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Germicidal lamps

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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 7605:1995** is replaced with this Standard.

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Germicidal lamps

Introduction

This Japanese Industrial Standard was established in 1958 and then has been revised four times up to the present. The last revision was performed in 1995, and this revision has been made with the aim of corresponding to the subsequent expansion of product types and revision of the normative references (JIS C 7617-1 and JIS C 7617-2).

No International Standard has been established at this point.

1 Scope

This Standard specifies the germicidal lamps of which the mercury vapour pressure in a tube at the time of lighting is about 100 Pa or less. It does not apply to those germicidal lamps integral with an arc tube, ballast and an starting device.

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 1609-1 *Illuminance meters Part 1: General measuring instruments*
- JIS C 7617-1 *Double-capped fluorescent lamps—Part 1: Safety specifications*
- JIS C 7617-2 *Double-capped fluorescent lamps—Part 2: Performance specifications*
- JIS C 7709-1 *Lamp caps and holders together with gauges for the control of interchangeability and safety Part 1: Lamp caps*
- 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*
- IEC 61549 *Miscellaneous lamps*

3 Terms and definitions

For the purposes of this Standard, the terms and definitions given in JIS Z 8113 and the following apply.

3.1 germicidal lamp

hot cathode low voltage mercury vapour lamp of which the external tube is a glass tube that transmits ultraviolet radiation (near a wavelength of 253.7 nm) with a strong germicidal action

3.2 type

group of lamps having the same cap, and of the same electric characteristics, dimensions and starting method

3.3 rated lamp wattage

electric power specified by the manufacturer or the responsible vendor

3.4 nominal value

representative value used to identify a lamp and to distinguish it from others

3.5 rated value

numerical value indicating the lamp characteristics under the specified lighting condition

3.6 germicidal irradiance

irradiance with a wavelength of 253.7 nm

It is expressed in watt per square metre ($\text{W} \cdot \text{m}^{-2}$).

3.7 germicidal radiant flux

total radiant flux with a wavelength of 253.7 nm

It is expressed in watts (W).

3.8 germicidal radiant flux maintenance factor

rate of the germicidal radiant flux of a lamp at a certain time during its life to the initial value, when the lamp is lighted under the specified condition

This rate is usually expressed in percentages.

3.9 initial value

value of starting characteristics of a lamp before aging and value of electric and optical characteristics after 100-h lighting

3.10 reference current of reference ballast

current value used at the time of the inspection and control of a reference ballast

3.11 type test

an inspection or a series of inspections performed using a type test sample in order to confirm that the design of a product conforms to the requirements of related standards

3.12 classification of size

number for classifying the lamps according to the interchangeability in size and characteristics

3.13 life

either the total lighting time until a lamp stops lighting or total lighting time until the germicidal radiant flux decreases to 70 % of the initial value, whichever is shorter, when the lamp is lighted under the specified condition

3.14 rated life

life released based on the average of the life of lamps of the same type manufactured over the long period of time

4 General requirements

The germicidal lamps shall be designed and manufactured so that their characteristics other than germicidal radiation do not pose a danger to users and the circumference when they are normally used. Furthermore, the germicidal lamps shall be designed so that their characteristics are reliable in ordinary use and normal use. The germicidal lamp shall satisfy all the requirements specified in this Standard.

The requirements specified in this Standard shall be used for the inspection of the sample submitted by the manufacturer. The sample that passed the inspection as well as the products manufactured in the same process shall be regarded to be in conformance with this Standard. However, since there is variation in manufacture, it is possible that some non-conforming individual products may be produced. The guidance of the sampling method and the inspection procedure according to characteristics shall be in accordance with JIS Z 9015-1.

Unless otherwise specified, all measurements shall be performed using the rated input voltage and the rated frequency at an ambient temperature of $25^{\circ}\text{C} \pm 1^{\circ}\text{C}$ and in a draft-free atmosphere.

5 Safety requirements

Safety requirements shall be as given in table 1.

Table 1 Safety requirements and test method

Item	Requirements
a) General matters	As specified in 2.1 of JIS C 7617-1.
b) Marking	As specified in clause 9.
c) Mechanical requirements of cap	As specified in 2.3 of JIS C 7617-1.
d) Insulation resistance	As specified in 2.4 of JIS C 7617-1.
e) Electric strength	As specified in 2.5 of JIS C 7617-1.
f) Exposure of live part	As specified in 2.6 of JIS C 7617-1.
g) Heat resistance and fire resistance	As specified in 2.7 of JIS C 7617-1.
h) Creepage distance of cap	As specified in 2.8 of JIS C 7617-1.
i) Cap temperature rise of lamp	As specified in 2.9 of JIS C 7617-1.
j) Minimum of lamp length	As specified in 2.10 of JIS C 7617-1.
NOTE: The test method is specified in JIS C 7617-1.	

