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JAPANESE INDUSTRIAL STANDARD

Liquefied Petroleum Gas Pressure
Regulators for Domestic Use

JIS B 8238—1984

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Liquefied Petroleum Gas Pressure
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1. Scope

This Japanese Industrial Standard specifies the single-stage pressure regulators ⁽¹⁾, hereinafter referred to as the "single-stage regulators", and automatic change-over pressure regulators ⁽²⁾, hereinafter referred to as the "automatic regulators", out of liquefied petroleum gas pressure regulators for domestic use, hereinafter referred to as the "regulators", used for liquefied petroleum gas, hereinafter referred to as the "LP gas".

- Notes ⁽¹⁾ Such regulators that have a pressure-reducing capacity of not more than 5 kg/h and are capable of reducing the pressure of LP gas at 0.7 to 15.6 kgf/cm² {0.07 to 1.56 MPa} down to a pressure within 230 to 330 mm H₂O {2.3 to 3.3 kPa}.
- ⁽²⁾ Such regulators that have a pressure-reducing capacity of less than 10 kg/h, automatically supply reserve LP gas when the LP gas supplying pressure has become not to be maintainable by the normal supply cylinder alone and are capable of reducing the pressure of LP gas within 1.0 to 15.6 kgf/cm² {0.1 to 1.56 MPa} down to a pressure range of 255 to 330 mm H₂O {2.55 to 3.30 kPa}.

Remark: The units and numerical values shown in { } in this standard are in accordance with the International System of Units (SI), and are appended for reference.

2. Terminology

2.1 Names of Parts of Regulator Fig. 1 shows the names of parts of the single-stage regulator and Fig. 2 those of the automatic one.

