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Absorption refrigerating machines

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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)/Japanese Standards Association (JSA) with the draft being attached, based on the provision of Article 12 Clause 1 of the Industrial Standardization Law applicable to the case of revision by the provision of Article 14.

Consequently **JIS B 8622**:2002 has been replaced with this Standard.

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Absorption refrigerating machines

1 Scope

This Japanese Industrial Standard specifies the absorption refrigerating machines, absorption water chilling and water heating packages and absorption heat pumps (hereafter referred to as “refrigerating machines”) having the refrigerating capacity of 25 kW or over per a single machine among those which perform cooling or heating of water, constituting of an absorption refrigeration cycle with generators (including high temperature generators, and low temperature generators) condenser, absorber, evaporator, etc. by using water as a refrigerant and lithium-bromide water solution as an absorbent solution and supplying heating sources to the generator or high temperature generator.

NOTE 1 For heating sources, there are city gas, liquefied petroleum gas, oil, steam, hot water for heating and exhaust gas for heating.

NOTE 2 Unless otherwise specified, the pressure described in this Standard refers to a gauge pressure.

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 7410 *Liquid-in-glass thermometers for testing of petroleum product*

JIS B 7411 *Solid-stem general purpose liquid-in-glass thermometers*

JIS B 7505-1 *Aneroid pressure gauges—Part 1: Bourdon tube pressure gauges*

JIS B 7551 *Variable area flowmeters*

JIS B 7554 *Electromagnetic flowmeters*

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

JIS B 7983 *Continuous analyzers for oxygen in flue gas*

JIS B 7987 *Continuous analyzers for carbon monoxide in flue gas*

JIS B 8222 *Land boilers—Heat balancing*

JIS B 8407 *Atomizing oil burner of the monobloc type—Testing*

JIS B 8412 *Combustion safety controllers for guntype oil burners*

JIS B 8473 *Fuel oil pipe line—Solenoid valves*

JIS C 1102-1 *Direct acting indicating analogue electrical measuring instruments and their accessories—Part 1: Definitions and general requirements common to all parts*

JIS C 1102-2 *Direct acting indicating analogue electrical measuring instruments and their accessories Part 2: Special requirements for ammeters and voltmeters*

- JIS C 1102-3 *Direct acting indicating analogue electrical measuring instruments and their accessories Part 3: Special requirements for wattmeters and varmeters*
- JIS C 1102-4 *Direct acting indicating analogue electrical measuring instruments and their accessories Part 4: Special requirements for frequency meters*
- JIS C 1102-5 *Direct acting indicating analogue electrical measuring instruments and their accessories Part 5: Special requirements for phase meters, power factor meters and synchrosopes*
- JIS C 1102-6 *Direct acting indicating analogue electrical measuring instruments and their accessories Part 6: Special requirements for ohmmeters (impedance meters) and conductance meters*
- JIS C 1102-7 *Direct acting indicating analogue electrical measuring instruments and their accessories Part 7: Special requirements for multi-function instruments*
- JIS C 1102-8 *Direct acting indicating analogue electrical measuring instruments and their accessories Part 8: Special requirements for accessories*
- JIS C 1102-9 *Direct acting indicating analogue electrical measuring instruments and their accessories Part 9: Recommended test methods*
- JIS C 1211-1 *Alternating-current watt-hour meters (for direct connection)—Part 1: General measuring instrument*
- JIS C 1302 *Insulation resistance testers*
- JIS C 1509-1 *Electroacoustics—Sound level meters—Part 1: Specifications*
- JIS C 1602 *Thermocouples*
- JIS C 1604 *Resistance thermometer sensors*
- JIS C 1605 *Mineral insulated thermocouples*
- JIS C 1611 *Thermistor for temperature measurement*
- JIS C 4210 *Low-voltage three-phase squirrel-cage induction motors for general purpose*
- JIS D 1030 *Automobiles—Analytical procedure for measurement of carbon monoxide, carbon dioxide, total hydrocarbons and oxides of nitrogen in exhaust gas*
- JIS K 0098 *Methods for determination of carbon monoxide in flue gas*
- JIS K 0104 *Methods for determination of nitrogen oxides in flue gas*
- JIS K 0151 *Non-dispersive infrared gas analyzer*
- JIS K 0301 *Methods for determination of oxygen in flue gas*
- JIS K 2203 *Kerosine*
- JIS K 2205 *Fuel oil*
- JIS K 2240 *Liquefied petroleum gases*

