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(JRAIA)

**Gas engine driven heat pump
air conditioners—
Part 1 : General requirements**

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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 The Japan Refrigeration and Air conditioning Industry Association (JRAIA) 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 B 8627-1** : 2000 is replaced with this Standard.

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JIS B 8627 consists of the following parts under the general title “*Gas engine driven heat pump air conditioners*”:

Part 1 : General requirements

Part 2 : Non-ducted gas engine driven heat pump air conditioners—Testing and rating for performance

Part 3 : Ducted gas engine driven heat pump air conditioners—Testing and rating for performance

Gas engine driven heat pump air conditioners— Part 1 : General requirements

1 Scope This Japanese Industrial Standard specifies the heat pump air conditioner which drives the compressor of a vapor compression refrigeration cycle by a gas engine (hereafter referred to as “engine”) using city gas or liquefied petroleum gas as a fuel and utilizes engine exhaust heat recovery during the heating period for the purpose of the indoor comfortable air conditioning (hereafter referred to as “gas heat pump”) with the rated cooling capacity of 85 kW or less.

In addition, those described below are not included.

- a) Gas heat pump for cooling only
- b) Gas heat pump of which the cooling system of a condenser during the cooling period uses a water-cooled system
- c) Gas heat pump with the heating function by an electric heater or an auxiliary electric heater
- d) Gas heat pump of which the temperature condition of entering air, etc. is specific ¹⁾
- e) Gas heat pump of which the main purpose is air conditioning for machinery and food
- f) Gas heat pump of which the main purpose is air conditioning attained by introducing only outdoor air indoors
- g) Gas heat pump of which the main purpose is air conditioning in a vehicle
- h) Gas heat pump of which the purpose is to use for other specific applications
- i) Gas heat pump of which the multiple outdoor units are used by combining them
- j) Gas heat pump which is capable of cooling and heating simultaneously
- k) Gas heat pump to which the generator is added.

Note ¹⁾ For example, the gas heat pump for a computer room, all fresh type, etc.

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 B 0203 *Taper pipe threads*

JIS B 7951 *Continuous analyzer for carbon monoxide in ambient air*

JIS B 7982 *Automated measuring systems and analyzers for nitrogen oxides in flue gas*

JIS B 8620 *Safety code for small refrigerating equipment*

- JIS B 8627-2 *Gas engine driven heat pump air conditioners—Part 2: Non-ducted gas engine driven heat pump air conditioners—Testing and rating for performance*
- JIS B 8627-3 *Gas engine driven heat pump air conditioners—Part 3: Ducted gas engine driven heat pump air conditioners—Testing and rating for performance*
- JIS C 1509-1 *Electroacoustics—Sound level meters—Part 1: Specifications*
- JIS C 1509-2 *Electroacoustics—Sound level meters—Part 2: Pattern evaluation tests*
- JIS C 3306 *Polyvinyl chloride insulated flexible cords*
- JIS C 9335-1 *Household and similar electrical appliances—Safety—Part 1: General requirements*
- JIS C 9335-2-40 *Household and similar electrical appliances—Safety—Part 2-40: Particular requirements for electrical heat pumps, air-conditioners and dehumidifiers*
- JIS K 0151 *Non-dispersive infrared gas analyzer*
- JIS K 2211 *Refrigerating machine oils*
- JIS K 5600-5-4 *Testing methods for paints—Part 5: Mechanical property of film—Section 4: Scratch hardness (Pencil method)*
- JIS K 8116 *Ammonium chloride*
- JIS S 2093 *Test methods of gas burning appliances for domestic use*
- JIS S 2145 *Metallic flexible hoses for gas*
- JIS S 6006 *Pencils, coloured pencils and leads for them*
- JIS Z 8731 *Acoustics—Description and measurement of environmental noise*
- JIS Z 9211 *Technical terms used in energy management*

3 Terms and definitions For the purpose of this Standard, the following definitions apply.

3.1 Terms on system and structure

3.1.1 non-ducted type type which is used by free delivery of air indoors mainly

3.1.2 ducted type type which is used by connecting ducts mainly

3.1.3 multiple combination type type which has multiple combinations of indoor units which can connect to one outdoor unit

3.1.4 representative combination representative combination of indoor units of a multiple combination type gas heat pump of which the shape shall be made to be optimum for use and in principle a four-way-discharge ceiling recessed cassette type (hereafter referred to as “four-way cassette type”)

3.1.5 multi-type type which connects two or more indoor units to one outdoor unit and controls the indoor units individually

3.1.6 standard combination standard combination of the indoor units of a multi-type gas heat pump, which satisfies the following conditions:

- the shape of the indoor unit shall be made to be optimum for use and in principle a four-way-cassette type;
- the number of the indoor units shall be in principle, when there are connecting ports for every indoor unit in the outdoor unit, the number of those connecting ports and when there are not individual connecting ports, the minimum number of the indoor units in the same room (two or more units). However, for the combination, marketability shall be taken into consideration;
- the capacity of the indoor unit in which the ratio of the sum of cooling capacity of the indoor unit to the cooling capacity of the outdoor unit becomes 1 (the value nearest to 1 when there is no combination in which the ratio becomes 1) shall be selected.

3.2 Terms on cooling performance and heating performance

3.2.1 rated cooling capacity capacity given by indicating the amount of heat expressed in kW which a gas heat pump removes from inside the room on the equipment name plate under the test condition of cooling capacity specified in 4.2 of JIS B 8627-2 and JIS B 8627-3

3.2.2 rated cooling sensible heat factor (SHF) sensible heat factor specified in 3.14 of JIS B 8627-2 and JIS B 8627-3 during the operation in which a gas heat pump shows the rated cooling capacity

3.2.3 rated cooling gas consumption consumption given by indicating the amount of gas expressed in kW which a gas heat pump consumes on the equipment name plate under the test condition of cooling capacity specified in 4.2 of JIS B 8627-2 and JIS B 8627-3

3.2.4 rated cooling power consumption power consumption given by indicating the effective power consumption expressed in kW on the equipment name plate under the test condition of cooling capacity specified in 4.2 of JIS B 8627-2 and JIS B 8627-3

3.2.5 intermediate cooling capacity amount of heat expressed in kW to be removed from inside the room when measured at the setting in which a gas heat pump shows the capacity of one-half the rated cooling capacity under the rated cooling performance test condition specified in clause 9

NOTE : The intermediate cooling capacity shall be expressed in a unit of 0.1 kW in the range of $50 \% \pm 5 \%$ of the rated cooling capacity. However, when the minimum capacity of the equipment exceeds 55 % of the rated cooling capacity, the value at that time shall be taken as intermediate capacity.

3.2.6 intermediate cooling gas consumption gas consumption expressed in kW to consume when measured at the setting in which a gas heat pump shows the capacity of one-half the rated cooling capacity under the rated cooling performance test condition specified in clause 9

NOTE : The indicated value of intermediate cooling gas consumption shall be expressed in kW and in a unit of 0.1 kW. However, when the minimum cooling capacity of the equipment exceeds 55 % of the rated cooling capacity, the value at that time shall be taken as intermediate cooling gas consumption.

