

JIS

JAPANESE INDUSTRIAL STANDARD

**Automatic gas valves
for gas appliances**

JIS S 2151—1993

Translated and Published

by

Japanese Standards Association

Printed in Japan

In the event of any doubt arising,
the original Standard in Japanese is to be final authority.

JAPANESE INDUSTRIAL STANDARD

J I S

Automatic gas valves for gas appliances

S 2151-1993

1. Scope This Japanese Industrial Standard specifies the automatic gas valves to be used for the gas appliances using liquefied petroleum gas⁽¹⁾ or city gas⁽²⁾ having gas pressures of 3.3 kPa {330 mmH₂O} or less, which are to be connected by gas supply line of external diameter of 35 mm or less (hereafter referred to as "automatic gas valves").

Notes ⁽¹⁾ The liquefied petroleum gas means the gas described in the "Standard for liquefied petroleum gas" of enforcement regulations (1968, Ordinance of Ministry of International Trade and Industry No. 14) based on the Law Concerning the Security of Safety and the Optimization of Transaction of Liquefied Petroleum Gas (1967, Law No. 149).

⁽²⁾ The city gas means the gas of gas group described in the ministerial ordinance concerning the verification of gas appliance and material (1971, Ordinance of Ministry of International Trade and Industry No. 27) based on the Gas Utility Industry Law (1954, Law No. 51).

Remarks 1. The standards cited in this Standard are shown in Attached Table 1.

2. The units and numerical values given in { } in this Standard are based on the traditional units and are appended for informative reference.

2. Classification The classification of the automatic gas valves shall be as Table 1 and Table 2.

Table 1. Classification by use

Use	Details of classification
For appliance valve	Type capable of being used as appliance valve
For non appliance valve	Type incapable of being used as appliance valve

Table 2. Classification by type of operation

Type of operation	Details of classification
Electromagnetic type	Type which makes open and close of gas passage by the electric magnet or solenoid. There is direct acting type and pilot type. (Informative reference Fig. 1 and Informative reference Fig. 2)
Motor type	Type which makes open and close of gas passage by the motor.

3. Performance

3.1 Performance of automatic gas valve The performance of the automatic gas valve, when tested by 6., shall conform to the specification of Table 3.

Table 3. Performance of automatic gas valve

Item			Performance	Main test condition	Applied test item
Air-tightness	For appliance valve	Pass leakage	0.03 l/h max.	4.2 kPa {420 mmH ₂ O} 0.5 kPa {50 mmH ₂ O}	6.5
		Outer leakage			
	For non-appliance valve	Pass leakage	0.3 l/h max.		
		Outer leakage	0.03 l/h max.		
Strength for negative pressure (Only for electromagnetic type)			No interference with use and conform to the requirement of air-tightness.	On the state of closing a automatic gas valve and closing the gas outlet side, apply a negative pressure of 50 kPa {0.5 kgf/cm ² } on the gas inlet side for 1 min.	6.6
Strength of lead wire			No abnormalities as slip-off or break of the lead wires.	Apply a pulling load to one lead wire by the force of 30 N {3 kgf} for 1 min per application to the lead-out direction.	6.7
Strength of terminal (Except for the terminals, which are connected by solder or screw, and which have figures of connecting with two or more terminals at the same time)			No slip-off nor break.	One time for one terminal, each for period of 1 min, apply a force of 30 N {3 kgf} to the direction of plug in and out of the terminal, and a force of 10 N {1 kgf} perpendicular to the direction of plug in and out of terminal.	6.8

Table 3. (continued)

