (luminaire for fluorescent lamp) A luminaire accommodating a lighting circuit which increases the current flowing through the lamp circuit to a value greater than the standard value of the applicable lamp, so that the lamp wattage and luminous flux are increased.
- (17) high output type (luminaire for fluorescent lamp) A luminaire for use with a high output fluorescent lamp.
- (18) starter type (luminaire for fluorescent lamp) A luminaire which has a circuit to start the lamp by preheating the cathode of lamp by means of the starter operated manually or automatically.
- (19) rapid start type (luminaire for fluorescent lamp) A luminaire which has a circuit to start the lamp rapidly without use of any starter or application of a high voltage, by preheating the cathode of lamp with a cathode heating mechanism provided as a part of the ballast.
- (20) class 0 luminaire A luminaire which has no earth terminal or earthing conductor and is protected only by basic insulation as a whole.
- (21) class I luminaire A luminaire which is protected only by basic insulation as a whole, and equipped with an earth terminal or any connecting means with earthing conductor, or a cord containing earthing conductor and a plug with earthing contact.
- (22) class II luminaire A luminaire in which double insulation is used (including the one in which reinforced insulation is used for the part where application of double insulation is impracticable) or a luminaire the enclosure of which is entirely composed of durable and robust insulating materials, or a luminaire which has a combination of the said insulations.
- (23) class III luminaire A luminaire which is used by connecting to a power supply with a rated voltage not exceeding a.c. 30 V.
- (24) luminaire wiring Wiring (including printed-circuit board) which is a component of luminaire necessary for its operation. Luminaire wiring is normally divided into external wiring and internal wiring.

- (25) external wiring Wiring outside the enclosure of luminaire but forming a part of the luminaire.
- (26) internal wiring Wiring inside the enclosure of luminaire, which forms the circuits between such accessories in luminaire as power supply terminals, light source, transformer, etc. and the wiring specified below.
- (a) Fixed wiring which is partially exposed on some parts of luminaire such as lampholder mounting part where access of a man is rare under normal service conditions.
- (b) Wiring firmly fixed in a groove outside the luminaire without protruding from the surface of groove.
- (c) Lead wire of lampholder for circular type lamp.
- (27) supply wire Wiring of a luminaire intended to be connected with an indoor or outdoor wiring.
- (28) normal position The working position of a luminaire instructed by the manufacturer for users in the instruction manual or the like, so as to guarantee the performance of the luminaire.
- (29) basic insulation Insulation necessary for essential function of luminaire, which provides basic protection against electric shock.
- (30) supplementary insulation Independent insulation additionally applied to basic insulation or basic insulated part in order to provide sure protection against electric shock in case of a failure of basic insulation.
- (31) basic insulated part A metal part insulated from live parts by basic insulation.
- (32) double insulation Insulation comprising both basic insulation and supplementary insulation.
- (33) reinforced insulation A basic insulation system the electrical and mechanical performances of which are reinforced at least equivalent to double insulation, which is only applicable to a part of luminaire where application of double insulation is difficult due to its construction.
- (34) working voltage The highest r.m.s. voltage which may occur across any insulation at rated input voltage, transients being neglected, in open circuit conditions or during normal operation.
- (35) standard ballast A practical ballast which shows the values close to respective medians in the measurement of characteristics of combined lamp and ballast when it operates a lamp.

Remark: This is used to select a test light source for testing a light source not specified in JIS.

3. Classification

Luminaires are classified as given in Table 1.

Table 1

Classification by	Kinds and types
Service condition	Fixed luminaire, portable luminaire
Type of mounting or working state	Directly mounted type, suspended type, recessed type
Protection against electric shock	Class 0, class I, class II, class III
Protection against ingress of water	Waterproof [drip-proof (type), rain-proof (type), splash-proof (type), jet-proof (type), watertight (type), moisture-proof (type)], ordinary (type)
Applicable light source	Incandescent lamp (including tungsten halogen lamp), fluorescent lamp, HID lamp, low pressure sodium lamp

4. Test Requirements

4.1 Atmospheric Conditions for Testing Unless otherwise specified, the atmospheric conditions for testing shall be the ordinary temperature (20 ± 15 °C) specified in JIS Z 8703.

