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(JELMA/JSA)

**Ballasts for discharge lamps
(excluding tubular fluorescent lamps)**

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Contents

	Page
Introduction	1
1 Scope	1
2 Normative references	1
3 Terms and definitions	2
4 Classification	3
5 Requirements	3
5.1 Safety	3
5.2 Performances	9
6 Tests	10
6.1 General requirements	10
6.2 Test methods	10
7 Inspections	11
7.1 General	11
7.2 Type inspection	12
7.3 Acceptance inspection	12
8 Designation of product	13
9 Marking	13
Annex A (normative) Reference ballasts	14
Annex B (normative) Reference lamps	15
Annex C (informative) Heat endurance of winding	16
Annex D (informative) Protective functions	19

Foreword

This translation has been made based on the original Japanese Industrial Standard revised by the Minister of Economy, Trade and Industry through deliberations at the Japanese Industrial Standards Committee as the result of proposal for revision of Japanese Industrial Standard submitted by Japan Electric Lamp Manufacturers Association (JELMA)/Japanese Standards Association (JSA) with the draft being attached, based on the provision of Article 12 Clause 1 of the Industrial Standardization Law applicable to the case of revision by the provision of Article 14.

Consequently **JIS C 8110:1987** is replaced with this Standard.

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Ballasts for discharge lamps (excluding tubular fluorescent lamps)

Introduction

This Japanese Industrial Standard was established in 1958, and the last revision was made in 1987, after which JIS C 8147-1, JIS C 8147-2-9 and JIS C 8119 conforming to the International Standards have been established. In the revision at this time, the said Japanese Industrial Standards are cited in this Standard to the extent possible. Also, the name of the standard has been changed to “Ballasts for discharge lamps (excluding tubular fluorescent lamps)”.

1 Scope

This Standard specifies magnetic type ballasts for discharge lamps (hereafter referred to as “ballasts”) for operating, the high-pressure mercury vapour lamps specified in JIS C 7604, low pressure sodium vapour lamps specified in JIS C 7610, high-pressure sodium vapour lamps specified in JIS C 7621 and metal halide lamps specified in JIS C 7623 (hereafter referred to as “lamps”) which are to be used in ordinary places, in the circuit with the rated secondary voltage not more than 1 000 V, of the rated frequency 50 Hz or 60 Hz.

This Standard is applicable to ballasts for operating lamps that are not specified in any of the above Japanese Industrial Standards.

NOTE : The heat endurance of windings is described in Annex C and the protective functions, in Annex D.

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 C 1302 *Insulation resistance testers*
- JIS C 1602 *Thermocouples*
- JIS C 4908 *Capacitors for electrical apparatus*
- JIS C 7604 *High-pressure mercury vapour lamps — Performance specifications*
- JIS C 7610 *Low pressure sodium vapour lamps*
- JIS C 7621 *High-pressure sodium vapour lamps — Performance specification*

- JIS C 7623 *Metal halide lamps — Performance specification*
- JIS C 8119 *Ballasts for discharge lamps (excluding tubular fluorescent lamps) — Performance requirements*
- JIS C 8147-1 *Lamp controlgear — Part 1 : General and safety requirements*
- JIS C 8147-2-9 *Lamp controlgear — Part 2-9 : Particular requirements for ballasts for discharge lamps (excluding fluorescent lamps)*
- JIS Z 8113 *Lighting vocabulary*

3 Terms and definitions

For the purposes of this Standard, in addition to the terms and definitions given in JIS Z 8113, the following principal terms and definitions shall apply:

3.1 ballast

device consisting of all or some of transformer, choke-coil, capacitor or the like, to be used for ensuring appropriate operation of the lamp

Sometimes “ballast” may be constructed to include capacitor for power factor improvement, capacitor discharge device, protective device or the like.

3.2 reference ballast

a choke-coil type ballast intended for use as a comparison standard in testing the ballasts and selecting reference lamps

3.3 reference lamp

a lamp which has been sufficiently aged by previous operation for a long period to, so that it can be used as a load in testing the ballasts

3.4 transformer type ballast

a ballast which has functions of transformers

There are some ballasts of this type of which the primary windings are insulated from the secondary windings inside by means of a insulation transformer, while there are others with no such insulation.