3.2.7 rated heating standard capacity capacity given by indicating the amount of heat expressed in kW which a gas heat pump adds to inside the room on the equipment name plate under the heating capacity test condition (standard) specified in 5.2 of JIS B 8627-2 and JIS B 8627-3

3.2.8 rated heating standard gas consumption gas consumption given by indicating the amount of gas expressed in kW which a gas heat pump consumes on the equipment name plate under the heating capacity test condition (standard) specified in 5.2 of JIS B 8627-2 and JIS B 8627-3

3.2.9 rated heating standard power consumption power consumption given by indicating the sum of the effective power consumption expressed in kW which a gas heat pump consumes on the equipment name plate under the heating capacity test condition (standard) specified in 5.2 of JIS B 8627-2 and JIS B 8627-3

3.2.10 intermediate heating standard capacity amount of heat expressed in kW which a gas heat pump adds to inside the room when measured at the setting in which a gas heat pump shows the capacity of one-half the rated heating standard capacity under the rated heating performance test condition specified in clause 9

NOTE : The intermediate heating standard capacity shall be expressed in a unit of 0.1 kW in the range of $50 \% \pm 5 \%$ of the rated heating standard capacity. However, when the minimum heating capacity of the equipment exceeds 55 % of the rated heating standard capacity, the value at that time shall be taken as intermediate heating capacity.

3.2.11 intermediate heating standard gas consumption the amount of gas expressed in kW which a gas heat pump consumes when measured at the setting in which a gas heat pump shows the capacity of one-half the rated heating standard capacity under the rated heating performance test condition specified in clause 9

NOTE : The indicated value of intermediate heating gas consumption shall be expressed in kW and in a unit of 0.1 kW. However, when the minimum heating capacity of the equipment exceeds 55 % of the rated cooling capacity, the value at that time shall be taken as intermediate heating gas consumption.

3.2.12 rated heating low-temperature capacity capacity given by indicating the amount of heat expressed in kW which a gas heat pump adds to inside the room on the equipment name plate under the heating capacity test condition (low temperature) specified in 5.2 of JIS B 8627-2 and JIS B 8627-3

3.2.13 rated heating low-temperature gas consumption gas consumption given by indicating the amount of gas expressed in kW which a gas heat pump consumes in the operation manual under the heating capacity test condition (low temperature) specified in 5.2 of JIS B 8627-2 and JIS B 8627-3

3.2.14 rated heating low-temperature power consumption power consumption given by indicating the sum of the effective power consumption expressed in kW which a gas heat pump consumes in the operation manual under the heating capacity test condition (low temperature) specified in 5.2 of JIS B 8627-2 and JIS B 8627-3

3.2.15 rated heating ultralow-temperature capacity capacity given by indicating the amount of heat expressed in kW which a gas heat pump adds to inside the room on the equipment name plate under the heating capacity test condition (ultralow temperature) specified in 5.2 of JIS B 8627-2 and JIS B 8627-3

3.2.16 rated heating capacity general term of rated heating standard capacity, rated heating low-temperature capacity and rated heating ultralow-temperature capacity

3.2.17 effective power consumption average electrical input to the equipment within a specified time

The electrical input refers to the electrical input to all the control units and safety devices of the equipment and the electrical input to the heat transfer apparatus (for example, a blower, a pump) in the equipment.

3.2.18 cooling coefficient of performance value obtained by dividing the rated cooling capacity by the sum of the rated cooling gas consumption and the rated cooling power consumption

3.2.19 heating coefficient of performance value obtained by dividing the rated heating standard capacity by the sum of the rated heating standard gas consumption and the rated heating standard power consumption

3.3 Terms used for calculation of annual energy consumption

3.3.1 cooling seasonal gas consumption sum of the amount of gas consumed by performing the cooling operation of a gas heat pump during cooling period

NOTE : It refers to the cooling seasonal gas consumption calculated in accordance with Annex A.

3.3.2 heating seasonal gas consumption sum of the amount of gas consumed by performing the heating operation of a gas heat pump during heating period

NOTE : It refers to the heating seasonal gas consumption calculated in accordance with Annex A.

3.3.3 cooling seasonal power consumption sum of the power consumed by performing the cooling operation of a gas heat pump during the cooling period

NOTE : It refers to the cooling seasonal power consumption calculated in accordance with Annex A.

3.3.4 heating seasonal power consumption sum of the power consumed by performing the heating operation of a gas heat pump during the heating period

NOTE : It refers to the heating seasonal power consumption calculated in accordance with Annex A.

3.3.5 annual gas consumption sum of the cooling seasonal gas consumption and the heating seasonal gas consumption

NOTE : It refers to the annual gas consumption calculated in accordance with Annex A.

3.3.6 annual power consumption sum of the cooling seasonal power consumption and heating seasonal power consumption

NOTE : It refers to the annual power consumption calculated in accordance with Annex A.

3.3.7 annual energy consumption sum of the seasonal gas consumption and the seasonal power consumption

NOTE : It refers to the annual energy consumption calculated in accordance with Annex A.

3.3.8 cooling seasonal performance factor (CSPF) value obtained by dividing the sum of heat amount which can be removed from inside the room by performing the cooling operation of a gas heat pump during the cooling period by the sum of the gas consumption and the power consumption which are consumed

NOTE : It refers to the cooling seasonal performance factor calculated in accordance with Annex A, and as a representative value, the value calculated assuming the load in an independent store or an office according to the kind of gas heat pumps based on the outside air temperature occurrence time period of Tokyo district shall be used.

3.3.9 heating seasonal performance factor (HSPF) value obtained by dividing the sum of heat amount added to inside the room by performing the heating operation of a gas heat pump during the heating period by the sum of the gas consumption and the power consumption which are consumed

NOTE : It refers to the heating period performance factor calculated in accordance with Annex A, and as a representative value, the value calculated assuming the load in an independent store or an office according to the kind of gas heat pumps based on the outside air temperature occurrence time period of Tokyo district shall be used.

3.3.10 annual performance factor (APF) value obtained by dividing the total sum of the heat amount which a gas heat pump removes from inside the room and the heat amount which a gas heat pump adds to inside the room throughout the cooling period and the heating period by the annual energy consumption

NOTE : It refers to the annual performance factor calculated in accordance with Annex A, and as a representative value, the value calculated assuming the load in an independent store or an office according to the kind of gas heat pumps based on the outside air temperature occurrence time period of Tokyo district shall be used.