- JIS K 2279 *Crude petroleum and petroleum products—Determination and estimation of heat of combustion*
- JIS K 2301 *Fuel gases and natural gas—Methods for chemical analysis and testing*
- JIS M 7605 *Detector tube type carbon monoxide measuring instruments (Colour-intensity)*
- JIS M 7650 *Detector tube type carbon monoxide measuring instruments (Length-of-stain)*
- JIS S 2142 *Ignition transformers for burning apparatus*
- JIS Z 8731 *Acoustics—Description and measurement of environmental noise*
- JIS Z 8762-1 *Measurement of fluid flow by means of pressure differential devices inserted in circular cross-section conduits running full—Part 1: General principles and requirements*
- JIS Z 8762-2 *Measurement of fluid flow by means of pressure differential devices inserted in circular cross-section conduits running full—Part 2: Orifice plates*
- JIS Z 8762-3 *Measurement of fluid flow by means of pressure differential devices inserted in circular cross-section conduits running full—Part 3: Nozzles and Venturi nozzles*
- JIS Z 8762-4 *Measurement of fluid flow by means of pressure differential devices inserted in circular cross-section conduits running full—Part 4: Venturi tubes*
- JIS Z 8765 *Method of flow measurement by turbine meters*
- JIS Z 8766 *Vortex flowmeters—Methods of flow measurement*

3 Terms and definitions

For the purposes of this Standard, the following terms and definitions apply.

3.1 rated value

a characteristic value when operating a refrigerating machine under a rated condition

It is marked on a name plate, etc. The rated value is classified into the following two kinds.

- a) **standard rating** A rating based on tests performed under standard rating conditions.
- b) **application rating** A rating based on tests performed under application rated conditions (other than standard rating conditions).

3.2 rated refrigerating capacity

a rated value of heat quantity removed from the circulating chilled water

The unit is expressed in kW.

3.3 rated heating capacity

a rated value of heat quantity added to the circulating hot water

The unit is expressed in kW.

3.4 rated heat discharge

a rated value of heat quantity dissipated to the circulating cooling waters

The unit is expressed in kW.

3.5 consumption of heating sources

a flow rate of city gas, liquefied petroleum gas, oil, steam, high temperature water for heating, etc. consumed by refrigerating machines

The unit is expressed in m³/h, L/h, kg/h, or L/min.

3.6 heat consumption of heating sources

a value obtained by converting consumption of heating sources into calorie basis

The unit is expressed in kW.

3.7 power consumption

electric power consumed in a built-in electric motor and a control circuit

The unit is expressed in kW.

3.8 coefficient of performance

a value obtained by dividing refrigerating capacity or heating capacity by the sum of heat consumption of heating sources and power consumption

3.9 exhaust gas loss

heat quantity released by the combustion exhaust gas from a direct fired absorption water chilling and water heating package to the outside of the package

The unit is expressed in kW.

3.10 body heat loss

heat quantity released or received by the temperature difference between the ambient temperature and the body surface temperature of a refrigerating machine

The unit is expressed in kW.

3.11 rated flow rate

a flow rate of water, steam, fuel, etc. when testing the refrigerating capacity and heating capacity

The unit is expressed in m³/h, L/h, kg/h, or L/min.

3.12 absorption refrigerating machine

a machine constituting the absorption refrigeration cycle which supplies chilled water by supplying heating sources to the generator or high temperature generator

3.13 absorption water chilling and water heating package

a package constituting the absorption refrigeration cycle which supplies chilled water and hot water by supplying heating sources to the generator or high temperature generator

Especially, the package equipped with a burning facility is called the direct fired absorption water chilling and water heating package.

3.14 absorption heat pump

a machine constituting the cycle which supplies hot water with the absorber and condenser by collecting waste heat from the heat source water with the evaporator by supplying heating sources to the generator or high temperature generator

3.15 single effect type

a machine which regenerates refrigerants only through the generator using the refrigerating cycle of refrigerating machine

It is also called a simple effect type.