3.5 rated input voltage

the reference value of voltage to be applied across input terminals of a complete circuit comprising the ballast and lamp, which is marked on the ballast

3.6 rated frequency

the reference value of frequency of the voltage to be applied across input terminals of a complete circuit comprising the ballast and lamp, which is marked on the ballast

3.7 rated input current

the reference value of stabilized input current, when the ballast is operated under the

rated input voltage of the rated frequency employing the reference lamp as the load, which is marked on the ballast

3.8 rated input power

the reference value of stabilized input power, when the ballast is operated under the rated input voltage of the rated frequency employing the reference lamp as the load, which is marked on the ballast

3.9 rated secondary voltage

the reference value of secondary no-load voltage, when the rated input voltage of the rated frequency is applied to a transformer type ballast, which is marked on the ballast

3.10 rated secondary current

the current that passes through the lamp when the rated input voltage of the rated frequency is applied to a transformer type ballast, which is the reference value of current of the applicable lamp marked on the ballast

3.11 rated secondary short-circuit current

the reference value of secondary short-circuit current, when the rated input voltage of the rated frequency is applied to a transformer type ballast, which is marked on the ballast

4 Classification

Ballasts are classified as given in table 1.

Table 1 Classification

Classification according to applicable lamp	Classification according to use	Classification according to power factor
High-pressure mercury vapour lamp ballast	Built-in	Low power factor type
Low-pressure sodium vapour lamp ballast	Indoor use	High power factor type
Metal halide lamp ballast	Outdoor use	
High pressure sodium vapour lamp ballast		

5 Requirements

5.1 Safety

5.1.1 Constructions

The construction shall be as specified in 15.1 (tree, cotton, silk, paper, and similar fibred material) of JIS C 8147-1 and the following requirements.

a) For ballasts with the outer case filled with insulating compound (except the part

containing a capacitor), there shall be no possibility of developing leakage. The ballasts conforming to the provisions of 5.1.11, however, may be without this insulating compound.

- b) The outdoor type ballast shall not be, as the lamp is in use, liable to intrusion of rain water into the case, and the insulated bushing shall be safe from the splashing of rain water.
- c) Parts made of iron or steel other than stainless steel, except the iron core, shall be treated to prevent rusting.
- d) Unless such adequate protective devices as protective bushing is used, the part where the lead wire passes through the outer case or the enclosure shall be chamfered or suitably treated so as not to damage the lead wire. When such part is of non-metallic material and smooth enough not to damage the lead wire, this requirement does not have to be applied.

5.1.2 Terminals

The terminal shall comply with the following requirements:

- a) The terminal except that for earthing shall consist of a screw or bolt-nut of copper or copper alloy with nominal diameter not less than 4 mm (not less than 3.5 mm in the case of press set screw) by which an insulated wire with conductor diameter of 2 mm is securely fixed. However, terminals for built-in ballasts may be a terminal of copper or copper alloy as prescribed below which can ensure electrical connection of the applicable wire specified in table 1.2 (Classification of used wire) of Annex 1 of JIS C 8147-1 or may be the following 1) or 2). Also, terminals for indoor ballasts may be a terminal of copper or copper alloy as prescribed below which can ensure electrical connection of the applicable wire specified in table 1.2 of Annex 1 of JIS C 8147-1 or may be the following 2).
 - 1) Lug terminals or eyelets of adequate size for soldering.
 - 2) The terminals of robust construction that can clamp the conductor of wire by mechanical means to make contact, and that the contact resistance calculated from the voltage drop and the current flows through the joint between the conductor of wire and the terminal when the rated voltage of the rated frequency is applied to the ballast becomes not more than 30 mΩ or terminals similar to these.
- b) The terminals except that for earthing shall sufficiently withstand the load by itself when the applicable wire is connected to the terminal and a tensile load of 20 N is gradually applied in the direction of connection and the direction perpendicular thereto.

5.1.3 Protective earth

The protective earth shall be as specified in 9.B and 9.C of JIS C 8147-1 and on the earth terminal itself (except for earthing terminal screws that are easily removable) or in close proximity to it, the indication that the terminal is for earthing ($\oplus$, $\perp$, P.E, E, G, earth, earthing or earthing terminal) shall be indelibly marked.