6 Performance requirements

Performance requirements shall be as given in table 2.

Table 2 Performance requirements and test method

Item	Requirements
a) Cap	As specified in 1.5.2 of JIS C 7617-2 .
b) Dimension	As specified in the data sheet of this Standard.
c) Starting characteristics	As specified in 1.5.4 of JIS C 7617-2 and in the data sheet of this Standard.
d) Electric characteristics	As specified in 1.5.5 of JIS C 7617-2 and in the data sheet of this Standard
e) Germicidal radiant flux	As specified in the data sheet of this Standard. The measurement method shall be in accordance with Annex A. Germicidal radiant flux shall be not less than 90 % of the values specified in the data sheet of this Standard and specified by the manufacturer or the responsible vendor.
f) Germicidal radiant flux maintenance factor	As specified in the data sheet of this Standard. The lighting condition shall be in accordance with Annex C of JIS C 7617-2 .
NOTE: The test methods of a) , c) and d) are specified in JIS C 7617-2 .	

7 Type

Type shall be in accordance with Annex B.

8 Inspection

Inspection shall be in accordance with Annex C.

9 Marking

9.1 Marking on product

The following matters shall be marked conspicuously and indelibly on the germicidal lamp. Where it is impracticable to mark the matters in **d)** on the lamp body, they may be marked on the package or indicated in the instruction manual.

- Type
- Manufacturer's name or responsible vendor's name, or their abbreviations
- Rated lamp wattage (in "W" or "watts"), or alphanumeric characters or symbols for identifying the lamp.
- Graphical symbols and instructions given in table 3 that are necessary for safe installation and use.

Table 3 Contents of marking on the body

No.	Classification	Graphical symbol ^{a)}	Instruction	Risk	Action
1	Warning		Never observe the lighting lamp directly with the naked eye. Furthermore, prevent the reflected light from going into eyes. Such action may cause ocular pain or visual disorder.	Ocular pain Visual disorder	Install the dedicated luminaire at a sufficient distance from where people are. When checking the lighting of the lamp, wear dedicated protective glasses.
2	Warning		Do not apply ultraviolet radiation (germicidal rays) to the skin directly or indirectly. Such action may cause skin inflammation or suntan.	Skin inflammation Suntan	Install the dedicated luminaire at a sufficient distance from where people are.
Note ^{a)} Graphical symbols are specified in the data sheet 61549-IEC-310-1 of IEC 61549 .					

9.2 Marking on package and all

The marking on the package, in the instruction manual, in the catalog, etc. shall be in accordance with Annex D.

9.3 Acceptance criteria for marking on product

The acceptance criteria for the marking on a product shall be as follows.

- Marking shall be clear. Marking and its content shall be inspected by visual observation.
- The indelibility of the marking shall be tested by lightly rubbing the marking on a new lamp product with a smooth cloth moistened with water for 15 s at a speed of about one reciprocation per second.

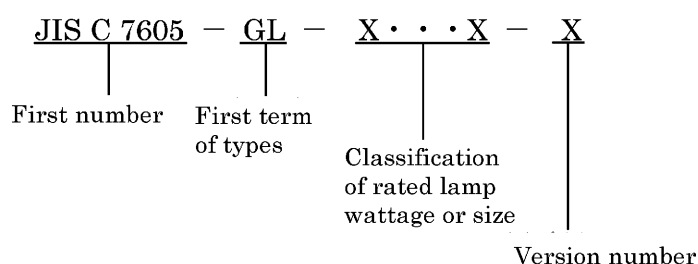
The marking shall be legible after this test.

10 Data sheet

10.1 General requirements of lamp data sheet No.

The data sheet No. of the lamp data sheet in 10.2 shall be as follows.

- The first number indicates the number of this Standard “7605”, before which “JIS C” is to be attached.
- The second character indicates the first term of type.
- The third numerical character indicates the classification of the rated lamp wattage or size.
- The fourth numerical character indicates the version number.



10.2 Data sheet illustrating positions for lamp dimension measurement

10.2.1 List of data sheet illustrating positions for lamp dimension measurement

The list of data sheet illustrating positions for lamp dimension measurement is shown below.

Sheet No.	Lamp classification
JIS C 7605-1-1	Germicidal lamp with G5 cap or G13 cap

10.3 Lamp data sheet

10.3.1 List of lamp data sheets

The list of lamp data sheets is shown below.