3.4 Other terms

3.4.1 city gas fuel gas supplied to urban residences and factories by piping (see JIS Z 9211)

3.4.2 liquefied petroleum gas gas liquefied by pressurizing or cooling the hydrocarbon of carbon numbers 3 and 4 as a main component (see **JIS Z 9211**)

3.4.3 reference airflow rate airflow rate converted under the condition of dry air (density of 1.204 kg/m^3) of standard atmospheric pressure of 101.325 kPa at a temperature of 20 °C

3.4.4 rated airflow rate airflow rate designated by the manufacturer when the air-blowing operation of the ducted type gas heat pump is performed at the rated external static pressure, which is converted into reference airflow rate

3.4.5 rated external static pressure external static pressure designated by the manufacturer of ducted type gas heat pumps

3.4.6 NO_x12 mode value average concentration of NO_x in the combustion gas which a gas heat pump discharges when the standard operation is performed throughout the year, of which the value is obtained in accordance with the method specified in **9.10**

NOTE : All of the gas consumption shall be based on the higher heating value.

3.4.7 refrigerant facilities part, such as a compressor, a condenser, an evaporator, etc. through which refrigerant passes and which is subjected to pressure, including lubricating oil systems subjected to pressure of refrigerants

4 Classification The classification of gas heat pumps shall be as follows.

a) **Classification according to unit structure**

- 1) Multiple combination type
- 2) Multi-type

b) **Classification according to air blowing system**

- 1) Non-ducted type
- 2) Ducted type

c) **Classification according to rated cooling capacity and rated heating capacity** The classification according to the rated cooling capacity and rated heating capacity shall be as specified in table 1.

Table 1 Rated cooling capacity and rated heating capacity

Unit: kW

	Capacity													
Rated cooling capacity	1.0	1.1	1.2	1.4	1.6	1.8	2.0	2.2	2.5	2.8	—	3.2	—	3.6
	—	4.0	—	4.5	—	5.0	—	5.6	—	6.3	—	7.1	—	8.0
	—	9.0	—	10.0	—	11.2	—	12.5	—	14.0	—	16.0	—	18.0
	—	20.0	—	22.4	—	25.0	—	28.0	—	31.5	—	35.5	—	40.0
	—	45.0	—	50.0	—	56.0	60.0	63.0	67.0	71.0	75.0	80.0	85.0	
Rated heating standard capacity					1.6	1.8	2.0	2.2	2.5	2.8	3.0	3.2	3.4	3.6
	3.8	4.0	4.2	4.5	4.8	5.0	5.3	5.6	6.0	6.3	6.7	7.1	7.5	8.0
	8.5	9.0	9.5	10.0	10.6	11.2	11.8	12.5	13.2	14.0	15.0	16.0	17.0	18.0
	19.0	20.0	21.2	22.4	23.6	25.0	26.5	28.0	30.0	31.5	33.5	35.5	37.5	40.0
	42.5	45.0	47.5	50.0	53.0	56.0	60.0	63.0	67.0	71.0	75.0	80.0	85.0	90.0
	95.0	100	106	112	118	125								
Rated heating low-temperature capacity and rated heating ultralow-temperature capacity	To be in a unit of 0.1 kW													

5 Type of gas, rated voltage and rated frequency

5.1 Type of gas The type of gas used as an engine fuel shall be as follows.

- a) **City gas** The classification of city gases shall refer to gases of gas group given in table 2, and the calorific value and the gas pressure shall be as follows.
 - 1) **Calorific value** The calorific value shall be that specified in the gas supply standard of the undertaker of gas utilities.
 - 2) **Gas pressure** The gas pressure shall be that specified in the gas supply standard of the undertaker of gas utilities, which shall be as given in table 2.

Table 2 Gas group and gas pressure

Unit: kPa

Gas group	13A, 12A	6A	L1 (5B, 6C, 7C) L2 (5A, 5AN, 5B) L3 (4A, 4B, 4C) 5C
Maximum pressure	2.5	2.2	2.0
Minimum pressure	1.0	0.7	0.5

- b) **Liquefied petroleum gas** The liquefied petroleum gases shall be classified into class “I” liquefied petroleum gas, class “RO” liquefied petroleum gas and class “HA” liquefied petroleum gas, and the gas pressure shall be the minimum pressure of 2.0 kPa and the maximum pressure of 3.3 kPa.

NOTE : The classification of liquefied petroleum gas refers to the classification stipulated in enforcement regulations of the Law Concerning the Securing of Safety and Optimization of Transaction of Liquefied Petroleum Gas.

5.2 Rated voltage and rated frequency The rated voltage of a gas heat pump shall be single-phase a.c. 100 V, single-phase a.c. 200 V or three phase a.c. 200 V, and the rated frequency shall be 50 Hz only, 60 Hz only, or both 50 Hz and 60 Hz.

6 Performance

6.1 Non-ducted type gas heat pump

6.1.1 Withstand pressure and airtightness performance of each part of refrigerant facilities Each part of refrigerant facilities, when the test is performed in accordance with 9.1.1, shall conform to the specification of clause 10 of JIS B 8620.

NOTE : The refrigerant facilities which are not covered by the scope of JIS B 8620 are covered by the High Pressure Gas Safety Law.

6.1.2 Cooling performance

a) **Cooling performance** The cooling performance, when the test is performed in accordance with a) of 9.1.2, shall satisfy each condition given in table 3.

Table 3 Cooling performance

Capacity	Gas consumption	Power consumption
Not less than 95 % of the value of rated cooling capacity	Not more than 105 % of the value of rated cooling gas consumption	Not more than 105 % of the value of rated cooling power consumption

b) **Intermediate cooling performance** The intermediate cooling performance shall be as follows.

1) **Intermediate cooling capacity** The intermediate cooling capacity, when the test is performed in accordance with a) of 9.1.2, shall be not less than 95 % of the value of intermediate cooling capacity.

2) **Intermediate cooling gas consumption** The intermediate cooling gas consumption, when the test is performed in accordance with a) of 9.1.2, shall be not more than 105 % of the value of intermediate cooling gas consumption.

c) **Cooling overload performance** The cooling overload performance, when the test is performed in accordance with b) of 9.1.2, shall satisfy the following conditions.

- 1) While a series of tests is performed, a gas heat pump can be operated normally.
- 2) For the first hour, a gas heat pump can be continuously operated without the stop of an engine or without the actuation of a motor overload protection device.
- 3) When the operation is restarted after the shutdown of 3 min, although for the first five minutes an engine may be stopped or a motor overload protection device may be actuated, for 1 h after that a gas heat pump can be continuously operated.

