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**Ballasts for discharge lamps
(excluding tubular fluorescent
lamps)— Performance requirements**

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In the event of any doubts arising as to the contents,
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Contents

	Page
Introduction.....	1
1 Scope.....	1
2 Normative references	2
3 Terms and definitions	3
4 General notes on tests	3
5 Marking.....	3
6 Ballasts designed to operate at various supply voltages.....	4
7 Circuit power-factor	4
8 Supply current	4
9 Current waveform	4
9.1 Supply current waveform	4
9.2 Lamp operating current waveform	4
9.3 Test procedure.....	5
10 Magnetic screening.....	5
11 Ignitors	5
12 Electrical requirements for ballasts for high-pressure mercury vapour lamps	6
12.1 Lamp power, lamp current and regulation of lamp power	6
12.2 Short-circuit current	6
12.3 Open-circuit voltage (minimum voltage for stable operation)	6
13 Electrical requirements for ballasts for low-pressure sodium vapour lamps	7
13.1 Lamp current	7
13.2 Short-circuit current and run-up conditions	8
13.3 Open-circuit voltage (minimum voltage for stable operation)	8
14 Electrical requirements for ballasts for metal halide lamps	9
14.1 Lamp power, lamp current and regulation of lamp power	9
14.2 Short-circuit current and run-up conditions	9
14.3 Open-circuit voltage (minimum voltage for stable operation)	10
15 Electrical requirements for ballasts for high-pressure sodium vapour lamps	11
15.1 Lamp power.....	11
15.2 Short-circuit current	11

15.3	Open-circuit voltage	12
Annex A (normative)	Reference ballasts	13
Annex B (normative)	Reference lamps	16
Annex C (normative)	General requirements for tests	18
Annex D (normative)	Explanation of measurements of ballast setting and lamp-operating current waveform for high-pressure sodium vapour lamps	20
Annex E (informative)	Interpretations of thermally protected independent ballasts	22
Annex JA (informative)	Inspection	23
Annex JB (informative)	Designation of product	25
Annex JC (informative)	Comparison table between JIS and corresponding International Standard	26

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 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.

Consequently **JIS C 8119-2: 1999** has been withdrawn and replaced with this Standard.

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Attention is drawn to the possibility that some parts of this Standard may conflict with a patent right, application for a patent after opening to the public, utility model right or application for registration of utility model after opening to the public which have technical properties. The relevant Minister and the Japanese Industrial Standards Committee are not responsible for identifying the patent right, application for a patent after opening to the public, utility model right or application for registration of utility model after opening to the public which have the said technical properties.

Ballasts for discharge lamps (excluding tubular fluorescent lamps)— Performance requirements

Introduction

This Japanese Industrial Standard has been prepared based on the third edition of **IEC 60923** published in 2006 with some modifications in the technical contents.

The corresponding International Standard includes, in its scope of application, ballasts for discharge lamps such as high-pressure mercury vapour lamps, low-pressure sodium vapour lamps, high-pressure sodium vapour lamps, and metal halide lamps. This Standard also includes these lamps as Japanese Industrial Standard, and is given the title “Ballasts for discharge lamps”.

The portions with continuous sidelines or dotted underlines, and Annexes JA and JB comprise the matters that are modified from or not given in the corresponding International Standard. A list of modifications with explanations is given in Annex JC.

1 Scope

This Standard specifies performance requirements for magnetic ballasts for discharge lamps such as 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**, for use on a.c. supplies up to 1 000 V at 50 Hz or 60 Hz, having the rated secondary voltage up to 1 000 V to be used in general locations (hereafter referred to as “ballasts”).

Clauses **1** through **11** specify general requirements of ballasts, and clauses **12** through **15** each detail specific requirements for a particular type of ballast.

It applies to complete ballasts and their component parts such as reactors, transformers and capacitors.

This Standard specifies the requirements for a type test—it does not include the requirements for the tests of individual ballasts performed during manufacture.

NOTE 1 For certain types of discharge lamps an ignitor is required.