4.2 Test Light Source

- (1) When applicable light source is the fluorescent lamp specified in JIS C 7601, the tests shall be carried out by using the test lamps specified in JIS C 8108, on all kinds of fluorescent lamp marked on the luminaire.
- (2) When applicable light source is a fluorescent lamp not specified in JIS C 7601, a lamp which shows lamp current and lamp wattage within a range of ± 2.5 % from the respective rated values when tested with a standard ballast shall be used as the test lamp.
- (3) When applicable light source is a fluorescent lamp accommodating ballast, a lamp whose lamp current and lamp wattage fall within a range of ± 2.5 % from the respective rated values shall be used as the test lamp.
- (4) When applicable light source is a mercury lamp or low pressure sodium lamp, the appropriate test lamp specified in JIS C 8110 shall be used as the test lamp, and when it is other HID lamp, the appropriate lamp whose lamp current and lamp wattage fall within a range of ± 2.5 % from the respective rated values shall be used.
- (5) When applicable light source is an incandescent lamp or a tungsten halogen lamp, a lamp with the maximum rated power consumption applicable to the luminaire shall be used as the test light source.

5. Construction

The construction of luminaires shall be as specified below. The verification of conformance to each item shall be carried out by visual check and by a simple and adequate method. In some cases, the decision shall be made by putting the conformance to the requirements in other items together.

5.1 Electrical Construction The electrical construction shall comply with the following requirements:

- (1) The live part, the light source and lampholder being excluded, shall not involve a risk of electric shock under service state and at the time of replacement of the light source or the like.
 - (a) The mounting position of lampholder (depth) shall be set so that the base of light source becomes dead when it touches the metal parts accessible by man (reflector or the like) and to have enough insulation distance between the screw shell of lampholder or the like.
 - (b) The opening provided on accessible metal reflector or the like for the light source or the like shall have a size not to allow a man to touch the live part at attaching and detaching the light source same as required in (a).
 - (c) The opening of accessible metal reflector shall be protected by insulating materials to avoid electrical connection even when the (live) base touches.

Remarks 1. The part in a circuit connected to the secondary of an insulating transformer where the voltage is not exceeding 30 V in a.c., or the part which passes an earth current not exceeding 1 mA when earthed with a wire of 1 k Ω , is excluded.

2. If earth current of auxiliary starting conductor is exceeding 1 mA, the auxiliary starting conductor may be covered with insulating materials.
 3. The words "not involve a risk of electric shock at the time of replacement of light source" means to provide a measure to avoid that the live base touches accessible metal parts at the time of replacement, attaching and detaching of the light source, all night lamp, etc.
- (2) The minimum insulation distances (including creepage distances) between live parts of different polarity, between live parts and dead metal parts, and between live parts and accessible dead metal parts shall comply with the Attached Table 2 in Separate Table 8 of the Ministerial Order Determining Technical Standards of Electrical Appliances and Materials, and the minimum insulation distance of external terminals of a capacitor shall comply with the Attached Table 3 in Separate Table 8 of the Ministerial Order Determining Technical Standards of Electrical Appliances and Materials.

The measurement of clearance shall be carried out, a force 30 N being applied to minimize the clearance under test an outside surface of luminaire, and a force 2 N to that inside of luminaire.

- (3) A luminaire with a rated voltage or working voltage (including rated secondary voltage) exceeding 150 V or of waterproof type shall provide a protective earth terminal or protective earth lead at an adequate position, and the marking ($\oplus$, $\pm$, PE, E, G, EARTH, etc.) denoting earthing termination shall be indelibly marked on itself or nearby it. However, the following luminaires are excepted.

Remark: The ballast or transformer and accessible metal parts shall be surely connected electrically. However, if the ballast is completely insulated from metal parts of luminaire and the enclosure of ballast or transformer is not accessible by man, such case is an exception.

