

JIS

JAPANESE INDUSTRIAL STANDARD

Drinking-water coolers

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by

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

1. Scope

This Japanese Industrial Standard specifies the electrical drinking-water coolers each of which consists of a compressor type refrigerator and a cooled-water tank integrated in it, and has an electric power consumption not exceeding 500 W (hereafter referred to as the "water coolers").

Remarks 1. The following Standards are cited in this Standard:

JIS C 0602-General Rules of Color Identification for
Protective Conductor and Neutral Conductor and
Terminal Marking for Apparatus

JIS C 3306-Polyvinyl Chloride Insulated Flexible Cords

JIS K 2211-Refrigerating Machine Oils

JIS K 2240-Liquefied Petroleum Gases

JIS K 5400-Testing Methods for Paints

JIS K 7202-Method of Rockwell Hardness Test for Plastics

JIS K 8116-Ammonium Chloride

JIS S 6006-Pencils and Colored Pencils

2. Definitions

For the purpose of this Standard, the following principal definitions apply:

- (1) rated cooling capacity The quantity of water passed through a water cooler expressed in l h, when the water cooler is operated under the conditions of 8.5. It is marked on each product.
- (2) rated power consumption The power consumed by a water cooler when the water cooler is operated under the conditions of 8.6. It is marked on each product.
- (3) precooler A device which previously cools feed drinking water by utilizing the spill from the cooled drinking water.
- (4) spill rate The rate of the quantity of spill to the quantity of water passed through water cooler when the cooled drinking water is discharged to precooler.

3. Classification

Water coolers are classified, according to the feed system of drinking water, as specified in Table 1.

Table 1. Classification

Classification	Feed system of drinking water
Pressure type	A system in which drinking water is supplied by direct connection with city water piping, cooled and then delivered.
Bottle type	A system in which drinking water is stored in a bottle or reservoir, cooled and then delivered.

4. Rated voltage and rated frequency

The rated voltage of water cooler shall be single phase a.c. not exceeding 300 V, and the rated frequency shall be 50 Hz, 60 Hz or 50 Hz/60 Hz.

5. Performances

5.1 Refrigerant leakage There shall be no leakage of refrigerant at any part of the refrigerant circuit when the test is carried out in accordance with the method of 8.3.

5.2 Withstand hydraulic pressure There shall be no leakage of water at any part of the water circuit when the test is carried out in accordance with the method of 8.4.

5.3 Cooling capacity The cooling capacity measured in accordance with the method of 8.5 shall be not less than 95 % of the rated cooling capacity.

5.4 Power consumption The power consumption measured in accordance with the method of 8.6 shall not exceed 110 % of the rated power consumption.

5.5 Temperature When the temperatures are measured in accordance with the method of 8.7, the temperatures of each part of water cooler shall not exceed the relevant value given in Table 2, and no abnormal heat shall take place at other parts.

Table 2. Temperature

Unit: °C

Measurement position			Temperature
Winding	Hermetic com- pressor motor	Synthetic resin insulation	135
		Other insulation	125
	Others	Class A insulation	100
		Class E insulation	115
		Class B insulation	125 (120)
		Class F insulation	150 (140)
		Class H insulation	170 (165)
Motor enclosure			150
Rectifier (Only that used in power supply circuit)	Made of selenium	75	
	Made of germanium	60	
	Made of silicon	135	
Contact of fuse clip and fuse			90
Carrying handle (excluding that operated by a man during service)	Made of metal, ceramics or glass	65	
	Made of others	80	
Handle operated by a man during service	Made of metal, ceramics or glass	55	
	Made of others	70	
Knob of switch and push button	Made of metal, ceramics or glass	60	
	Made of others	75	
Enclosure	Touched by a man in service	Made of metal, ceramics or glass	55
		Made of others	70
	Easily accessed by a man	Made of metal, ceramics or glass	85
		Made of others	100
	Not easily accessed by a man		
Surface of wooden base on which specimen is placed			95

Remarks: The numerical values in parentheses are applicable to motor windings.