- 4) When within 5 min after the operation is restarted an engine stops or a motor overload protection device is actuated, and both are designed so that they do not return within the same 5 min, although the operation may not be performed for 30 min, for 1 h after that a gas heat pump can be continuously operated.
- d) **Cooling low-temperature performance** The cooling low-temperature performance, when the test is performed in accordance with c) of 9.1.2, shall satisfy the following conditions.
- 1) The operation can be performed for 4 h without the protective device actuated.
In addition, the start and stop by the automatic return of a compressor shall not be regarded as the actuation of the protective device.
 - 2) At the time of the end of operation of 4 h, the area of accumulation of frost or ice on an evaporator shall be not more than 50 % of the indoor-side surface area (coil face area). However, when visual confirmation is difficult, the decrease of discharge airflow rate on the indoor side from the initial airflow rate should be not more than 25 %.
- e) **Discharge performance of enclosure sweat and condensed water** For the discharge performance of enclosure sweat and condensed water, the drip, leakage, or scattering of condensed water, when the test is performed in accordance with d) of 9.1.2, shall not be produced from a gas heat pump.
- f) **Freezing performance** The freezing performance, when the test is performed in accordance with e) of 9.1.2, shall satisfy the following conditions.
- 1) In the air blockage test, at the time of the end of cooling operation of 4 h, the area of accumulation of frost or ice on an evaporator shall be not more than 50 % of the indoor-side surface area (coil face area). However, when visual confirmation is difficult, the decrease of discharge airflow rate on the indoor side from the initial airflow rate should be not more than 25 %.
 - 2) In the drip test, the drip of ice and the drip or scattering of condensed water shall not be produced from a gas heat pump to the indoor side.

6.1.3 Heating performance

- a) **Heating performance** The heating performance, when the test is performed in accordance with a) of 9.1.3, shall satisfy each condition given in table 4.

Table 4 Heating performance

	Capacity	Gas consumption	Power consumption
Standard condition	Not less than 95 % of rated heating standard capacity	Not more than 105 % of rated heating standard gas consumption	Not more than 105 % of rated heating standard power consumption
Low-temperature condition	Not less than 95 % of rated heating low-temperature capacity	Not more than 105 % of rated heating low-temperature gas consumption	Not more than 105 % of rated heating low-temperature power consumption

- b) **Intermediate heating performance** The intermediate heating performance shall be as follows.
- 1) **Intermediate heating standard capacity** The intermediate heating standard capacity, when the test is performed in accordance with a) of **9.1.3**, shall be not less than 95 % of the value of intermediate heating standard capacity.
 - 2) **Intermediate heating standard gas consumption** The intermediate heating standard gas consumption, when the test is performed in accordance with a) of **9.1.3**, shall be not more than 105 % of the value of intermediate heating standard gas consumption.
- c) **Heating ultralow-temperature capacity** The heating ultralow-temperature capacity, when the test is performed in accordance with a) of **9.1.3**, shall be not less than 95 % of the rated heating ultralow-temperature capacity.
- d) **Heating overload performance** The heating overload performance, when the test is performed in accordance with b) of **9.1.3**, shall satisfy the following conditions.
- 1) While a series of tests is performed, a gas heat pump can be operated normally.
 - 2) For the first hour, a gas heat pump can be continuously operated without the stop of an engine or without the actuation of a motor overload protection device.
 - 3) When the operation is restarted after the shutdown of 3 min, although for the first five minutes an engine may be stopped or a motor overload protection device may be actuated, for 1 h after that a gas heat pump can be continuously operated.
 - 4) When within 5 min after the operation is restarted an engine is stopped or a motor overload protection device is actuated, and both are designed so that they do not return within the same 5 min, although the operation may not be performed for 30 min, for 1 h after that a gas heat pump can be continuously operated.
- e) **Automatic defrosting performance** When the test is performed in accordance with c) of **9.1.3**, during the defrosting operation the leaving air temperature on the indoor side shall not exceed 18 °C for more than 1 min.

6.2 Ducted type gas heat pump

6.2.1 Withstand pressure and airtightness performance of each part of refrigerant facilities Each part of refrigerant facilities, when the test is performed in accordance with **9.2.1**, shall conform to the specification of clause **10** of **JIS B 8620**.

NOTE : The refrigerant facilities which are not covered by the scope of **JIS B 8620** are covered by the High Pressure Gas Safety Law.

6.2.2 Cooling performance

- a) **Cooling performance** The cooling performance, when the test is performed in accordance with a) of 9.2.2, shall satisfy each condition given in table 5.

Table 5 Cooling performance

Capacity	Gas consumption	Power consumption
Not less than 95 % of the value of rated cooling capacity	Not more than 105 % of the value of rated cooling gas consumption	Not more than 105 % of the value of rated cooling power consumption

- b) **Intermediate cooling performance** The intermediate cooling performance shall be as follows.
- 1) **Intermediate cooling capacity** The intermediate cooling capacity, when the test is performed in accordance with a) of 9.2.2, shall be not less than 95 % of the value of intermediate cooling capacity.
 - 2) **Intermediate cooling gas consumption** The intermediate cooling gas consumption, when the test is performed in accordance with a) of 9.2.2, shall be not more than 105 % of the value of intermediate cooling gas consumption.
- c) **Cooling overload performance** The cooling overload performance, when the test is performed in accordance with b) of 9.2.2, shall satisfy the following conditions.
- 1) While a series of tests is performed, a gas heat pump can be operated normally.
 - 2) For the first hour, a gas heat pump can be continuously operated without the stop of an engine or without the actuation of a motor overload protection device.
 - 3) When the operation is restarted after the shutdown of 3 min, although for the first five minutes an engine may be stopped or a motor overload protection device may be actuated, for 1 h after that a gas heat pump can be continuously operated.
 - 4) When within 5 min after the operation is restarted an engine is stopped or a motor overload protection device is actuated, and both are designed so that they do not return within the same 5 min, although the operation may not be performed for 30 min, for 1 h after that a gas heat pump can be continuously operated.
- d) **Cooling low-temperature performance** The cooling low-temperature performance, when the test is performed in accordance with c) of 9.2.2, shall satisfy the following conditions.
- 1) The operation can be performed for 4 h without the protective device actuated.

In addition, the start and stop by the automatic return of a compressor shall not be regarded as the actuation of a protective device.

- 2) At the time of the end of operation of 4 h, the area of accumulation of frost or ice on an evaporator shall be not more than 50 % of the indoor-side surface area (coil face area). However, when visual confirmation is difficult, the decrease of discharge airflow rate on the indoor side from the initial airflow rate should be not more than 25 %.
- e) **Discharge performance of dew and condensed water** For the discharge performance of dew and condensed water, the drop, leakage, or scattering of condensed water, when the test is performed in accordance with **d)** of **9.2.2**, shall not be produced from a gas heat pump.

6.2.3 Heating performance

- a) **Heating performance** The heating performance, when the test is performed in accordance with **a)** of **9.2.3**, shall satisfy each condition given in table 6.

Table 6 Heating performance

	Capacity	Gas consumption	Power consumption
Standard condition	Not less than 95 % of rated heating standard capacity	Not more than 105 % of rated heating standard gas consumption	Not more than 105 % of rated heating standard power consumption
Low-temperature condition	Not less than 95 % of rated heating low-temperature capacity	Not more than 105 % of rated heating low-temperature gas consumption	Not more than 105 % of rated heating low-temperature power consumption

- b) **Intermediate heating performance** The intermediate heating performance shall be as follows.
- 1) **Intermediate heating standard capacity** The intermediate heating standard capacity, when the test is performed in accordance with **a)** of **9.2.3**, shall be not less than 95 % of the value of intermediate heating standard capacity.
- 2) **Intermediate heating standard gas consumption** The intermediate heating standard gas consumption, when the test is performed in accordance with **a)** of **9.2.3**, shall be not more than 105 % of the value of intermediate heating standard gas consumption.
- c) **Heating ultralow-temperature capacity** The heating ultralow-temperature capacity, when the test is performed in accordance with **a)** of **9.2.3**, shall be not less than 95 % of the rated heating ultralow-temperature capacity.
- d) **Heating overload performance** The heating overload performance, when the test is performed in accordance with **b)** of **9.2.3**, shall satisfy the following conditions.
- 1) While a series of tests is performed, a gas heat pump can be operated normally.
- 2) For the first hour, a gas heat pump can be continuously operated without the stop of an engine or without the actuation of a motor overload protection device.

