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(FGMAJ/JSA)
Insulating glass

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Foreword

This Japanese Industrial Standard has been 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 Flat Glass Manufacturers Association of Japan (FGMAJ)/Japanese Standards Association (JSA) with a draft being attached, based on the provision of Article 12, paragraph (1) of the Industrial Standardization Act applied mutatis mutandis pursuant to the provision of Article 16 of the said Act. This edition replaces the previous edition (**JIS R 3209**: 2018), which has been technically revised.

However, **JIS R 3209**: 2018 may be applied in the **JIS** mark certification based on the relevant provisions of Article 30, paragraph (1), etc. of the Industrial Standardization Act until 19 April 2024.

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Insulating glass

1 Scope

This Japanese Industrial Standard specifies requirements for the insulating glasses mainly intended for use in buildings and freezing/refrigerating showcases. This Standard applies to insulating glasses with one or two hollow layers, and does not apply to those insulating glasses containing lattice members or other built-in elements in the hollow layer or those containing a mixture of gasses other than air sealed in the hollow layer.

A list of technically significant revisions from the previous edition with reasons is given in Annex A.

2 Normative references

Part or all of the provisions of the following standards, 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 7502 *Micrometers*

JIS B 7512 *Steel tape measures*

JIS B 7516 *Metal rules*

JIS R 3106 *Testing method for transmittance, reflectance and emissivity of flat glass and calculation of total solar energy transmittance of glazing*

JIS R 3107 *Calculation of thermal transmittance of glazing*

JIS R 3202 *Float glass and polished plate glass*

JIS R 3203 *Patterned glass*

JIS R 3204 *Wired glass*

JIS R 3205 *Laminated glass*

JIS R 3206 *Tempered glass*

JIS R 3208 *Heat absorbing glass*

JIS R 3221 *Optical coated glass*

JIS R 3222 *Heat-strengthened glass*

JIS R 3223 *Tempered fire resistance glass*

JIS R 3224-1 *Glass in buildings — Insulating glass — Part 1: Durability of edge seals by climate tests*

JIS R 3224-3 *Glass in buildings — Insulating glass — Part 3: Gas concentration and gas leakage*

JIS Z 8401 *Rounding of numbers*

3 Terms and definitions

For the purpose of this Standard, the following terms and definitions, and those given in **JIS R 3106**, **JIS R 3107** and **JIS R 3221** apply.

3.1

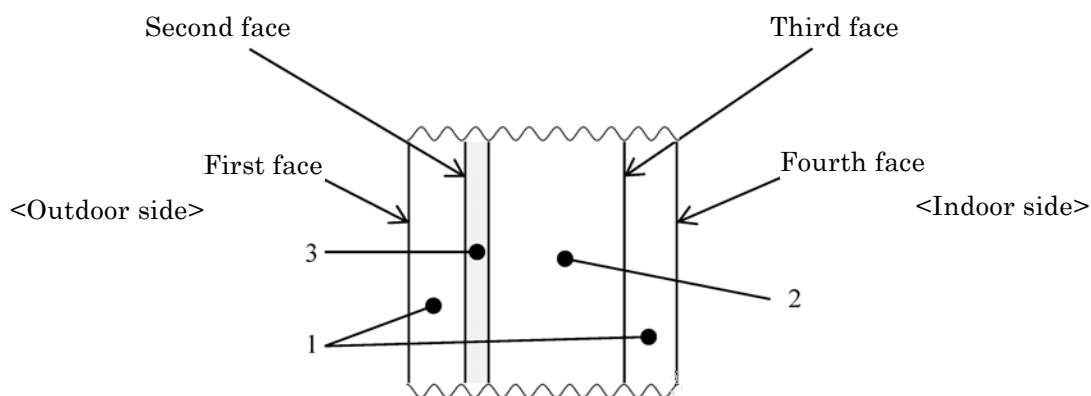
insulating glass

glass product consisting of two or more parallel panes of plate glass, processed glass or optical coated glass, separated by a predetermined gap and sealed (**3.4**) around the periphery, whereby the hollow layer (**3.2**) between the glass panes is filled with enclosed gas at a pressure close to that of the atmosphere

Note 1 to entry Plate glass used for manufacturing of insulating glass may be float glass and polished plate glass (see **JIS R 3202**) manufactured by continuous process, patterned glass (see **JIS R 3203**), wired glass (see **JIS R 3204**), heat absorbing glass (see **JIS R 3208**), etc.

Note 2 to entry Processed glass used for manufacturing of insulating glass may be laminated glass (see **JIS R 3205**), tempered glass (see **JIS R 3206**), heat-strengthened glass (see **JIS R 3222**) and tempered fire resistance glass (see **JIS R 3223**).