Fig. 1. Example of Construction and Names of Parts of Single-Stage Regulator

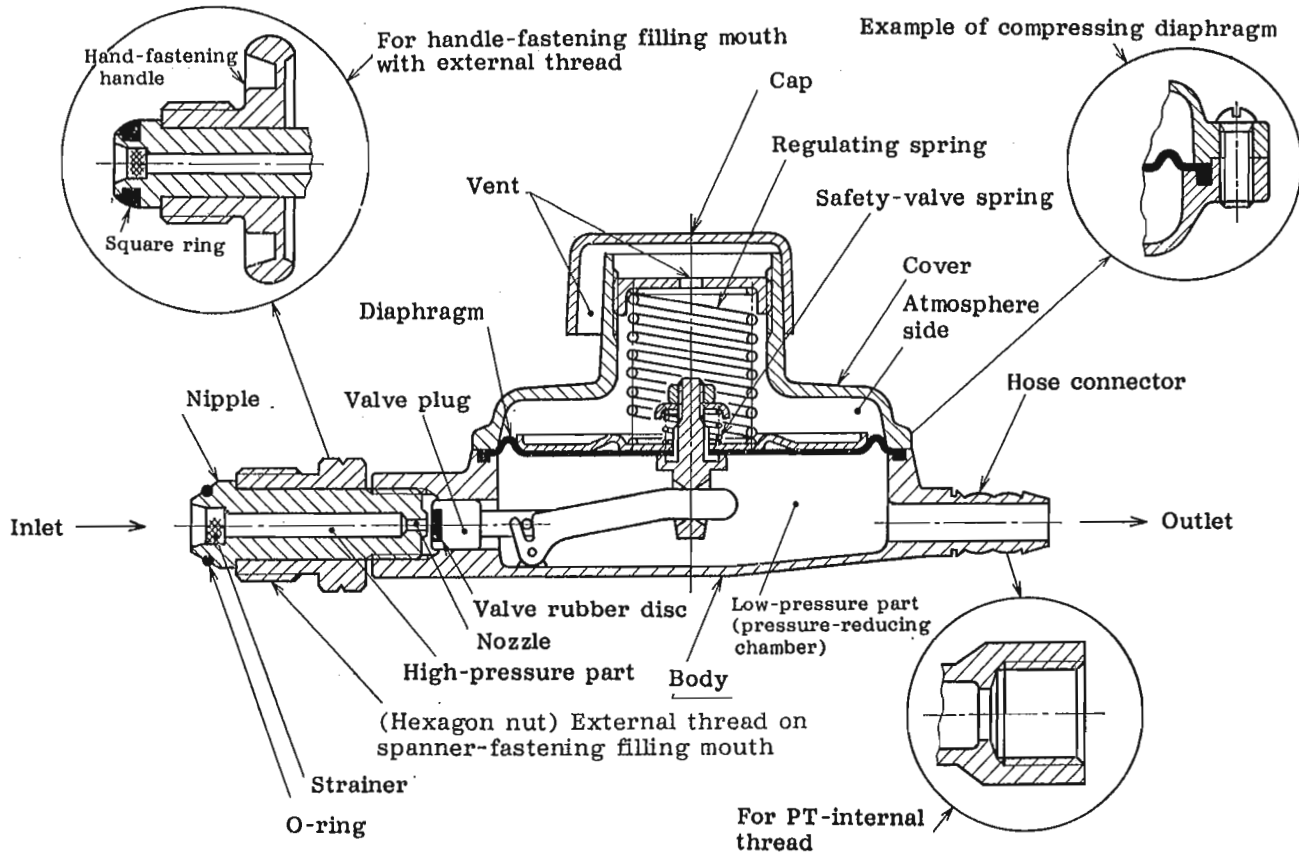
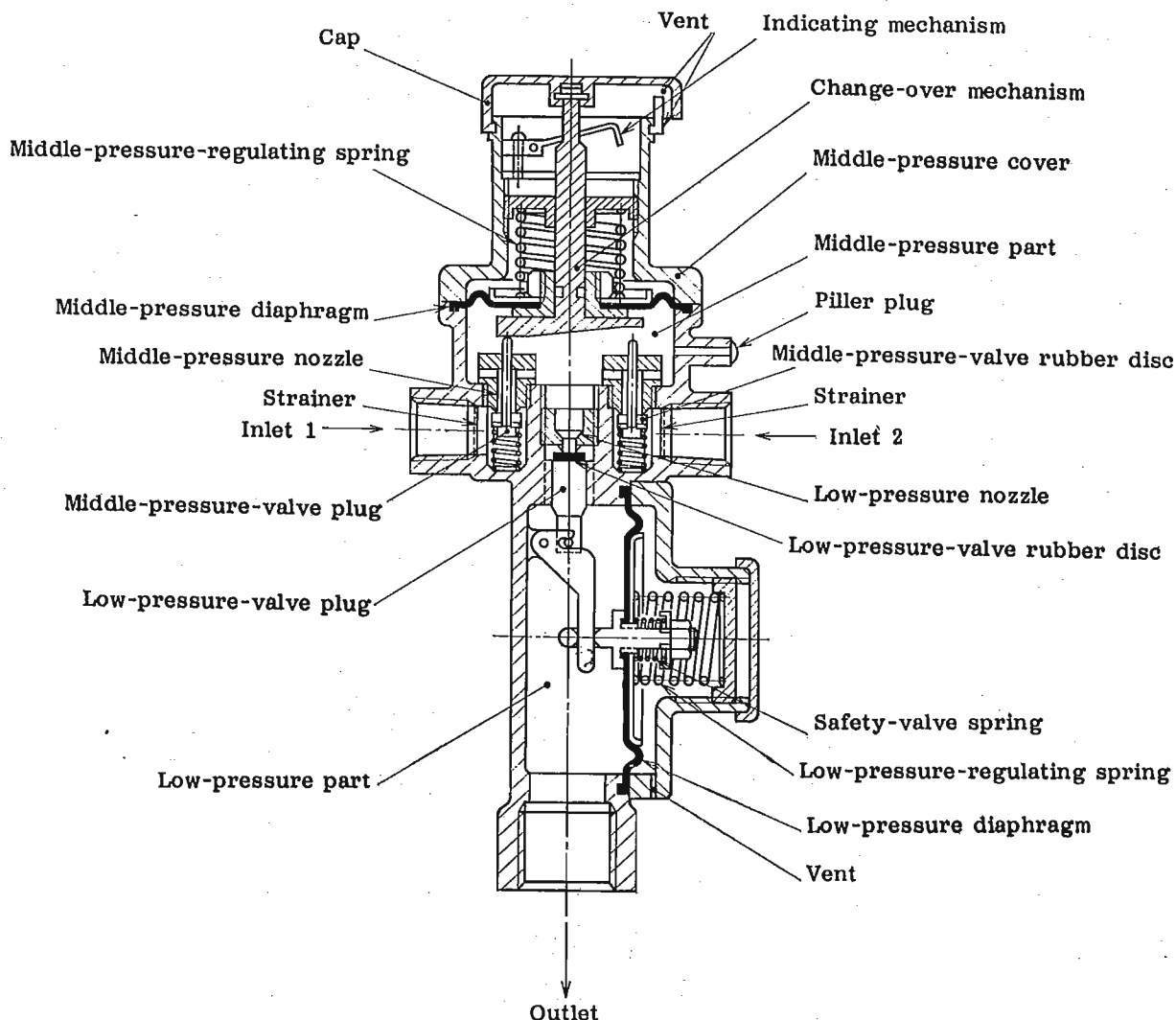


Fig. 2. Example of Construction and Names of Parts of Automatic Regulator



Note: This figure shows the condition that the inlet 1 is in the normal supply side and the inlet 2 is in the reserve supply side.