Sheet No	First term of type	Classification of size	Rated lamp wattage W	Frequency Hz		Nominal dimension mm	Cap	Lighting method
JIS C 7605-GL-4-1	GL	4	4	50	60	16 × 135	G5	Starter type
JIS C 7605-GL-6-1	GL	6	6	50	60	16 × 211	G5	Starter type
JIS C 7605-GL-8-1	GL	8	8	50	60	16 × 287	G5	Starter type
JIS C 7605-GL-10-1	GL	10	10	50	60	26 × 330	G13	Starter type
JIS C 7605-GL-15-1	GL	15	15	50	60	26 × 436	G13	Starter type
JIS C 7605-GL-20-1	GL	20	20	50	60	32 × 580	G13	Starter type
JIS C 7605-GL-30-1	GL	30	30	50	60	26 × 900	G13	Starter type
JIS C 7605-GL-40-1	GL	40	40	50	60	32 × 1 198	G13	Starter type

Annex A (normative)

Method for determination of germicidal radiant flux

The germicidal radiant flux is obtained by multiplying the coefficient that converts germicidal irradiance and irradiance into radiant flux by the square of measurement distance.

The germicidal radiant flux shall be obtained as follows. The coefficient K shall be as given in table A.1. The germicidal irradiance E shall be measured using the photo detector such as an irradiance meter calibrated at the responsivity of 253.7 nm according to the procedure traceable to national standard. The oblique incidence angle characteristics of the photo detector shall satisfy the limit value of a general type Class A illuminance meter in reference table 1 of JIS C 1609-1 in the range to the incidence angle θ in a measurement state (the incidence angle θ when the measurement distance is 2 times the tube length is about 15 °).

In addition, the germicidal lamp is lighted horizontally in a draft-free atmosphere. Other conditions shall be in accordance with Annex B of JIS C 7617-2.

$$\theta = \tan^{-1} \left(\frac{L_1}{2} \times L_0 \right)$$

$$\Phi = E \times K \times L_0^2$$

where, θ : incidence angle (°)
 L_1 : tube length (m)
 Φ : germicidal radiant flux (W)
 E : germicidal irradiance (W · m⁻²)
 K : coefficient for converting the irradiance into the radiant flux, to be in accordance with table A.1.
 L_0 : measurement distance (m)

Table A.1 Coefficient K

Measurement distance	K
Distance of 2 times the tube length	9.9
Distance of 3 times the tube length	9.7
Distance of 4 times the tube length	9.6

Since a germicidal lamp radiates also at a longer wavelength than 253.7 nm, use an irradiance meter that responds to radiation only at 253.7 nm. When an irradiance meter responds at a longer wavelength than 253.7 nm, prepare an optical filter that intercepts radiation at 253.7 nm and transmits radiation at a longer wavelength than about 300 nm, and at first, with the irradiance meter, obtain the germicidal irradiance E_1 in a state where the optical filter is not put into an optical path, and next, obtain the germicidal irradiance E_2 in a state where the optical filter is put into the optical path, and take E_0 obtained according to the following formula as the germicidal irradiance at 253.7 nm.

$$E_0 = E_1 - \left(\frac{E_2}{0.9} \right)$$

- where, E_0 : germicidal irradiance at 253.7 nm ($\text{W} \cdot \text{m}^{-2}$)
 E_1 : germicidal irradiance without the optical filter that transmits radiation at more than 300 nm in place ($\text{W} \cdot \text{m}^{-2}$)
 E_2 : germicidal irradiance with the optical filter that transmits radiation at more than 300 nm in place ($\text{W} \cdot \text{m}^{-2}$)

NOTE 1 For the measurement of germicidal radiant flux, in addition to the above-mentioned method, there are the method using the spherical zone coefficient obtained from light distribution characteristics and the method described in Annex B of JIS C 7801.

NOTE 2 For the unit of germicidal irradiance, milliwatt per square centimetre ($\text{mW} \cdot \text{cm}^{-2}$) or microwatt per square centimetre ($\mu\text{W} \cdot \text{cm}^{-2}$) may be used. In this case, for the germicidal radiant flux, the following formula is used.

- a) When the unit of germicidal irradiance is $\text{mW} \cdot \text{cm}^{-2}$,

$$\Phi = E \times K \times L_0^2 \times 10$$

- b) When the unit of germicidal irradiance is $\mu\text{W} \cdot \text{cm}^{-2}$,

$$\Phi = E \times K \times L_0^2 \times 10^{-2}$$

NOTE 3 The germicidal irradiance meter is to be checked periodically using the (photometric) working standard for measuring germicidal irradiance by the germicidal lamp of which the electric characteristics and germicidal irradiance are stable.

The working standard is to be set by either of the following means.

- a) It shall be valued with the valued irradiance meter that is traceable to national standard.
 b) It shall be valued by the spectrometry specified in 4.2 of JIS Z 8724 according to the spectral irradiance standard (deuterium lamp, etc. in which spectral irradiance at a wavelength of 200 nm to 400 nm is valued) that is traceable to national standard.