Note 3 to entry For an insulating glass consisting of optical coated glass panes and one hollow layer, the surface of the outdoor-side pane which faces the outdoor side of the insulating glass is called the first face, the surface of the outdoor-side pane which faces the hollow layer (hereafter referred to as the inner surface), the second face, the inner surface of the indoor-side pane, the third face, and the surface opposite to this of the indoor-side pane which faces the indoor side, the fourth face. Figure 1 shows an example of construction of an insulating glass having one hollow layer and an optical coating applied on the second face.



Key

- 1: Constituent glass pane
- 2: Hollow layer
- 3: Optical coating

Figure 1 Identification of processed surface of optical coating (example with the optical coating applied on the second face)

3.2

hollow layer

gap between two constituent glass panes in an insulating glass (3.1)

3.3

spacer

member installed at the periphery of an insulating glass (3.1) for keeping the enclosed gas dry and keeping the thickness of the hollow layer (3.2) constant

3.4

sealing

closing the periphery of an insulating glass (3.1) with sealing material (3.6), spacer (3.3), etc. so as to seal the hollow layer

3.5

edge seal

peripheral area of an insulating glass (3.1) comprising spacer (3.3), sealing material (3.6), etc. provided to seal (3.4) the hollow layer (3.2)

3.6

sealing material

material used in the periphery of an insulating glass (3.1) to seal (3.4) the hollow layer (3.2)

3.7

dew point

maximum temperature at which visible condensation or frost formation occurs on the inner surface of an insulating glass (3.1)

4 Classification

The insulating glasses are classified as follows according to the heat insulation performance, solar heat gain performance, solar radiation shielding performance, accelerated durability of sealing and type of enclosed gas.

- a) **Classification by heat insulation performance, solar heat gain performance and solar radiation shielding performance** The insulating glasses are classified according to the heat insulation performance, solar heat gain performance and solar radiation shielding performance as given in Table 1 and Table 2 based on their respective characteristic values (see 5.5.1 and 5.5.2).

Table 1 Classification by heat insulation performance

Unit: $W/(m^2 \cdot K)$

Symbol of heat insulation performance	Thermal transmittance $U^a)$
T1	4.0 max.
T2	2.7 max.
T3	2.3 max.
T4	1.9 max.
T5	1.5 max.
T6	1.1 max.
Note ^{a)} The values in the table assume vertical installation.	

Table 2 Classification by solar heat gain performance and solar radiation shielding performance

Symbol of solar heat gain performance and solar radiation shielding performance	Total solar energy transmittance $\eta^a)$
G	0.50 min.
S	0.49 max.
Note ^{a)} The values in the table assume vertical installation.	

- b) **Classification by accelerated durability of sealing** The insulating glasses shall be subject to the test of accelerated durability of sealing and classified based on the result by the relevant class and its symbol given in Table 3.

Table 3 Classification by accelerated durability of sealing

Class	Symbol	Applicable test method (applicable subclause)	Class requirement
Class A	A	Method according to Approach 2 [8.5.2 (6.2.2.1 of JIS R 3224-1)]	The product shall conform to 5.4.1 after 56 cycles of temperature cycle test and 7 weeks of constant temperature/humidity test.
Class I	I	Method not according to Approach 1 or Approach 2 [8.5.3 (6.3.1 a) of JIS R 3224-1)]	The product shall conform to 5.4.1 after 7 days of moisture and light resistance test followed by 12 cycles of temperature cycle test.
Class II	II	Method not according to Approach 1 or Approach 2 [8.5.3 (6.3.1 b) of JIS R 3224-1)]	The product shall conform to 5.4.1 after the tests specified for Class I, followed by 7 days of moisture and light resistance test and 12 cycles of temperature cycle test.
Class III	III	Method not according to Approach 1 or Approach 2 [8.5.3 (6.3.1 c) of JIS R 3224-1)]	The product shall conform to 5.4.1 after the tests specified for Class II, followed by 28 days of moisture and light resistance test and 48 cycles of temperature cycle test.
NOTE The accelerated durability of Class A is equivalent to that of Class III.			

- c) **Types of enclosed gas** Types of gas enclosed in the hollow layer and examples of their symbols are given in Table 4. The physical property values of air, argon, krypton and neon shall be in accordance with Table A.2 given in **JIS R 3107**.

NOTE An enclosed gas which is a mixture of gasses other than air is outside the scope of this Standard and therefore not included in Table 4.

Table 4 Types of enclosed gas and examples of their symbols

Type	Examples of symbols (informative)
Air	—
Argon	Ar, AR, Argon,
Krypton	Kr, KR, Krypton
Neon	Ne, NE, Neon

5 Quality

5.1 Appearance

When inspected in accordance with **8.2**, the inner surface of the insulating glass shall be free from stains, scattering of sealing material or other defects detrimental to the transparency of the glass.

5.2 Dew point