- 3) When the operation is restarted after the shutdown of 3 min, although for the first five minutes an engine may be stopped or a motor overload protection device may be actuated, for 1 h after that a gas heat pump can be continuously operated.
 - 4) When within 5 min after the operation is restarted an engine is stopped or a motor overload protection device is actuated, and both are designed so that they do not return within the same 5 min, although the operation may not be performed for 30 min, for 1 h after that a gas heat pump can be continuously operated.
- e) **Automatic defrosting performance** When the test is performed in accordance with c) of **9.2.3**, during the defrosting operation the leaving air temperature on the indoor side shall not exceed 18 °C for more than 1 min.

6.2.4 Airflow rate For the airflow rate, when the test is performed in accordance with **9.2.4**, the value obtained by converting the test result into the reference airflow rate shall be not less than 90 % of the rated airflow rate.

6.3 Withstand impulse voltage For the withstand impulse voltage performance, when the test is performed in accordance with **9.4**, the impulse voltage shall be withstood.

6.4 Temperature The temperature of each part at the time of cooling operation and heating operation, when the test is performed in accordance with **9.5**, shall be not higher than the temperature given in table 7, and the abnormal elevated temperature shall not be generated also in other parts.

Table 7 Upper limit of temperature of each part

Unit: °C

Enclosures	Objects which people touch and use	Objects made of metal, ceramics or glass	55
		Other objects	70
	Objects which people may touch easily, except the protective frame of a heat generation part and hot air exit	Objects made of metal, ceramics or glass	85
		Other objects	100
External surface of the part through which gas passes of a gas shut-off valve body			85 ^{a)}
External surface of the part through which gas passes of a zero governor			70 ^{b)}
Surface of the wood wall of an equipment rear face, side face and upper ceiling face, and surface of the wood table of an equipment lower face			100
Temperature of combustion gas			260
Notes ^{a)} When it exceeds 85 °C, it shall be confirmed according to the heat run test of functional parts specified in JIS S 2093 that a gas heat pump conforms to the item of airtightness of a gas passage and its operation is free from abnormalities.			
^{b)} When it exceeds 70 °C, it shall be confirmed according to the heat run test of functional parts specified in JIS S 2093 that a gas heat pump conforms to the item of airtightness of a gas passage and the adjusted pressure is free from abnormalities.			

6.5 Performance at the time of water spray The performance at the time of a water spray, when the test is performed in accordance with **9.6** with respect to the outdoor-side part of a gas heat pump, shall satisfy the following conditions.

- a) Abnormalities such as engine stop do not occur during the water spray.
- b) When the operation is performed 3 times after the end of water spray, a gas heat pump shall start normally each time and an engine shall not backfire at the time of start, during operation and at the time of stop.
- c) The value of insulation resistance shall be 1 MΩ or more after the end of water spray. The withstand voltage shall conform to the specification of **JIS C 9335-1** or Annex B.

6.6 Noise The noise, when the test is performed in accordance with **9.7**, shall be not more than the values given in table 8.

Table 8 Upper limit of noise

Unit: dB

Rated cooling capacity	Indoor side	Outdoor side
2.5 or under	50	50
Over 2.5 up to and incl. 4.0	55	55
Over 4.0 up to and incl. 10.0	60	60
Over 10.0 up to and incl. 16.0	63	65
Over 16.0 up to and incl. 85.0	66	68

6.7 Engine performance The engine performance shall satisfy each of following items. However, the conditions of test gas shall be in accordance with clause 4 of Annex 1 of **JIS B 8627-2**.

- a) For the engine startup performance, the engine, when the test is performed in accordance with **9.8**, shall be able to start by the first driving of the motor for startup for every time of three times of the operation and shall not backfire at the time of startup, during operation and at the time of stop.
- b) The CO concentration (volume %) in the theoretical dry combustion gas, when the test is performed in accordance with **9.9**, shall be not more than 0.28 %.
- c) The test of NO_x12 mode value shall be performed in accordance with **9.10**.

6.8 Airtightness of gas passage The airtightness of gas passage, when the test is performed in accordance with **9.11**, shall conform to each of following items.

- a) The amount of internal leakage which leaks through a shut-off valve shall be 0.07 L/h or less with the operation stopped.
- b) There shall be no external leakage from a gas connecting port to an engine inlet.

6.9 Power failure The power failure shall be as follows.

- a) **Service interruption** When the service interruption test is performed in accordance with **9.12**, safety shall not be compromised.
- b) **Voltage drop** When the voltage drop test is performed in accordance with **9.12**, safety shall not be compromised.
- c) **Power source noise** When the power source noise test is performed in accordance with **9.12**, safety shall not be compromised.

6.10 Electric safety performance The electric safety performance shall conform to the specification of **JIS C 9335-2-40** or Annex B.

6.11 Abnormalities When the test is performed in accordance with **9.13**, there shall be no mechanical damage which compromises safety, the value of insulation resistance after the test shall be 0.1 MΩ or more and the withstand voltage shall conform to the specification of **6.10**. The surface temperature of the blower motor at this time shall be 150 °C or less, and the temperature of the winding wire shall be not more than the value given in table 9.

Table 9 Upper temperature limit in abnormality test

Unit: °C

Classification of protective device of blower motor		Class of insulation of winding wire				
		A	E	B	F	H
In the case of impedance protection		150	165	175	190	210
In the case where the protective device is attached	First 1 h (maximum value)	200	215	225	240	260
	After the elapse of 1 h (maximum value)	175	190	200	215	235
	After the elapse of 1 h (arithmetic average value)	150	165	175	190	210

7 Structure

7.1 General The structure of the equipment shall satisfy the following conditions in consideration of safety and durability.

- a) The edge of the part which people touch with hands in service or in the case of maintenance and checking shall be sufficiently smooth.
- b) The control section and electric section shall not be influenced by the weather condition.
- c) The thermal insulation material, etc. shall not produce detachment or omission in normal use.
- d) The movable parts of the blower, etc. shall not easily come into contact with a human body in normal use.
- e) The thermal insulation material, etc. used near (less than 50 mm) the electric component section shall be fire-resistant, except in cases where there is no possibility that danger such as electric shock, fire arises if the thermal insulation material, etc. burns.