3.16 double effect type

a machine which regenerates refrigerants through two stages which are the high temperature generator and the low temperature generator, using the refrigerating cycle of refrigerating machine

3.17 combination type of single effect and double effect

a machine capable of performing either the single effect operation or the double effect operation by switching, or performing both the single effect operation and the double effect operation at the same time, with a high temperature heat source being used as the heating source for double effect and with a low temperature heat source being used as the heating source for the single effect operation

3.18 chilled water and hot water simultaneous supply type

an absorption water chilling and water heating package which supplies chilled water and hot water simultaneously

3.19 maximum allowable working pressure

a maximum pressure of water, steam, etc. which can be used safely with respect to the structural strength

3.20 vacuum

a condition in the space filled with the gas of pressure lower than the usual atmospheric pressure

3.21 rated pressure loss

a value of pressure loss produced when the chilled water, hot water, cooling water and heat source water pass through the refrigerating machine

The unit is expressed in kPa.

3.22 city gas

a gas of gas group described in the ministerial ordinance on certifications, etc. of gas appliances (Ordinance of the Ministry of International Trade and Industry No. 27 of 1971) based on Gas Business Act (Act No. 51 of 1954), which is a fuel gas supplied via gas pipelines by gas suppliers

3.23 liquefied petroleum gas

fuel gas specified in **JIS K 2240**

3.24 oil

oil used as heating sources, and that specified in **JIS K 2203** and **JIS K 2205**

3.25 steam

steam supplied as heating sources to the generator or high temperature generator of refrigerating machines, and served for heat concentration of absorbent solution

3.26 hot water for heating

water supplied as heating sources to the generator or high temperature generator of refrigerating machines, and served for heat concentration of absorbent solution

The hot water for heating includes the high temperature water, the low temperature water, and the warm waste water, etc.

3.27 exhaust gas for heating

a combustion exhaust gas from the manufacturing process which supplied as heating sources to the generator or high temperature generator of refrigerating machines, and served for heat concentration of absorbent solution of absorption water chilling and water heating packages

3.28 heat source water

water supplied to the evaporator with the absorption heat pump and served for the heat recovery

3.29 chilled water

water which is cooled by passing through the evaporator and used for cooling, etc.

3.30 cooling water

water which comes out from the refrigerating machine with its temperature raised after passing through the absorber and condenser

3.31 hot water

water which is heated by the absorption water chilling and water heating package and heat pump and used for heating, hot water supply, etc.

3.32 exhaust gas

a combustion exhaust gas discharged from the high temperature generator or generator of direct fired absorption water chilling and water heating packages

3.33 scale coefficient

thermal resistance produced by scale in the water in heat exchanger tubes of chilled water, cooling water, hot water, hot water for heating, heat source water, steam, etc.

The unit is expressed in $\text{m}^2 \cdot \text{K/kW}$.

3.34 bleed apparatus

an apparatus which extracts and removes the non-condensing gas in the refrigerating machine from the inside of the refrigerating machine

3.35 burning facility

a facility which receives city gas, liquefied petroleum gas, or oil, and burns and controls one of them

3.36 gross calorific value (higher heating value)

a total amount of heat generated when a fuel combusts completely by saturated moist air

3.37 net calorific value (lower heating value)

a remaining heating value obtained by subtracting the evaporation heat of steam generated by burning from the gross calorific value

3.38 control apparatus

an apparatus to control the normal and continuous operation of the refrigerating machine

3.39 proportional control

method of controlling for heating etc. continuously in the capacity control of the refrigerating machine

3.40 phase control

method of controlling for heating etc. stepwise in the capacity control of the refrigerating machine

3.41 on-off control

method of two-phase controlling between the heating phase and the stop phase in the capacity control of the refrigerating machine

3.42 part load

the condition under which the refrigerating machine is operated below the rated cooling capacity or the rated heating capacity

3.43 incidental facility

a facility such as a chilled water pump, hot water pump, hot water for heating pump, cooling water pump, cooling tower, flue, or water line that is not directly connected with the body of refrigerating machine

3.44 corrosion inhibitor

a chemical added to absorbent solution to inhibit the corrosive action of absorbent solution used for a refrigerating machine as much as possible