5.1.4 Lead wires

The lead wires shall be as specified in clause 3 of Annex 1 of **JIS C 8147-1** and the following requirements.

- a) For ballasts for outdoor use with the rated input voltage or rated secondary voltage of 300 V or under, the wires for outdoors use specified in table 1.2 of Annex 1 of **JIS C 8147-1**, in the column of “Over 300 V up to and incl. 600 V”, shall be used.
- b) The conductor shall be a stranded wire.
- c) The length of the lead wire outside of the ballast shall be not less than 150 mm. However, lead wires used in a built-in ballast are excluded.
- d) The ballast shall be so designed that the force originated when the lead wire is moved will not be directly applied to the part where the lead wire is connected inside the ballast.
- e) The lead wire shall be securely fitted so as to withstand without being broken and without outside help when a tensile load of 20 N is applied gradually in the outward direction from the outlet. In the ballast for outdoor use, when a tensile load corresponding to its tare (20 N for the tare 2 kg or under and 100 N for that exceeding 10 kg) is applied gradually in each direction of lead wires of the enclosure with all of them put together as one lump, the lead wire shall not break but withstand it.

5.1.5 Capacitor

The capacitor shall be as specified in 4.1 (Capacitor and other parts) of **JIS C 8147-2-9** and the following requirements.

- a) When the lamp is operated by the application of the rated input voltage of the rated frequency on the ballast, and has reached the stable condition, the termination voltage of the capacitor shall not exceed the rated input voltage.
- b) The capacitor for power-factor improvement shall be equipped with a suitable discharge device so that the terminal voltage of the capacitor decreases to 45 V or under within one minute from interruption of the supply circuit. However, such assembly that the said voltage decreases to 45 V or under within the said period due to the circuit characteristics of the ballast is excluded.

5.1.6 Protection from accidental contact with live part

The protection from the accidental contact with a live part shall be in accordance with 10.1 of **JIS C 8147-1** and the following requirements.

- a) The live part (except lead wires and terminals) and iron core of the ballast shall be housed in a metallic outer case. However, the built-in ballast of which the windings are covered with a metallic covering may be exempted from the above requirement. For those ballasts other than built-in, the live metal part shall not be accessible to humans under normal service conditions.
- b) The enclosure and the outer covering of the ballast shall be as follows.

- 1) For the enclosure of the ballast for outdoor use, the nominal thickness of the material shall be 0.8 mm or over. For the ballast having thermosetting resin as the insulating, it may be 0.5 mm or over.
- 2) The enclosure for indoor use ballast, or enclosure or outer covering used for built-in ballast shall be made of a material having a nominal thickness of 0.5 mm or more.

5.1.7 Insulation from power supply

The insulation from power supply shall be in accordance with clause 1 (Insulation from power supply) of Annex 1 of **JIS C 8147-1**.

5.1.8 Temperature rise

When the ballast is tested as specified in **6.2.2**, the temperature rise shall comply with table 2. There shall be no leakage of insulating compound during the test.

However, the test of the ballast which indicates t_w (rated maximum service temperature of winding) and t_c (maximum permissible temperature of outer surface of ballast) shall be performed in accordance with clause 14 (Temperature rise of ballast) of **JIS C 8147-2-9**.

Table 2 Temperature rise

Unit : K

Measuring part		Temperature rise ^{a)}
Winding	Of Class A insulation	60 max.
	Of Class E insulation	75 max.
	Of Class B insulation	85 max.
Enclosure		50 max. (55 max.)
Surface of capacitor	Marked M	30 max.
	Marked Y	35 max.
	Marked H	40 max.
	Marked Z	45 max.
The symbols of the capacitors M, Y, H and Z conform to the classification symbols of the maximum permissible temperature specified in JIS C 4908. Note ^{a)} In the temperature rise, the numerical value in parentheses is applicable for built-in ballasts.		

5.1.9 Insulation resistance

The insulation resistance of the ballast shall be not less than 5 MΩ, when tested as specified in **6.2.3**. The insulation resistance in cold state where the temperature rise test has not been carried out shall be not less than 30 MΩ.

5.1.10 Withstand voltage

The ballast shall withstand the test voltage when tested as specified in **6.2.4**.

5.1.11 Moisture resistance and insulation properties

Moisture resistance and insulation properties shall be in accordance with clause 11