NOTE 2 Extension of the standard to cover ballasts incorporating, or for use with, series capacitors is under consideration.

NOTE 3 The performance requirements of ballasts for tubular fluorescent lamps are covered by **JIS C 8118**.

NOTE 4 There are regional standards regarding the regulation of mains current harmonics for end-products such as luminaires and independent control gear. In a luminaire the control gear is dominant in this respect. Control gear, together with other components, should comply with these standards.

NOTE 5 The International Standard corresponding to this Standard and the symbol of degree of correspondence are as follows.

IEC 60923:2006 *Auxiliaries for lamps—Ballasts for discharge lamps (excluding tubular fluorescent lamps)—Performance requirements* (MOD)

The symbols which denote the degree of correspondence in the contents between **JIS** and the corresponding International Standard are IDT (identical), MOD (modified) and NEQ (not equivalent) according to **ISO/IEC Guide 21**.

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 7604 *High-pressure mercury vapour lamps—Performance specifications*

NOTE : Corresponding International Standard: IEC 60188 *High-pressure mercury vapour lamps—Performance specifications* (MOD)

JIS C 7610 *Low pressure sodium vapour lamps*

NOTE : Corresponding International Standard: IEC 60192 *Low-pressure sodium vapour lamps—Performance specifications* (NEQ)

JIS C 7621 *High-pressure sodium vapour lamps—Performance specification*

NOTE : Corresponding International Standard: IEC 60662 *High-pressure sodium vapour lamps* (MOD)

JIS C 7623 *Metal halide lamps—Performance specification*

NOTE : Corresponding International Standard: IEC 61167 *Metal halide lamps* (MOD)

JIS C 8147-1 *Lamp controlgear—Part 1: General and safety requirements*

NOTE : Corresponding International Standard: IEC 61347-1 *Lamp controlgear—Part 1: General and safety requirements* (MOD)

JIS C 8147-2-1 *Lamp controlgear—Part 2-1: Particular requirements for starting devices (other than glow starters)*

NOTE : Corresponding International Standard: IEC 61347-2-1 *Lamp controlgear—Part 2-1: Particular requirements for starting devices (other than glow starters)* (MOD)

JIS C 8147-2-9 *Lamp controlgear—Part 2-9: Particular requirements for ballasts for discharge lamps (excluding fluorescent lamps)*

NOTE : Corresponding International Standard: IEC 61347-2-9 *Lamp controlgear—Part 2-9: Particular requirements for ballasts for discharge lamps (excluding fluorescent lamps)* (MOD)

JIS C 61000-3-2 *Electromagnetic compatibility (EMC)—Part 3-2: Limits—Limits for harmonic current emissions (equipment input current ≤ 20 A per phase)*

JIS Z 8113 *Lighting vocabulary*

IEC 60927 *Auxiliaries for lamps—Starting devices (other than glow starters)—Performance requirements*

3 Terms and definitions

For the purpose of this Standard, the terms and definitions specified in **JIS Z 8113**, **JIS C 8147-1** and **JIS C 8147-2-9** and the following apply.

4 General notes on tests

4.1 Tests according to this Standard are type tests.

The requirements and tolerances permitted by this Standard are based on testing of a type test sample submitted by the manufacturer for that purpose. In principle this type test sample should consist of units having characteristics typical of the manufacturer's production and be as close to the production centre point values as possible.

NOTE : It may be expected with the tolerances given in the standard that products manufactured in accordance with the type test sample will comply with the standard for the majority of the production. Due to the production spread, however, it is inevitable that there will sometimes be ballasts outside the specified tolerances. For guidance of sampling plans and procedures for inspection by attributes, see **IEC 60410**.

4.2 The tests are carried out in the order of the clauses, unless otherwise specified.

4.3 One sample is submitted to all tests.

4.4 In general all tests are made on each type of ballast or, where a range of similar ballasts is involved, for each rated wattage in the range, or a representative selection from the range, as agreed with the manufacturer.