2.2 Definitions

- (1) high-pressure part The part that is subjected to the pressure held in the cylinder.
- (2) middle-pressure part In an automatic regulator, the part that is subjected to a pressure over 1000 mm H₂O {10 kPa} and not over 1.0 kgf/cm² {0.1 MPa} that has been reduced from the pressure in the high-pressure part.
- (3) low-pressure part The part that is subjected to the pressure on the outlet side.
- (4) regulated pressure The pressure on the outlet side of the regulator, when it is supplying LP gas.
- (5) shut-up pressure The pressure on the outlet side of the regulator when the flow of gas out of the outlet is shut up.

- (6) marked capacity The mass of LP gas that can be reduced of pressure per hour, within the prescribed ranges of the inlet side pressure and the regulated pressure of the regulator, and indicates the regulating capacity of the regulator, which is expressed in kg/h.
- (7) safety device The mechanism that prevents the extraordinary rise in pressure by releasing a part of LP gas in the low-pressure part by the automatic action of a safety valve, when the shut-up pressure has risen extraordinarily high.
- (8) air vent The opening provided to keep the atmosphere side of the diaphragm always at the atmospheric pressure.
- (9) performance curve The curve that is drawn with the outlet side pressure of the regulator as the ordinate and the flow rate of LP gas as the abscissa to indicate the performance of the regulator.
- (10) standard outlet pressure It implies the standard outlet pressure out of the regulated pressure by the regulator, and is defined as 280 mm H₂O {2.8 kPa}.
- (11) change-over mechanism In automatic regulators, the mechanism that changes over the circuit in the regulator from the normal supply side to the reserve supply side.
- (12) normal supply side In automatic regulators, that side that is indicated by the change-over mechanism as the normal supply side and supplies LP gas until the pressure in the cylinder falls below 1.0 kgf/cm²{0.1 MPa}.
- (13) reserve supply side In automatic regulators, the side that automatically supplies the shortage of LP gas, when the normal supply side cylinder has become unable to maintain the supply pressure of the gas.
- (14) replenishment-starting pressure In automatic regulators, the inlet pressure on the normal supply side, at which the replenishment of LP gas from the reserve supply side starts.
- (15) indicating mechanism In automatic regulators, the mechanism that indicates that LP gas is being supplied from the reserve supply side cylinder.

3. Kinds and Symbols

3.1 Single-Stage Regulators The single-stage regulators are classified by the types of inlet, outlet and sealing for inlet, as given in Table 1.

Table 1. Classification and Symbols for Single-Stage Regulators

Symbol for single-stage regulator	Inlet		Outlet		Sealing for inlet		Remarks
	Type	Symbol	Type	Symbol	Type	Symbol	
A	Spanner-fastening filling mouth with external thread	S	Hose connector	1	O-ring	O	The classification depends on the shapes of inlet, outlet and sealing for inlet
			PT-internal thread	2	Metal	D	
	Handle-fastening filling mouth with external thread	H	Hose connector	1	O-ring	O	
			PT-internal thread	2	Square ring	G	

3.2 Automatic Regulators The automatic regulators are classified by the types of inlet and outlet, as given in Table 2.

Table 2. Classification and Symbols for Automatic Regulators

Symbol for automatic regulator	Inlet		Outlet	
	Type	Symbol	Type	Symbol
B	PT-internal thread	1	PT-internal thread	2
			Union coupling with PT-internal thread	3
			Union coupling with PT-external thread	4

4. Performance

4.1 The performance of single-stage regulators shall conform to Table 3-1.

Table 3-1. Performance of Single-Stage Regulators

Item	Performance	Main test conditions	Applicable test item
Pressure resistivity	Not to show damage or leakage.	Test pressure for pressure resistivity High-pressure part 26 kgf/cm ² {2.6 MPa} Low-pressure part 3 kgf/cm ² {0.3 MPa} Test duration 1 min	8.2.1
Gastightness	Not to show leakage and other abnormality.	Test pressure for gastightness High-pressure part 15.6 kgf/cm ² {1.56 MPa} Low-pressure part 550 mm H ₂ O {5.5 kPa} Test duration 1 min	8.2.2
Load resistivity	Not to show leakage and other abnormality.	Bending moment of 500 kgf·cm {50 N·m} Test duration 5 min	8.2.3
Durability	Shut-up pressure shall be not more than 110% of that before undergoing durability test. Regulated pressure shall be within 230 to 330 mm H ₂ O {2.3 to 3.3 kPa}. The gastightness shall not show leakage or other abnormality.	Inlet pressure 1.0 kgf/cm ² {0.1 MPa} Gas-handling quantity Marked capacity ± 30 % Number of cycles of opening and shutting valve 60000 cycles	8.2.4
Cold-proofness	Shut-up pressure shall be not more than 420 mm H ₂ O {4.2 kPa}. Regulated pressure shall be within 230 to 380 mm H ₂ O {2.3 to 3.8 kPa}.	After being maintained at -25 ⁰ / ₋₅ °C for 1 h, shut-up pressures at inlet pressures 0.7 and 1.5 kgf/cm ² {0.07 and 0.15 MPa}, and regulated pressures at flow rates 5 to 100 % of marked capacity are measured.	8.2.5