5.6 Voltage fluctuation When the voltage fluctuation is measured in accordance with the method of 8.8, the overload protective device shall not operate, and the running shall be continued without any trouble.

5.7 Insulation resistance The insulation resistance shall be not less than 1 M Ω , when measured in accordance with the method of 8.9.

5.8 Dielectric withstand voltage When the dielectric withstand voltage test is carried out in accordance with the method of 8.10, the specimen shall withstand the test voltage.

5.9 Starting When the starting is examined in accordance with the method of 8.11, the motor shall be capable of starting irrespective of the rotor position.

5.10 Overload When the overload test is carried out in accordance with the method of 8.12, the specimen shall be capable of running without any abnormality in its motor, electrical components, wiring, etc.

5.11 Leakage current The leakage current shall not exceed 1 mA, when measured in accordance with the method of 8.13.

5.12 Insulation at water overflow When the test for insulation at water overflow is carried out in accordance with the method of 8.14, the insulation resistance shall be not less than 1 M Ω .

5.13 Water surge When the water surge test is carried out in accordance with the method of 8.15, the produced surge shall not exceed the appropriate value given below.

- (1) Gauge pressure 0.45 MPa for coolers in which quick closing action is done automatically.
- (2) Gauge pressure 1.5 MPa for coolers in which quick closing action is done manually.

5.14 Abnormality When the abnormality test is carried out in accordance with 8.16, there shall be no risk of fire, or mechanical damage which may impair safety or prevention of electric shock. The insulation resistance after the test shall be not less than 0.1 M Ω and the dielectric withstand voltage shall comply with 5.8. The temperatures at enclosure surfaces of condenser cooling motor and compressor shall be not more than 150°C and the temperature of winding shall not exceed the appropriate value of Table 3.

Table 3. Temperature of winding

Unit: °C

Kind of protective device for condenser cooling motor and compressor		Insulation class of winding				
		A	E	B	F	H
Protected by impedance		150	165	175	190	210
With protective device	First one hour (maximum value)	200	215	225	240	260
	Beyond one hour (maximum value)	175	190	200	215	235
	Beyond one hour (arithmetical mean value)	150	165	175	190	210

6. Construction

6.1 Construction in general The construction of water coolers shall comply with the following requirements:

- (1) An appliance having a mass of body not exceeding 40 kg shall not tumble when inclined through an angle of 10° under normal service state. If an appliance does not tumble when a force of 100 N is applied to every position of the body (excluding the bottom face), such a case is an exception.
- (2) The part of metallic cover or box to which arc may reach when the switch is opened or closed shall be lined with arc resistant electric insulating materials.
- (3) Adequate moisture proof treatment shall be applied to the part whose moisture absorption may result in such risks as burning of components and exposure of live parts.
- (4) Accessible moving parts under normal use, shall be equipped with suitable protective frame or protective net so as to prevent easy access. However, the parts having no possibility to cause danger such as electric shock, and injury, if accessed by a man, are exempted from the above requirements.
- (5) For switches operated by the user, the opening and closing operations, or open and closed states of the switch shall be marked on an easily visible place by means of letters, symbols or colors. If it is difficult to mark, such a case is an exception.
- (6) The enclosure shall not cause fissures, cracks, or other abnormalities which result in such danger as electrical shock and fire when a weight 250 g in mass, having a spherical surface of 10 mm radius finished with polyamide to have Rockwell hardness HRR 100 specified in JIS K 7202 is dropped vertically from the height of 20 cm once or when an impact force of $0.5 \pm 0.05 \text{ N}\cdot\text{m}$ is applied with the impact testing apparatus given in Attached Fig. 1, once. However, the indicator lamp, fuse holder or the like exposed on the outside of appliance body and their protective cover, each of which has a surface area not exceeding 4 cm^2 , and does not project by 10 mm or more from the enclosure surface of appliance body, are excluded.
- (7) The appliance with an enclosure made of synthetic resin (except the portion which needs translucency or transparency or that which needs flexibility, mechanical strength, etc. due to its function) shall not burn when tested in such a manner, that a flat square part of 9 cm^2 or more on the external surface of enclosure (a square test piece with a side length of 3 cm and original thickness cut out of the same material if there is no flat part of 9 cm^2 or more on the enclosure) is inclined about 45 degrees from the horizontal plane, a flame of about 20 mm long is produced by burning the gas of class 1 and No. 1 specified in JIS K 2240 or the equivalent gas using a burner having nozzle inside diameter 0.5 mm with the air inlet closed, the tip of the flame is applied, from the bottom, to the center of the said plane for 5 s and then removed.