- (a) Class II luminaire and class III luminaire.
 - (b) Luminaires which have external wiring for connection with power supply equipped with 3-pole or 4-pole plug connector, one pole of which is earthed when connected to the power supply.
- (4) No abnormality such as deformation or deterioration in color shall appear at every part of luminaire, and the characteristics and endurance of the light source shall not remarkably be affected, due to the temperature rise during operation.
- (5) The temperature rise at the joint of luminaire wiring and power supply wire shall, as a rule, be not more than 30°C.
- (6) Luminaires of class III and those operate at a.c. 30 V or less by means of accommodated insulating transformer shall comply with the following requirements:
- (a) No short circuit shall appear between live parts of different polarity when a luminaire is touched by the test finger shown in Attached Fig. 1.
 - (b) A luminaire which may cause a danger if the live parts of different polarity are short circuited, shall be equipped with a protective device (fuses or the like).
 - (c) It is preferable that the primary side of such luminaire that operates at a.c. 30 V or less by means of accommodated insulating transformer complies with the construction of class II.

5.2 Requirements for Class II Luminaire

5.2.1 Double Insulation

- (1) The live parts shall be insulated from the accessible surface of enclosure by means of both the basic insulation and the supplementary insulation.
- (2) The supplementary insulation shall completely satisfy necessary performances for ensuring safety even in the event of a failure of basic insulation.

- (3) The basic insulation and the supplementary insulation shall be physically separated.
- (4) The insulating materials for supplementary insulation shall be robust and durable, and shall have electrical, thermal and mechanical performances at least equivalent to those of insulating materials for basic insulation.
- (5) When the enclosure is made of insulating materials, such small metal parts as screws, rivets and nameplates, and such metal parts as guards⁽¹⁾ on the surface of enclosure shall be insulated from the live parts by the creepage distance and the clearance at least equivalent to those specified for the reinforced insulation.

Note (1) The guard or the like dealt with here means, as a rule, only such attachment that can easily be attached and detached by the user, and that the functions as class II luminaire are ensured when being detached.

5.2.2 Reinforced Insulation

- (1) Only in such case that the principal double insulation specified in 5.2.1 is not practically applicable for components, accessories, etc. of luminaire due to their construction and size, reinforced insulation may be applied.
- (2) This insulation system shall have, as one insulation system, electrical and mechanical performances at least equivalent to that of combination of basic insulation and supplementary insulation.
- (3) Reinforced insulation is applicable to the following parts:
 - (a) Lampholder
 - (b) Switch
 - (c) Terminal block
 - (d) Bare live parts such as terminals of components having double insulation or reinforced insulation inside luminaire.
 - (e) Parts for which double insulation is impractical.

5.2.3 Construction of Class II Luminaire

- (1) The components having double insulation or reinforced insulation shall be firmly fixed not to be loosened by vibration or shocks anticipated during service.
- (2) The insulation distance of supplementary insulation shall be at least equivalent to that of the basic insulation [5.1 (2)]. The insulation distance of reinforced insulation shall be not less than two times that of basic insulation.

- (3) The test finger shown in Attached Fig. 1 shall not come in contact with the live parts or basic insulated parts through the opening on outer surface of enclosure, under normal service conditions. Further, there shall be no live part or basic insulated part which can be touched by the test finger shown in Attached Fig. 1, when the transparent cover or the like is opened for replacement of the light source or the like, the cap of light source and the screw shell of lampholder being excluded.
- (4) No protective earth terminal nor protective earth lead shall be provided.
- (5) Glow starter of type P with metal enclosure or photoelectric automatic switch shall not be exposed outside the enclosure of luminaire.
- (6) No connector nor terminal block for connection with the power supply wire shall be provided on the enclosure of luminaire.

5.3 Requirements for Class III Luminaire

- (1) The luminaire shall be so constructed that the supply voltage is fed to the lamp at an a.c. voltage not exceeding 30 V through the insulating transformer.
- (2) No connector which can be connected with general power supply shall be provided.
- (3) A fuse shall be provided at a position on the luminaire nearest to the power supply as far as possible, except the case that a fuse is provided in the secondary side of the exclusive insulating transformer connected.