Item		Performance	Main test condition	Applied test item
Voltage/current for open/close-valve		Voltage/current for open-valve shall be the voltage/current specified by the manufacturer or less. Voltage/current for close-valve shall be the voltage/current specified by the manufacturer or more.	3.3 kPa { 330 mmH ₂ O }	6.9
Temperature-rise of winding (Values in parenthesis shall be applied to the windings of the motors) Remarks 1. Ambient temperature specified by the manufacturer. 2. Classification of insulation for the windings shall conform to JIS C 4003.		Class A insulation: 100°C max. Class E insulation: 115°C max. Class B insulation: 125°C max. (120°C) max. Class F insulation: 150°C max. (140°C) max. Class H insulation: 170°C max. (165°C) max.	Connect a hose of the length which is 10 times the diameter of the connection end, raise the temperature to reach the steady state, measure by the resistance method, etc.	6.10
Insulation		5 MΩ min.	DC 500 V	6.11
Withstand voltage (Except the one using a dry battery-source)		Endurance	Apply the specified voltage continuously for 1 min.	6.12
Damp proof insulation		1 MΩ min.	Leave for 24 h, in the atmosphere of 40 ± 3°C and relative humidity of (90 ± 2) %. DC 500 V	6.13
Repeating operation	Low temperature repeating operation	Conform to the requirement of air-tightness, and no interferences with use.	In the atmosphere of -20 ± 2°C, carry out the repeating operation of 3000 times, at the specified interval of opening/closing of valve.	6.14 (1)

Table 3. (continued)

Item			Performance	Main test condition	Applied test item
	High temperature repeating operation		Conform to the requirements of air-tightness and insulation, and no interferences with use.	In the specified atmosphere, carry out the repeating operation of 3000 times, at the specified interval of opening/closing of valve.	6.14 (2)
Thermal shock resistance			Conform to the requirements of air-tightness and insulation, and no interferences with use.	Repeat 10 cycles, of which 1 cycle means to leave in the atmosphere of 80°C for 1 h, and of -20°C for 1 h.	6.15
Mechanical endurance	Electromagnetic type	For appliance valve	Conform to the requirement of air-tightness, and no interferences with use. However, pass leakages in the item of air-tightness shall be, 12000 times 0.3 l/h max. 100000 times 0.3 l/h max.	Carry out the repeating operations of 100000 times, at the specified interval of opening/closing of valve.	6.16
		For non-appliance valve	Conform to the requirement of air-tightness, and no interferences with use.		
	Motor type	-	Conform to the requirement of air-tightness, and no interferences with use.	Carry out the repeating operations of 12000 times, at the specified interval of opening/closing of valve.	
Thread fastening resistance (Only for the type with screw connection part)			Free from any deformations, breakages or cracks, and conform to the requirement of air-tightness.	By the specified thread force, carry out the connecting/detaching operations.	6.17
Static load resistance (Only for the type with screw connection part)			Free from any deformations, breakages or cracks, and conform to the requirement of air-tightness.	Apply the specified static load for 15 min.	6.18

3.2 Parts performance The performance of the parts to be used for the automatic gas valves, when tested by 6.19, shall conform to the specification of Table 4.

Table 4. Performances of parts

Name of parts	Item	Performance	Main test conditions	Applied test item
Packings	Gas resistance	(1) Packings of rubber or plastics shall be within 20 % in mass-change, and free from fragility, swellings and softenings interfere with practical use.	(1) Dip in <i>n</i> -pentane for 72 h or longer.	6.19.1 (1)
		(2) Packings of rubber shall be 0.005 g/h or less in permeability in <i>n</i> -pentane. However, except for the samples conforming to JIS B 2401.	(2) Fix the sample to the specified equipment, leave it for 24 h, in the atmosphere of the temperature $23 \pm 2^{\circ}\text{C}$, then, maintain for 7 days in the atmosphere of $100 \pm 2^{\circ}\text{C}$.	6.19.1 (2)
Sealing materials	Gas resistance	Mass change shall be within 10 % at gas temperature of $20 \pm 1^{\circ}\text{C}$ and, within 25 % at $4 \pm 1^{\circ}\text{C}$.	Leave for 1 h, in butane gas of pressure 5 kPa{500 mmH ₂ O}, and temperature $20 \pm 1^{\circ}\text{C}$ and $4 \pm 1^{\circ}\text{C}$.	6.19.2
Grease	Corrosion resistance	No greening or blackening of copper plate.	Follow to the B method of 5.5 in JIS K 2220.	6.19.3 (1)
	Water resistance	No muddiness and precipitate in water.	Dip in distilled water of ordinary temperature for 72 h or longer.	6.19.3 (2)
	Gas resistance	Mass change shall be within: 10 % at gas temperature of $20 \pm 1^{\circ}\text{C}$, 25 % at $4 \pm 1^{\circ}\text{C}$.	Leave for 1 h, in butane gas of pressure of 5 kPa {500 mmH ₂ O} and of temperature $20 \pm 1^{\circ}\text{C}$ and $4 \pm 1^{\circ}\text{C}$.	6.19.3 (3)
	Heat resistance	Evaporation rate: 1 % max.	Follow the A method of 5.6 in JIS K 2220.	6.19.3 (4)