Table 3-1 (Continued)

Item	Performance	Main test conditions	Applicable test item
Flow rate	Shut-up pressures shall be not more than 350 mm H ₂ O {3.5 kPa}. Regulated pressure shall be within 230 to 330 mm H ₂ O {2.3 to 3.3 kPa}.	Shut-up pressures are measured at inlet pressures of 0.7 and 15.6 kgf/cm ² {0.07 and 1.56 MPa}. Regulated pressures are measured for the combinations of inlet pressures and flow rates below: Inlet pressure 15.6 kgf/cm ² {1.56 MPa} 10.0 kgf/cm ² {1 MPa} 5.0 kgf/cm ² {0.5 MPa} 0.7 kgf/cm ² {0.07 MPa} Flow rate Measurements are made at 5 %, 100 % and their middle point of marked capacity.	8.2.6
Action of safety device	(1) <u>Test for Acting Pressure</u> Action-starting pressure shall be within 560 to 840 mm H ₂ O {5.6 to 8.4 kPa}. Action-stopping pressure shall be within the ranged 504 to 840 mm H ₂ O {5.0 to 8.4 kPa}. (2) <u>Test for Blow-off Rate</u> To be not less than 140 l/h for nozzle diameters not more than 3.2 mm. To be not less than the value calculated from the following equation, for nozzle diameters over 3.2 mm. $Q=44D$ where Q : blow-off rate of safety valve (air) l/h D : nozzle diameter of regulator mm 44: coefficient	For action starting pressure, blow-starting pressure is measured. For action-stopping pressure, the pressure when the action of safety valve has stopped is measured. Test for blow-off rate is made by applying a prescribed pressure to the outlet.	8.2.7

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Table 3-1 (Continued)

Item	Performance	Main test conditions	Applicable test item	
Rainproof-ness	No water shall enter inside.	The sample in normal fitting condition is sprinkled with water with the use of a rose from a height 300 to 500 mm above it to an extent 60 deg. from the vertical under the conditions below. Rainfall: 10 to 20 mm/min Inlet pressure: 1.0 kgf/cm²{0.1 MPa} Gas-handling quantity: Marked capacity ±30 % Repeating cycles of opening and shutting valve: 10 to 15 cycle/min Test duration 10 min	8.2.8	
Durability against screwing	No deformation of thread shall be shown.	Test torque		8.3.2
		Nominal size of pipe	Torque (kgf.cm) {N.m}	
		¼B	250 { 25 }	
		⅜B	450 { 45 }	
		½B	800 { 80 }	
		¾B	1000 {100}	

4.2 The performance of automatic regulators shall conform to Table 3-2.

Table 3-2. Performance of Automatic Regulator

Item	Performance	Main test conditions	Applicable test item
Pressure resistivity	Not to show damage or leakage.	Test pressure for pressure resistivity. High-pressure part 26 kgf/cm ² {2.6 MPa} Low-pressure part 3 kgf/cm ² {0.3 MPa} Middle-pressure part 8 kgf/cm ² {0.8 MPa} Test duration 1 min	8.2.1
Gastightness	Not to show leakage and other abnormality.	Test pressure for gastightness. High-pressure part 15.6 kgf/cm ² {1.56 MPa} Low-pressure part 550 mm H ₂ O {5.5 kPa} Middle-pressure part 1.5 kgf/cm ² {0.15 MPa} Test duration 1 min	8.2.2
Load-resistivity	Not to show leakage and other abnormality.	Bending moment of 500 kgf·cm {N·m} Test duration 5 min	8.2.3
Durability	Shut-up pressure shall be not more than 110% of than before undergoing durability test. Regulated pressure shall be within 255 to 330 mm H ₂ O {2.5 to 3.3 kPa}. Concerning gastightness, not to show leakage and other abnormality.	Inlet pressure 1.0 kgf/cm ² {0.1 MPa} Gas-handling quantity Marked capacity ±30 % Number of cycles of opening and shutting valve 30000 cycles for each both inlets	8.2.4
Cold-proofness	Shut-up pressure shall be not more than 420 mm H ₂ O {4.2 kPa}. Regulated pressure shall be within 255 to 380 mm H ₂ O {2.5 to 3.8 kPa}.	After retaining at -25 ⁰ ₋₅ °C for 1 h, shut-up pressures at inlet pressures 1.0 and 1.5 kgf/cm ² {0.1 and 0.15 MPa}, and regulated pressures at flow rates 5 to 100 % of marked capacity are measured.	8.2.5