3.45 type inspection

an inspection of performance and other characteristics typically carried out on the product of the same design produced by the same manufacturer

3.46 delivery inspection

an inspection of the function of the product which is required on the occasion of delivery of the product of the same design and manufacture as those that have already been accepted by the type inspection

4 Classification

4.1 Classification by performance

The classification shall be as follows:

- a) Exclusive supply of chilled water
- b) Both supply of chilled water and hot water (it refers to each exclusive supply by switching to chilled water or hot water.)
- c) Simultaneous supply of chilled water and hot water
- d) Exclusive supply of hot water (by heat pump cycle)

4.2 Classification by refrigerating cycle

The classification by refrigerating cycle shall be as follows:

- a) Single effect type
- b) Double effect type
- c) Combination type of single effect and double effect

4.3 Classification by heating source

The classification by heating source shall be as follows:

- a) City gas system
- b) Liquefied petroleum gas system
- c) Oil (kerosene, heavy fuel oil) system
- d) Steam system
- e) Hot water for heating (high temperature water or low temperature water) system
- f) Exhaust gas for heating system

4.4 Classification by installation site

The classification by installation site shall be as follows:

- a) **Indoor type** Those installed at the inside of a house, such as a machine room.
- b) **Outdoor type** Those installed at the outside of a house, such as a rooftop, and the protective measures against the external detrimental environmental conditions, such as wind, rain, and heat are taken by using an outdoor type casing, etc.
- c) **Cooling tower-incorporated type** The absorption refrigerating machine which integrates an outdoor type refrigerating machine, a cooling water, a cooling water pump, a cooling water line and other incidental facilities, and is used as a standard-type by manufactures.

5 Rating

5.1 Voltage and frequency

For the rated voltage of refrigerating machine, single-phase AC 100 V, single-phase AC 200 V, three-phase AC 200 V, three-phase AC 220 V, three-phase AC 400 V, or three-phase AC 440 V, shall be used, and for the rated frequency, either 50 Hz or 60 Hz shall be used exclusively or both 50 Hz and 60 Hz shall be used commonly.

5.2 Heating source

The heating source shall be as follows.

- a) **City gas**
 - 1) **Gross calorific value** The gross calorific value shall be the calorific value specified in the stipulation of gas supply of the gas suppliers.
 - 2) **Gas pressure** The gas pressure shall be the pressure specified in the stipulation of gas supply of the gas suppliers. The design standard gas pressure based on the low pressure specification used by the refrigerating machine manufacturer shall be as shown in table 1.

In addition, the design standard gas pressure based on the intermediate pressure specification used by the refrigerating machine manufacturer shall be 8 kPa and the design standard gas pressure of the medium pressure specification shall be 0.1 MPa.

Table 1 Design standard gas pressure based on low pressure specification used by refrigerating machine manufacturer

Unit: kPa

Group of city gas	Design standards gas pressure
5C, L1 (7C, 6B, 6C) L2 (5A, 5B, 5AN) L3 (4A, 4B, 4C)	1.0
6A	1.5
12A, 13A	2.0
NOTE : The content in parentheses refers to the conventional gas group, and is described for informative references.	

- b) **Liquefied petroleum gas** The liquefied petroleum gas shall be classified into Class 1 No. 1, Class 1 No. 2, or Class 1 No. 3 specified in **JIS K 2240**. Furthermore, the design gas pressure used by the refrigerating machine manufacturer shall be determined in consultation with the distributor.
- c) **Oil** The oil used as fuel shall be classified into kerosene specified in **JIS K 2203**, Class 1 No. 1 heavy fuel oil specified in **JIS K 2205**.
- d) **Steam** The standard rated pressure and temperature shall be as follows:
 - 1) **Single effect type pressure** 147 kPa, 127 °C (saturation)
 - 2) **Double effect type pressure** 785 kPa, 175 °C (saturation)
- e) **Hot water for heating** The temperature and the pressure of the hot water for heating shall be upon the agreement between the parties concerned with delivery.
- f) **Exhaust gas for heating** The temperature and the pressure of the exhaust gas for heating shall be upon the agreement between the parties concerned with delivery.