4.5 Reference ballasts and reference lamps shall be in accordance with Annexes A and B.

4.6 The tests are made under the conditions specified in Annex C.

4.7 All ballasts specified in this Standard shall meet the requirements of **JIS C 8147-1** and **JIS C 8147-2-9**.

4.8 Attention is drawn to lamp performance standards which contain "information for ballast design". This information should be followed for proper lamp operation. However, this Standard does not require the testing of lamp performance as part of the type test approval for ballasts.

5 Marking

The following additional marking is included, if appropriate:

- a) For the ballast of a high power-factor, "High power-factor" or the value of circuit power-factor (for example, $\lambda=0.85$) shall be marked. For the ballast of a low power-factor, the this marking is not necessary.

6 Ballasts designed to operate at various supply voltages

If a ballast is rated for more than one value of supply voltage, it shall comply with the relevant clauses of this specification at all voltages for which it is marked. In case of a ballast with taps, it is tested using the appropriate tapings.

7 Circuit power-factor

The measured circuit power-factor shall be not less than 0.85 for ballasts marked "high power-factor" and shall not differ from the marked value by more than 0.05 for ballasts marked with the power-factor when the ballast is operated with one or more appropriate lamp(s) and the whole combination is supplied at its rated voltage and frequency.

8 Supply current

At rated voltage and at rated frequency, the supply current shall not differ by more than $\pm 10\%$ from the value marked on the ballast when the latter is operated with a reference lamp.

9 Current waveform

9.1 Supply current waveform

Harmonics of supply current shall be as specified in 7.3 of JIS C 61000-3-2.

Luminaires to be used together with ballasts of which conformance with 7.3 of JIS C 61000-3-2 has been confirmed by a test using a reference lamp are regarded to conform to JIS C 61000-3-2 and therefore do not need to be tested themselves.

9.2 Lamp operating current waveform

The maximum ratio of peak value to root-mean-square (r.m.s.) value shall not exceed the values in table 1 when the ballast associated with a reference lamp is operated at its rated voltage and at the rated frequency. For the leading power factor type ballasts, the value shall not exceed 2.0.

Table 1 Lamp operating current waveform, maximum ratio of peak value to r.m.s.

Lamp type	Maximum ratio of peak value to r.m.s.
High-pressure mercury	1.9
Low-pressure sodium	1.6 ^{a)}
Metal halide	(Under consideration)
High-pressure sodium	1.8
Note ^{a)} Deviating from this table, for ignitor circuits for low-pressure sodium lamps, the maximum ratio of peak value to r.m.s. value of the lamp operating current shall not exceed 2.0 for a short duration, e.g. ≤ 0.2 ms, and 1.8 for a longer duration.	

9.3 Test procedure

The peak value of the lamp current shall be determined by means of a calibrated cathode-ray oscilloscope as shown in figure 1.

The oscilloscope is connected with its earth connection on the supply side.

The resistor R shall be inserted in the earthed side of the circuit.

This resistor shall have a sufficiently low value such that the voltage drop shall not exceed 0.5 % of the nominal lamp voltage.

Care is taken to ensure a sufficiently low impedance of the supply for the different frequencies involved.

Moreover, the supply voltage distortion of maximum 3 % [see item c) of C.2] shall be taken into account when evaluating test results.

In case of doubt a distortion-free supply is used.