- f) The confirmation of drain of the condensed water can be easily performed.
- g) The connecting port, etc. for refrigerant collection shall be provided.
- h) The refrigerant circuit shall be safe for an abnormal pressure rise.

7.2 Structure of each part

7.2.1 Gas connecting port The gas introduction section shall be as follows.

- a) The gas connecting port, normally, shall be exposed to the outside or shall be located so that it is able to be easily identified visually.
- b) For the screw threads of the gas connecting port, those specified in **JIS B 0203** shall be used.

7.2.2 Shut-off valve The shut-off valve shall be as follows.

- a) The gas passage to an engine shall be closed by two or more shut-off valves provided in series at the time of engine stop.
- b) Each shut-off valve shall have the independent function.

7.2.3 Gas pipe The gas pipe shall be as follows.

- a) The gas pipe used for the part which becomes negative pressure shall have sufficient strength to negative pressure. Under the normal operation condition, each part of the gas pipe shall be free from abnormalities such as deformation during the period from the close of the gas valve in the gas inlet side to the stop of the engine.
- b) The surface treatment such as a tinning shall be given to the inner surface of the steel pipe of 2 mm or less in inner diameter used for a gas pipe.

7.2.4 Combustion gas passage The combustion gas passage shall be as follows.

- a) The combustion gas passage shall have the structure to endure the temperature of combustion gas, vibration of an engine, etc. sufficiently.
- b) The opening of combustion gas exhaust outlet shall be structured so that a steel ball of 16 mm in diameter cannot enter or birds, etc. cannot invade.
- c) The combustion gas passage shall have the structure which is capable of easily discharging drain.

7.2.5 Casing The casing shall be as follows.

- a) The opening of casing to introduce air for combustion shall be structured so that a steel ball of 16 mm in diameter cannot enter or birds, etc. cannot invade.
- b) The panel for checking and maintenance shall have the structure to endure the repetitive use of attachment and detachment.

7.2.6 Motor for engine startup The motor for engine startup shall have the function to prevent overheat.

7.2.7 Engine ignition device The engine ignition device shall be structured so that the noise radiation (radio noise) generated by the engine ignition device gives no interference to other equipment.

7.2.8 Engine protective device The engine protective device shall be as follows.

- a) When the number of rotations of an engine exceeds that designated by the manufacturer, the engine protective device shall have the function in which the engine stops and the gas passage is automatically closed.
- b) When the engine oil decreases to the degree which the manufacturer designates, the engine protective device shall have the function in which the engine stops and the gas passage is automatically closed.
- c) When the engine cooling water (anti-freeze solution) exceeds the temperature which the manufacturer designates, the engine protective device shall have the function in which the engine stops and the gas passage is automatically closed.

7.3 Structure of electric section The structure of an electric section shall conform to the specification of **JIS C 9335-2-40** or conform to Annex B.

7.4 Refrigerant facilities The strength of each part of refrigerant facilities shall conform to the specification of clause 7 of **JIS B 8620**.

NOTE : The refrigerant facilities which are not covered by the scope of **JIS B 8620** are covered by the High Pressure Gas Safety Law.

7.5 Refrigerating machine oil The refrigerating machine oil specified in **JIS K 2211** or that at least equivalent thereto in quality shall be used.

8 Material

8.1 General The material used for a gas heat pump shall conform to the specification of **JIS C 9335-2-40**, or shall conform to Annex B.

8.2 Gas passage The material used for the part which contains gas shall be as follows.

- a) The metallic material shall be anti-corrosion or of which the surface is given an anti-corrosion treatment.
- b) The rubber hose shall have quality to sufficiently endure the pressure and components of a fuel gas.
- c) The metal braided flexible hose shall be that which conforms to **JIS S 2145** or that at least equivalent thereto in the performance.
- d) The material of the gas passage of the part in which the gas pressure downstream from the regulator becomes negative pressure shall sufficiently endure the negative pressure.

8.3 Combustion gas passage The material used for the combustion gas passage shall be as follows.

- a) The metallic material shall be anti-corrosion or of which the surface is given an anti-corrosion treatment.
- b) The material other than metal shall be resistant to combustion gas and drain.

8.4 Thermal insulation material, etc. The thermal insulation material, sound absorbing material, etc. of the periphery of an engine shall be that which does not burn or naturally burns out within 10 s when it burns.

8.5 Vibration-proof material The vibration-proof material which supports an engine shall be durable.

9 Test methods

9.1 Non-ducted type gas heat pump

9.1.1 Pressure test For the pressure test, the test specified in clause 11 of **JIS B 8620** shall be performed.

NOTE : The refrigerant facilities which are not covered by the scope of **JIS B 8620** are covered by the High Pressure Gas Safety Law.

9.1.2 Cooling test The cooling test shall be as follows.

- a) **Cooling capacity, cooling gas consumption, cooling power consumption and cooling coefficient-of-performance test** The test method of cooling capacity, cooling gas consumption, cooling power consumption and cooling coefficient of performance shall be in accordance with 4.2 of **JIS B 8627-2**. For the cooling intermediate performance test, the cooling capacity and cooling gas consumption shall be measured at the setting in which a gas heat pump shows the capacity of one-half the rated cooling capacity according to the conditions of 4.2 of **JIS B 8627-2**. However, even when the minimum capacity of the equipment exceeds 55 % of the rated cooling capacity, they shall be measured at that setting according to the conditions of 4.2 of **JIS B 8627-2**.
- b) **Cooling overload test** The cooling overload test method shall be in accordance with 4.3 of **JIS B 8627-2**.
- c) **Cooling low-temperature test** The cooling low-temperature-test method shall be in accordance with 4.4 of **JIS B 8627-2**.
- d) **Discharge performance test of enclosure sweat and condensed water** The discharge performance test of enclosure sweat and condensed water shall be in accordance with 4.5 of **JIS B 8627-2**.
- e) **Freezing performance test** The freezing performance test method shall be in accordance with 4.6 of **JIS B 8627-2**.

9.1.3 Heating test The heating test shall be as follows.

- a) **Heating capacity, heating gas consumption, heating power consumption and heating coefficient-of-performance test** The test method of heating standard capacity, heating low-temperature capacity, heating ultralow-temperature capacity, heating standard gas consumption, heating low-temperature gas consumption, heating ultralow-temperature gas consumption, heating standard power consumption, heating low-temperature power consumption, heating ultralow temperature power consumption and heating coefficient of performance shall be in accordance with **5.2 of JIS B 8627-2**. For the heating intermediate performance test, the heating capacity and heating gas consumption shall be measured at the setting in which a gas heat pump shows the capacity of one-half the rated heating capacity according to the conditions of **5.2 of JIS B 8627-2**. However, even when the minimum capacity of the equipment exceeds 55 % of the rated capacity, they shall be measured at that setting according to the conditions of **5.2 of JIS B 8627-2**.
- b) **Heating overload test** The heating overload test method shall be in accordance with **5.3 of JIS B 8627-2**.
- c) **Automatic defrosting test** The automatic defrosting test method shall be in accordance with **5.4 of JIS B 8627-2**.