6 Composition of standard apparatus

The composition of standard apparatus of refrigerating machine shall be as shown in table 2, and each section shall be as follows:

Table 2 List of standard composition of apparatus

Composition of apparatus	Classification of heating sources											Remarks
	City gas		Liquefied petroleum gas		Oil		Steam		Hot water for heating		Exhaust gas for heating	
	Sin- gle	Dou- ble	Sin- gle	Dou- ble	Sin- gle	Dou- ble	Sin- gle	Dou- ble	Sin- gle	Dou- ble	Dou- ble	
Absorber	○	○	○	○	○	○	○	○	○	○	○	
Evaporator	○	○	○	○	○	○	○	○	○	○	○	
Generator	○		○		○		○		○			
High temperature generator		○		○		○		○		○	○	
Low temperature generator		○		○		○		○		○	○	
Condenser	○	○	○	○	○	○	○	○	○	○	○	
Heat exchanger	○		○		○		○		○			
High temperature heat exchanger		○		○		○		○		○	○	
Low temperature heat exchanger		○		○		○		○		○	○	
Hot water heat exchanger		○		○		○					○	If provided
Absorbent solution pump	○	○	○	○	○	○	○	○	○	○	○	If provided
Refrigerant pump	○	○	○	○	○	○	○	○	○	○	○	If provided
Bleed apparatus	○	○	○	○	○	○	○	○	○	○	○	
Burning facility	○	○	○	○	○	○						
Safety device	○	○	○	○	○	○	○	○	○	○	○	
Console panel	○	○	○	○	○	○	○	○	○	○	○	
Volume control apparatus	○	○	○	○	○	○	○	○	○	○	○	
Name plate	○	○	○	○	○	○	○	○	○	○	○	
Refrigerant	○	○	○	○	○	○	○	○	○	○	○	
Absorbent solution	○	○	○	○	○	○	○	○	○	○	○	
Drain heat recovery machine							○	○				If provided
NOTE 1 The combination type of single effect and double effect is included in the double effect type. NOTE 2 For other items that compose the apparatus, the exhaust heat recovery machine, refrigerant heat recovery machine, etc. for coping with energy saving are included. NOTE 3 The absorption heat pump is included in each column of classification of heating sources according to the classification of heating sources. NOTE 4 ○-mark in the column indicates the applicable item.												

- a) **Absorber** The refrigerant steam from the evaporator is made to be absorbed into an absorbent solution at the time of chilled water supply, and the pressure in the evaporator is maintained at the required value. The heat of absorption generated at the time of refrigerant absorption is removed by cooling water passing through the inside of a nest of tubes. At the time of hot water supply, the absorber is left stopped, or the sensible heat of absorbent solution is given off to hot water.
- b) **Evaporator** The refrigerant liquid is sprinkled to a nest of tubes at the time of chilled water supply, and the temperature of chilled water which passes through the inside of a nest of tubes is lowered by this evaporation. At the time of hot water supply, the evaporator is left stopped, or high temperature absorbent solution instead of refrigerant is sprinkled, or the hot water is heated by condensing refrigerant steam outside a nest of tubes.
- c) **Generator** The low concentration absorbent solution is heated and condensed by heating sources, and the refrigerant steam is regenerated. In the case of a single effect type, a generator is used.
- d) **High temperature generator** The low concentration absorbent solution is heated and condensed by high temperature heating sources, and the high concentration absorbent solution is obtained regenerating refrigerant steam. In the case of a double effect type, a high temperature generator is used.
- e) **Low temperature generator** The absorbent solution is heated and condensed by the high temperature refrigerant steam regenerated with the high temperature generator, and at the same time the refrigerant steam is regenerated. In the case of a double effect type, a low temperature generator is used.
- f) **Condenser** At the time of chilled water supply, the refrigerant steam from low temperature generator or the refrigerant steam from the generator are cooled and condensed by the cooling water passing through the inside of a nest of tubes. At the time of hot water supply, the hot water is heated by the refrigerant steam and refrigerant liquid or the condenser is left stopped.
- g) **Heat exchanger** The heat exchange between the low temperature, low concentration absorbent solution, and the high temperature, high concentration absorbent solution is performed, and each temperature is raised or lowered respectively. In the case of a single effect type, a heat exchanger is used.
- h) **High temperature heat exchanger** The heat exchange between the low temperature, low concentration absorbent solution and the high temperature, high concentration absorbent solution is performed, and each temperature is raised or lowered respectively. The high temperature heat exchanger is used for the high temperature section of the double effect type.
- i) **Low temperature heat exchanger** The heat exchange between the low temperature, low concentration absorbent solution and the high temperature, high concentration absorbent solution is performed, and each temperature is raised or lowered respectively. The low temperature heat exchanger is used for low temperature section of the double effect type.