6
S 2151-1993

4. Construction

4.1 General construction Each part of the automatic gas valve shall withstand against mechanical, chemical and thermal loads, which are liable to receive in normal use and maintenance conditions, and shall conform to each following item.

- (1) The valve shall have no potential of dangers in the normal use state, and the figure shall be correct and assembly shall be good.
- (2) The screws to be used for fitting of each part, shall be effective for fastening, and the parts needed to be removed for maintenance check shall be usable repeatedly.
- (3) Open/close of the gas passage can be made smoothly and correctly.
- (4) In the electromagnetic type automatic gas valve, valve and valve seat shall make a correct and close contact, and air-tightness shall be kept.
- (5) In the electromagnetic type automatic gas valve, on the state of closing of the gas passage, air-tightness shall be surely kept.
- (6) Through-holes for electric wires shall be provided with protective springs or protective bushings, or processed protective finishing as corner roundings, and such protective operations shall be made to prevent the wires from breaking.

4.2 Connection part The connection part shall be as follows.

- (1) For gas connection part sealed by screws, use screws specified in JIS B 0203. The connection work can be done by usual tools and loosings or deformations tend to impair air-tightness shall not be created.
- (2) Connection part connected by flange, shall be free from warps or cracks interfere with use when connected.

5. Material

5.1 Material in general The materials to be used for the automatic gas valves, shall withstand against mechanical, chemical and thermal actions, which are liable to receive in normal use and maintenance conditions, and shall conform to each following item.

- (1) Materials enclosing gas, except packings (including diaphragms and rubber valve bodies. Hereafter, the same) and sealing materials (including grease. Hereafter, the same), shall be the incombustible materials which are confirmed no-melting at 500°C by 6.3, and shall conform to anyone of the following items.
 - (a) Materials shown in Table 5, or that of equivalent or superior in corrosion resistance.
 - (b) For the electro-plated metallic materials, they shall be the one confirmed as corrosion free by the test of 6.4 (1), or the one confirmed that the rating number being between 9.8 and 6 of corrosion area rate, judging by (1) in 13. of JIS Z 2371.

- (c) The metallic materials surface-treated by painting, shall be tested by 6.4 (2), and shall be confirmed that they are free from rusts, swellings and peeling.
- (2) Materials used for the terminal screws (except for the terminal screws for earthing) shall be copper, copper alloys, stainless steel, or those that have the same or higher electrical, thermal and mechanical stabilities, and shall be hard to rust.
- (3) Materials for electrical conductors shall be copper, copper alloys, stainless steel, or those that have the same or higher electrical, thermal and mechanical stabilities, and shall be hard to rust. However, it shall not be applied for the materials to be used in the parts which need elasticity, or in the parts structurally inevitable, when there is no potential of dangers.

Table 5. Corrosion resistant material

Material	JIS Number
Castings	JIS H 5101 JIS H 5202
Die castings	JIS H 5302
Stainless steel	JIS G 3446 JIS G 3459 JIS G 4303 JIS G 4304 JIS G 4305 JIS G 4308 JIS G 4313 JIS G 4314
Surface treated steel sheets and coils	JIS G 3302 JIS G 3313 JIS G 3314
Aluminium and aluminium alloy	JIS H 4000 JIS H 4040 JIS H 4080 JIS H 4090 JIS H 4100
Copper and copper alloy	JIS C 3101 JIS C 3102 JIS H 3100 JIS H 3250 JIS H 3300 JIS H 3320
Nickel iron soft magnetic alloy sheets and strips	JIS C 2531