5.4 Mechanical Construction The mechanical construction of luminaires shall comply with the following requirements:

- (1) The luminaire shall be constructed solidly and durably using materials of good quality.
- (2) The luminaire for fixed light shall be capable of being firmly mounted on structural materials.
- (3) If there is possibility of corrosion on metal parts of luminaires, suitable corrosion-proof treatment such as metal coating and painting shall be applied.
- (4) Clamping procedure of the part which is opened and closed for replacing or cleaning of light source shall be simple and sure without causing danger.
- (5) Luminaire shall be so constructed that insects, dust, etc. which enter into it do not adversely affect its working.
- (6) Luminaires shall be so constructed that the assembly, mounting and maintenance can be made easily and safely.
- (7) Luminaires shall be so constructed that there is no contact failure, dislocation nor any looseness of light source, no damage on various parts due to vibration, shock, etc. which may be expected under normal service conditions.

- (8) The lampholder mounts or joints of main part of luminaire, which are liable to rotate and damage the coverings of wires as the result, shall provide adequate means to prevent rotation or loosening.
- (9) The parts easily accessed by hands during use such as edges of shade or reflector shall be so finished that they do not injure human hands.
- (10) In incandescent lamp-stand employing a light source of 40 W or more, the space between the surface of light source and the inside of shade shall be not less than 50 mm when they become most close condition. However, the above requirement does not apply when sufficient heat resistant materials are used.
- (11) The cord used for cord suspended luminaire shall be as given in Table 2 correlating with the mass of luminaire (including the mass of cord).

Table 2

Unit: kg

Mass of luminaire	Kind of cord
3 and under	Ordinary cord
Over 3 to 5 incl.	Reinforced cord
Over 5	Reinforced cord (load shall not be applied on electrically connected part of rosette)

- (12) Suspended luminaire shall withstand a static load corresponding to 4 times the mass of the luminaire (80 N, if such static load is less than 80 N) uniformly applied between the luminaire and the suspending fixture for 1 h. The said mass of luminaire means that excluding the suspending fixture.
- (13) Pull-string of suspended luminaire shall have appropriate strength corresponding to the strength of suspending cord, chain (or string), and the mass of the luminaire, so that the luminaire will not fall down nor be damaged by excess pulling of the string.
The mount of the pull-string shall lie at a position where the user can fix the string easily, and the knob shall not adversely affect other parts due to repulsive force of the pull-string.
- (14) The parts made of breakable materials such as porcelain and glass (excluding light source and lampholder) shall be so designed that no accessible live parts appear even if such parts are removed, assuming their possible falling down by breakage.
- (15) Luminaires shall be so constructed that no force which will result in harmful mechanical or thermal strain is applied to the light sources, except such slight ones as lamp catching type shade holders.
- (16) Luminaires for metal halide lamp shall be used with the protective shield attached. However, if no need of protective shield is described in the instruction manual of the lamp, such case is excluded.

- (17) Luminaires employing ball lamp as the light source should be sized referring to the dimensions given in Reference of JIS C 7530.
 - (18) Luminaires equipped with adjusting device for height, rotation and bending, shall not cause any rapid motion which will result in danger, even if the clamping device adjustable without tools is loosened carelessly.
 - (19) The free moving metal parts of portable luminaire shall satisfy the requirements given below after they have been operated 1000 times (100 times for flexible tube) under normal conditions. Such parts which will not move without operation of adjusting mechanism such as screw and cam, may be tested by an appropriate procedure to the construction.
 - (a) The relative disconnection of component wires of the wire at that portion shall be not more than 30 %, and there shall be no harmful damage of the covering wire.
 - (b) There shall be no remarkable looseness and no harmful damage on the movable parts.
- Remarks 1. One reciprocating motion shall be counted as one time, and one time per 5 sec is the standard rate.
2. When the movable part has any control mechanism, the mechanism shall be controlled suitably while carrying out the test.
- (20) Outdoor luminaires shall have either one of drips-proof, rain-proof splash-proof, jet-proof or watertight construction.