- j) **Hot water heat exchanger** Hot water is heated by the high temperature refrigerant.
- k) **Drain heat recovery machine** The heat from the drain water of heating source steam is collected in absorbent solution.
- l) **Absorbent solution pump** The absorbent solution from the absorbent solution pool is transferred to the generator, the high temperature generator, or low temperature generator.
- m) **Refrigerant pump** The refrigerant liquid from the refrigerant liquid pool of the evaporator is sprinkled on a nest of tubes of the evaporator, and the evaporation action of refrigerant is speeded up.
- n) **Bleed apparatus** The non-condensing gas inside the refrigerating machine is bled and removed from the inside of refrigerating machine.
- o) **Burning facility** City gas, liquefied petroleum gas, oil, etc. are obtained, and are burned and controlled.
- p) **Safety device** The refrigerating machine is safely stopped, or controlled to the safety side.
- q) **Console panel** The operation of turning on and off of the refrigerating machine is performed, and the conditions and malfunctions are displayed.
- r) **Volume control apparatus** The refrigerating machine is made to operate normally, and the volume is controlled appropriately.
- s) **Name plate** The specification of refrigerating machine, etc. are described clearly.
- t) **Refrigerant** The medium which cools chilled water by evaporation.
- u) **Absorbent solution** The medium which absorbs refrigerant steam in the absorption refrigeration cycle.

7 Performance

7.1 Rating condition

The rating condition shall be as follows:

- a) The standard rating condition shall be as shown in table 3. This table shall be applied to the steam absorption refrigerating machine and the direct fired absorption water chilling and water heating package.

Table 3 Standard rating condition

Item	Section			
	Use side		Heat dissipation side	
	Chilled (heat) water		Cooling water	
	Entering temperature	Leaving temperature	Entering temperature	Leaving temperature
Refrigerating capacity	(12 °C)	7 °C	32 °C	(37.5 °C)
Heating capacity	—	55 °C	—	—
Flow rate	Fixed (Rated value)	—	Fixed (Rated value)	Fixed (Rated value)
Scale coefficient	$0.086 \text{ m}^2 \cdot \text{K/kW}$	—	$0.086 \text{ m}^2 \cdot \text{K/kW}$	$0.086 \text{ m}^2 \cdot \text{K/kW}$
NOTE : The numerical values in parentheses in table are values for informative references.				

- b) The application rating conditions shall be the condition other than the standard rating condition.

7.2 Refrigerating capacity

The refrigerating capacity of the refrigerating machine shall be tested in accordance with **9.1**, and the value shall be not less than 95 % of the marked rated refrigerating capacity. Refrigerating capacity corresponding to both of the single effect and the double effect shall be the value for the double effect type.

7.3 Heating capacity

The heating capacity of the refrigerating machine shall be tested in accordance with **9.2**, and the value shall be not less than 95 % of the marked rated heating capacity. Refrigerating capacity corresponding to both of the single effect and the double effect shall be the value for the double effect type.

7.4 Heat consumption of heating sources

The heat consumption of heating sources of refrigerating machine is the energy consumption of steam, hot water for heating, city gas, etc. which the generator (high temperature generator for the double effect type) consumes when tested in accordance with **9.3**. The value shall be not more than 105 % of the rated value per unit refrigerating capacity or unit heating capacity. Refrigerating capacity corresponding to both of the single effect and the double effect shall be the value for the double effect type.

7.5 Coefficient of performance

The coefficient of performance at the time of rated operation shall be the value obtained by dividing refrigerating capacity obtained in **7.2** or heating capacity obtained in **7.3** by the sum of heat consumption of heating sources obtained in **7.4** and power consumption obtained in **7.10**. The value shall be not less than 95 % of the rated value. Refrigerating capacity corresponding to both of the single effect and the double effect shall be the value for the double effect type.