9.2 Ducted type gas heat pump

9.2.1 Pressure test For the pressure test, the test specified in clause **11 of JIS B 8620** shall be performed.

NOTE : The refrigerant facilities which are not covered by the scope of **JIS B 8620** are covered by the High Pressure Gas Safety Law.

9.2.2 Cooling test The cooling test shall be as follows.

- a) **Cooling capacity, cooling gas consumption, cooling power consumption and cooling coefficient-of-performance test** The test method of cooling capacity, cooling gas consumption, cooling power consumption and cooling coefficient of performance shall be in accordance with **4.2 of JIS B 8627-3**. For the cooling intermediate performance test, the cooling capacity and cooling gas consumption shall be measured at the setting in which a gas heat pump shows the capacity of one-half the rated cooling capacity according to the conditions of **4.2 of JIS B 8627-3**. However, even when the minimum capacity of the equipment exceeds 55 % of the rated capacity, they shall be measured at that setting according to the conditions of **4.2 of JIS B 8627-3**.
- b) **Cooling overload test** The cooling overload test method shall be in accordance with **4.3 of JIS B 8627-3**.
- c) **Cooling low-temperature test** The cooling low-temperature-test method shall be in accordance with **4.4 of JIS B 8627-3**.
- d) **Discharge performance test method of enclosure sweat and condensed water** The discharge performance test of enclosure sweat and condensed water shall be in accordance with **4.5 of JIS B 8627-3**.

9.2.3 Heating test The heating test shall be as follows.

- a) **Heating capacity, heating gas consumption, heating power consumption and heating coefficient-of-performance test** The test method of heating standard capacity, heating low-temperature capacity, heating ultralow-temperature capacity, heating standard gas consumption, heating low-temperature gas consumption, heating ultralow-temperature gas consumption, heating standard power consumption, heating low-temperature power consumption, heating ultralow temperature power consumption and heating coefficient of performance shall be in accordance with **5.2 of JIS B 8627-3**. For the heating intermediate performance test, the heating capacity and heating gas consumption shall be measured at the setting in which a gas heat pump shows the capacity of one-half the rated heating capacity according to the conditions of **5.2 of JIS B 8627-3**. However, even when the minimum capacity of the equipment exceeds 55 % of the rated capacity, they shall be measured at that setting according to the conditions of **5.2 of JIS B 8627-3**.
- b) **Heating overload test** The heating overload test method shall be in accordance with **5.3 of JIS B 8627-3**.
- c) **Automatic defrosting test** The automatic defrosting test method shall be in accordance with **5.4 of JIS B 8627-3**.

9.2.4 Airflow rate test The airflow rate test method shall be in accordance with Annex 1 of **JIS B 8627-3**.

9.3 Insulation resistance test The insulation resistance test shall be in accordance with **B.5.1**.

9.4 Withstand impulse voltage test The withstand impulse voltage test method shall be in accordance with Annex C.

9.5 Temperature test The temperature test method shall be in accordance with Annex D.

9.6 Performance test at the time of water spray The performance-test method at the time of water spray shall be in accordance with Annex E.

9.7 Noise test The noise test method shall be in accordance with Annex F.

9.8 Engine startup test The engine startup test method shall be in accordance with Annex G.

9.9 CO concentration test The CO concentration test method shall be in accordance with Annex H.

9.10 NO_x concentration test The NO_x concentration test method shall be in accordance with Annex I.

9.11 Gas passage airtightness test The gas passage airtightness test method shall be in accordance with Annex J.

9.12 Power failure test The power failure test method shall be in accordance with Annex K.

9.13 Abnormality test The abnormality test method shall be in accordance with Annex L.

NOTE : The CO concentration test and NO_x concentration test can be performed simultaneously.

10 Inspections

10.1 Type inspection The type inspection shall be performed in accordance with the method specified in clause 9, and each of following items shall conform to the specifications of clause 6, clause 7, and clause 8.

- a) Structure and material
- b) Withstand pressure and airtightness of each part of refrigerant facilities
- c) Rated cooling capacity
- d) Rated cooling gas consumption
- e) Rated cooling power consumption
- f) Cooling coefficient of performance
- g) Intermediate cooling capacity
- h) Intermediate cooling gas consumption
- i) Rated heating standard capacity
- j) Rated heating standard gas consumption
- k) Rated heating standard power consumption
- l) Heating coefficient of performance
- m) Intermediate heating standard capacity
- n) Intermediate heating standard gas consumption
- o) Rated heating low-temperature capacity
- p) Rated heating low-temperature gas consumption
- q) Rated heating low-temperature power consumption
- r) Rated heating ultralow-temperature capacity
- s) Rated heating ultralow-temperature gas consumption
- t) Rated heating ultralow-temperature power consumption
- u) Airflow rate (in the case of ducted type gas heat pump)
- v) Cooling overload performance
- w) Heating overload performance

- x) Freezing performance (in the case of non-ducted type gas heat pump)
- y) Automatic defrosting performance
- z) Cooling low-temperature performance
- aa) Discharging performance of enclosure sweat and condensed water
- ab) Insulation resistance
- ac) Withstand voltage
- ad) Withstand impulse voltage
- ae) Temperature
- af) Performance at the time of water spray
- ag) Noise
- ah) Engine startup performance
- ai) CO concentration
- aj) NO_x concentration
- ak) Gas passage airtightness
- al) Power failure
- am) Abnormalities.

NOTE : The type inspection refers to the inspection for judging whether the product quality satisfies the quality items given in design or not.

10.2 Delivery inspection The delivery inspection shall be performed with respect to each item of the following, and shall conform to the specification of clause 6.

In addition, **a)** to **m)**, **p)** and **q)** shall be performed in accordance with the sampling inspection procedure, and **n)**, **o)** and **r)** shall be performed in accordance with the total inspection procedure.

- a) Airtightness of refrigerant facilities
- b) Rated cooling capacity
- c) Rated cooling gas consumption
- d) Rated cooling power consumption
- e) Cooling coefficient of performance
- f) Intermediate cooling capacity
- g) Intermediate cooling gas consumption
- h) Rated heating standard capacity
- i) Rated heating standard gas consumption
- j) Rated heating standard power consumption
- k) Heating coefficient of performance

- l) Intermediate heating standard capacity
- m) Intermediate heating standard gas consumption
- n) Insulation resistance
- o) Withstand voltage
- p) Temperature
- q) Noise
- r) Gas passage airtightness

NOTE : The delivery inspection refers to the inspection for judging whether the product quality satisfies the quality items accepted to be required or not on the occasion of delivery of the product of which the design and manufacture are the same as those of the product which passed the type inspection already.

11 Marking

11.1 Marking on body

- a) The equipment name plate on which the marking items given in **b)** are marked indelibly shall be attached to the conspicuous place ²⁾ of the gas heat pump under the condition of the normal installation.

Note ²⁾ It refers to the surface of the enclosure, or the surface of the interior of the enclosure covered with a lid which is capable of opening or closing without use of tools, etc.