5.5 Luminaire Wiring

5.5.1 Wires to be Used The wires or the like used for wiring of luminaire shall be as follows:

- (1) The internal wiring shall have an adequate ampacity and an insulation appropriate to the working voltage and the ambient temperature.
- (2) Wires to be used for the external wiring shall be the insulated wires of nominal cross-sectional area not less than 0.75 mm² given in Table 3 or those at least equivalent in their characteristics. However, the insulated wire other than the power supply wire exposed outside the enclosure upto 80 mm is regarded as the internal wiring.

Table 3

Working voltage	Kind of wire	Symbol of wire	Number of JIS
150 and under	Indoor silicone rubber cords	—	—
300 and under	Rubber insulated flexible cords	—	JIS C 3301
	P.V.C. insulated flexible cords	—	JIS C 3306
600 and under	600 V grade p.v.c. insulated wires	IV	JIS C 3307
	600 V heat-resistant p.v.c. insulated wires	HIV	JIS C 3317
	600 V grade silicone rubber insulated glass fiber braided wires	600 V KGB	JIS C 3323
	600 V grade rubber insulated flexible cables	2 CT, 2 RNCT	JIS C 3327
	600 V grade rubber insulated lead wires for electrical machinery and apparatus	600 V LKGB	JIS C 3315
	600 V grade p.v.c. insulated wires for electrical apparatus	KIV	JIS C 3316
	600 V grade p.v.c. insulated and sheathed portable power cables	VCT	JIS C 3312
1000 and under	1000 V grade p.v.c. insulated wires for fluorescent lamps	1000 V FL	JIS C 3309

5.5.2 Wiring of Class II Luminaire The internal wiring of class II luminaire shall comply with the requirements below, in addition to 5.5.1.

- (1) The sheath used for wires of luminaire wiring may be considered as a supplementary insulation if it is not remarkably affected thermally or mechanically inside the luminaire.
- (2) When an insulated wire as the internal wiring comes close to accessible dead metal parts, any of the following measures shall be employed:
 - (a) The accessible dead metal part which may come in contact with the insulated wire shall be lined with insulating materials which have the performance as the supplementary insulation.

- (b) The insulated wire shall be put through a tube made of insulating materials which have the performance as the supplementary insulation. The performance as the supplementary insulation may be prepared by means of an insulating tube and an insulating tape wound thereon.
- (c) The spacing between the surface of the insulated wire and the accessible dead metal part shall at least be maintained at the distance required of supplementary insulation.

Remark: The performance of the support to which the wire is fixed shall comply with the requirements for supplementary insulation.

- (3) The spacing between the bare conductor and the accessible dead metal part shall at least be maintained at the clearance required of the part.

Remark: The performance of support to which the wire is fixed shall comply with the requirements for reinforced insulation.

- (4) The portion where the internal wiring passes through the dead metal part shall be treated not to impair the supplementary insulation.

- (5) The joint of internal wiring shall comply with either of the following means:

- (5.1) The internal wiring shall be fixed in the proximity of the joint.

- (5.2) An insulating barrier shall be provided to avoid contact of the conductor of wire with the accessible dead metal part when the wire falls down.

- (5.3) If it is difficult to follow (5.1) or (5.2), either of the following means shall be employed:

- (a) When connection by screw terminal is employed, the end of wire shall be treated to ensure firm fixing of wire, and then clamped by using the externally toothed washer or the toothed conical washer specified in JIS B 1255, or the screw is completely tightened and sure locking means shall be applied.

- (b) When connection by solder is employed for a portable luminaire, the wire shall not separate from the terminal when a force of 2 N is applied in all directions without soldering, or shall be so treated that there is a given insulation distance if the wire separates.

6. Materials

The materials to be used for luminaires shall comply with the following requirements:

- (1) The synthetic resin and the like used for luminaires (including translucent covers) shall not remarkably deteriorate due to the heat, light, etc. in relation with the service conditions and the position in the luminaire.