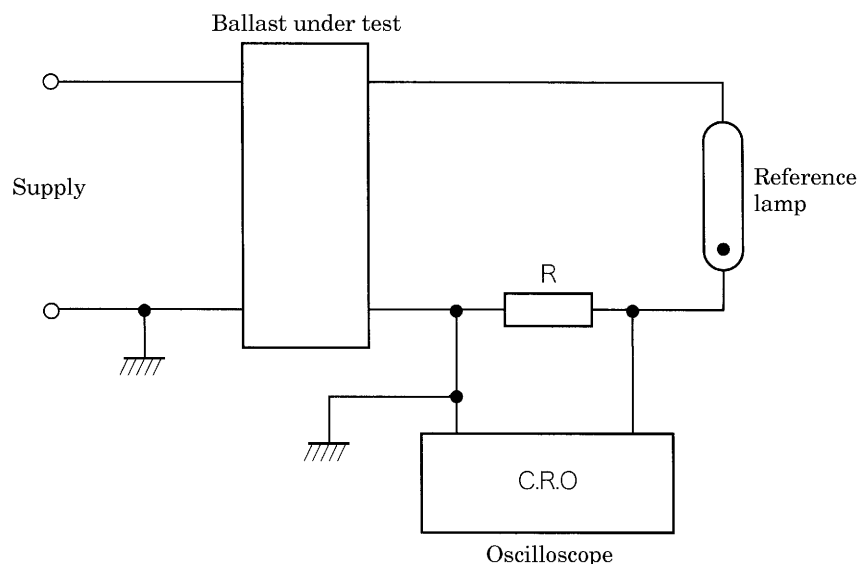


Figure 1 Measurement of current waveform

10 Magnetic screening

The ballast shall be effectively screened against the influence of adjacent ferro-magnetic materials. Compliance is checked by the following test.

- The ballast is operated at rated voltage with an appropriate lamp.
- After stabilization, a steel plate 1 mm thick and of length and breadth greater than those of the ballast under test shall be successively moved into proximity and held at a spacing of 5 mm to each face of the latter.
- During this operation, the lamp current is measured and this shall not change by more than 2 % due to the presence of the steel plate.

11 Ignitors

Ignitors shall conform to the requirements of **JIS C 8147-2-1** and **IEC 60927**.

12 Electrical requirements for ballasts for high-pressure mercury vapour lamps

12.1 Lamp power, lamp current and regulation of lamp power

The ballast shall limit the power and current delivered to a reference lamp to not less than 92.5 % for the power and not more than 115 % for the current of the corresponding values delivered to the same lamp when operated with a reference ballast. Both the reference ballast and the ballast under test shall have the same rated frequency and each shall be operated at its rated voltage.

Moreover, for any other supply voltage between 92 % and 106 % of its rated value, the power delivered by the ballast to the reference lamp shall lie between the limit of 88 % of the power delivered to the same lamp by the reference ballast when supplied at 92 % of its rated voltage and the limit of 109 % of the power delivered to the lamp by the reference ballast when supplied at 106 % of its rated voltage.

Procedure : The tests are carried out with a circuit shown in figure 2, switch S_2 in the up position and switch S_1 successively operating the lamp from the reference ballast and the ballast under test.

12.2 Short-circuit current

When the ballast is supplied at any voltage between 92 % and 106 % of its rated voltage and at rated frequency, the short-circuit current passed shall not exceed the values given in the lamp data sheet of section 2 of **JIS C 7604**.

In addition, when not specified in **JIS C 7604**, the ratio of short-circuit current to rated lamp current shall be 2.3 or less.

Procedure : The test circuit shown in figure 2, is used with switch S_1 , in the up position and switch S_2 in the down position, and the short-circuit current is measured.

12.3 Open-circuit voltage (minimum voltage for stable operation)

When the ballast is operated at any voltage between 92 % and 106 % of its rated voltage and at rated frequency, it shall provide a voltage not less than the values given in the lamp data sheet of section 2 of **JIS C 7604**.

In addition, when the minimum voltage for stable operation is not specified in **JIS C 7604**, it shall be as specified in 12.3.1.

12.3.1 Starting test voltage

The open-circuit voltage when the ballast is operated at any voltage between 90 % and 110 % of its rated voltage and at rated frequency shall be not less than the value of starting test voltage specified in the lamp data sheet of section 2 of **JIS C 7604**. However, for the ballast with special consideration on starting, if it is confirmed that the starting performance using the applicable lamp of the ballast under test is equivalent to that of the reference ballast, the open-circuit voltage need not be more than the value of starting test voltage specified in the lamp data sheet.

Procedure : The test circuit shown in figure 2, is used with switch S_1 , in the up position and switch S_2 in the down position, and the open-circuit voltage is measured.