- b) The marking items shall be as follows.
 - 1) Standard title ³⁾
 - 2) Type
 - 3) Class of gas ⁴⁾
 - 4) Rated voltage (V) ⁵⁾
 - 5) Number of phases (single phase or three phase).
 - 6) Rated frequency (Hz) ⁵⁾
 - 7) Rated cooling capacity (kW) ⁶⁾
 - 8) Rated cooling gas consumption (kW) ⁶⁾
 - 9) Rated cooling power consumption (kW) ^{5) 6) 7)}
 - 10) Rated heating standard capacity (kW) ⁶⁾
 - 11) Rated heating standard gas consumption (kW) ⁶⁾
 - 12) Rated heating standard power consumption (kW) ^{5) 6) 7)}
 - 13) Refrigerant name or its symbol, and the refrigerant filling quantity (kg) ⁷⁾
 - 14) Name of refrigerating machine oil

- 15) Design pressure (high voltage section, low pressure section) (MPa) ⁸⁾
- 16) IP code ⁹⁾
- 17) Manufacturer's name or abbreviation
- 18) Manufacture year, manufacturing number or lot number
- 19) Gross mass [approximate mass (kg)] ⁷⁾
- 20) Rated airflow rate (m³/min) (ducted type heat pump only) ¹⁰⁾
- 21) Rated external static pressure (Pa) (ducted type heat pump only) ¹⁰⁾

Notes ³⁾ Standard title may be simply described as "Gas heat pump air conditioner".

- ⁴⁾ For city gas, for example, "For city gas 13 A", "For city gas L1 (6B, 6C, 7C)". For liquefied petroleum gas, "For LP gas (class "I" propane)".
- ⁵⁾ For dual-rated frequencies of 50 Hz and 60 Hz, each frequency shall be marked.
- ⁶⁾ For multiple combination type, the value in the case of representative combination may be marked. Furthermore, for multi-type, the value in the case of standard combination shall be marked.
- ⁷⁾ For the unit of power consumption and the unit of mass, in the case where a numeric value is less than 1 000, the unit of watt (W) and gram (g) may be used.
- ⁸⁾ Design pressure, high pressure section and low pressure section may be marked as DP, H and L, respectively.
- ⁹⁾ Electric safety performance in accordance with **JIS C 9335-2-40** shall be marked.
- ¹⁰⁾ For the ducted type heat pump, the item shall be indelibly marked on the product.

In addition, in the case of ducted type heat pump, the coefficient of performance of the equipment in which the external static pressure obtained by performing the test is described in the specification sheet may be calculated from the value of cooling capacity, heating capacity, gas consumption and power consumption measured by giving the value of external static pressure.

11.2 Publication of engineering data, etc.

- a) Items given in **b)** shall be appropriately published using engineering data, etc. of a gas heat pump.
- b) The items to be published by using engineering data, etc. shall be as follows.
 - 1) Standard title ¹¹⁾
 - 2) Type

- 3) Class of gas ¹²⁾
- 4) Rated voltage (V) ¹³⁾
- 5) Number of phases (single phase or three phase)
- 6) Rated frequency (Hz) ¹³⁾
- 7) Rated cooling capacity (kW)
- 8) Rated cooling sensible heat factor
- 9) Rated cooling gas consumption (kW)
- 10) Rated cooling power consumption (kW) ^{13) 14)}
- 11) Cooling coefficient of performance ^{15) 16)}
- 12) Intermediate cooling capacity (kW)
- 13) Intermediate cooling gas consumption (kW)
- 14) Cooling period coefficient of performance ¹⁶⁾
- 15) Rated heating standard capacity (kW)
- 16) Rated heating standard gas consumption (kW)
- 17) Rated heating standard power consumption (kW) ^{13) 14)}
- 18) Heating coefficient of performance ^{16) 17)}
- 19) Intermediate heating standard capacity (kW)
- 20) Intermediate heating standard gas consumption (kW)
- 21) Heating period coefficient of performance ¹⁶⁾
- 22) Annual coefficient of performance ¹⁶⁾
- 23) Rated heating low-temperature capacity (kW)
- 24) Rated heating low-temperature gas consumption (kW)
- 25) Rated heating ultralow-temperature capacity (kW) ¹⁸⁾
- 26) Annual energy consumption (kW)
- 27) Refrigerant name or its symbol, and refrigerant filling quantity (kg) ¹⁴⁾
- 28) Name of refrigerating machine oil
- 29) Design pressure (high pressure section, low pressure section) (MPa) ¹⁹⁾
- 30) IP code ²⁰⁾
- 31) Gross mass [approximate mass (kg)] ¹⁴⁾
- 32) Rated airflow rate (m³/min) (ducted type heat pump only) ²¹⁾
- 33) Rated external static pressure (Pa) (ducted type heat pump only) ²¹⁾

Notes ¹¹⁾ Standard name shall be “gas heat pump air conditioner”, or the name peculiar to the manufacturer which shows the product covering the scope of this Standard may be used.

- 12) For city gas, for example, “For city gas 13 A”, “For city gas L1 (6B, 6C, 7C)”. For liquefied petroleum gas, “For LP gas (class “I” propane)”.
- 13) For dual-rated frequencies of 50 Hz and 60 Hz, each frequency shall be marked.
- 14) For the unit of power consumption and the unit of mass, in the case where a numeric value is less than 1 000, the unit of watt (W) and gram (g) may be used.
- 15) The value obtained by dividing the rated cooling capacity by the sum of the rated cooling gas consumption and the rated cooling power consumption shall be marked. For the cooling coefficient of performance, the designation of “cooling COP” may be used.
- 16) Although the coefficient of performance shall be expressed in units of 0.05, it may be expressed also in units of 0.01.
- 17) The value obtained by dividing the rated heating standard capacity by the sum of the rated heating standard gas consumption and the rated heating standard power consumption shall be marked. For the heating coefficient of performance, the designation of “heating COP” may be used.
- 18) It shall be marked on the equipment in which it is described in the specification sheet, the operation manual, etc. that the continuous operation is possible at not more than the temperature of the ultralow-temperature condition as the service range.
- 19) Design pressure, high pressure section and low pressure section may be marked as DP, H and L, respectively.
- 20) Electric safety performance in accordance with **JIS C 9335-2-40** shall be marked.
- 21) For the ducted type heat pump, the item shall be indelibly marked on the product.

In addition, in the case of the ducted type heat pump, the coefficient of performance of the equipment in which the external static pressure obtained by performing the test is described in the specification sheet may be calculated from the value of cooling capacity, heating capacity, gas consumption and power consumption measured by giving the value of external static pressure.

12 Operation manual The manual, etc. which describe the following matter shall be attached to a gas heat pump.

a) **Precautions concerning handling**

- 1) Matter concerning the handling of a gas heat pump
- 2) Matter concerning daily checking, cleaning and periodic checking
- 3) Matter concerning how to identify failures, abnormalities when they arise, the method for taking measures against them and contact