- (8) When a circuit on secondary side of an insulating transformer or beyond a rectifier containing capacitors, semiconductor elements, resistors or the like, is subjected to the following tests, the component connected to that circuit shall not burn. If there is no possibility of burning of other parts even if a component connected to the circuit burns, such a case is an exception.
- (a) For display lamps, etc., the heater or filament terminals shall be opened, and other terminals shall be short-circuited.
[Excluding the case where the provision of 6.2 (2) is complied with. This applies to each item in (8)].
- (b) For capacitors, semiconductor elements, resistors, transformers, coils or the similar components, the terminals shall be short-circuited or opened.
- (c) The insulation resistance between the live parts and the surface of appliance body measured with a d.c. 500 V insulation resistance tester when the circuit is shorted or opened in the tests of (a) and (b) shall be not less than $0.1\text{ M}\Omega$. However, in such a case that the voltage to earth and the line voltage are not exceeding 30 V for a.c. or 45 V for d.c. or that the current flowing through $1\text{ k}\Omega$ resistors connected between the live part and the earth and between the lines does not exceed 1 mA (excluding the case that there is no risk of electric shock at a frequency not less than power frequency) the insulation resistance between the live parts and the surface of appliance body is exempted from the above requirement.
- (9) The heat reserving material, heat insulating material, etc. to be filled in the vicinity of electric apparatus (less than 50 mm) shall be flame retardant ones. If burning of the heat reserving material, heat insulating material, etc. does not result in risks of electric shock and fire, such a case is an exception.
- (10) The compressor motor shall be equipped with an overload protective device.
- The overload protective device shall not operate under the normal service state.
- (11) The appliance which may cause hazards due to temperature rise shall be equipped with a temperature limiter or overload protective device which surely operates before the occurrence of hazards. Such devices shall not operate under the normal service state.
- (12) Such components to which the refrigerant pressure is applied as compressor, container, heat exchanger and valve shall withstand 1.5 times the designed pressure.

6.2 Live part The live part shall comply with the following requirements:

- (1) The live parts, except those prescribed below, shall not be touched by the test finger shown in Attached Fig. 2, with easily detachable parts removed.

In this procedure, the force to be applied to the test finger shall be 30 N. However, the force shall be 10 N, for the bottom face of table type and the back face and bottom face of floor type (stationary type only)(for appliance whose body exceeds 40 kg in mass and whose bottom face height from the floor is 5 cm or less, to the extent within twice the height from the outer edges of the bottom).

- (a) The live part on mounting face which is not easily accessible under mounted state.
 - (b) The live part which is 40 cm or more apart from the opening of bottom face of an appliance body exceeding 40 kg in mass.
 - (c) The live part of an appliance exposure of which is unavoidable due to construction, that is connected to an insulating transformer secondary circuit where the voltage to earth and voltage between lines do not exceed 30 V for a.c. or 45 V for d.c., or where the current flowing through a 1 k Ω resistor connected between the live parts and the earth and that between the lines do not exceed 1 mA if there is no risk of electric shock at a frequency not less than power frequency.
- (2) The clearance (including creepage distances) between live parts of different polarity, between live part and dead metallic part liable to be earthed, and between live part and surface of non-metallic part accessible by a man shall have at least the appropriate values prescribed in Table 4. However, the clearance of the part shown in the left column of Table 5, shall have at least the value shown in the right column of the same table.

Further, the part where decrease of insulation distance is unavoidable due to the structural reason is exempted from the above specifications if the part complies with the following requirements as the results of test.

- (a) When the live parts of different polarity are short-circuited, the components in the shorted circuit shall not burn. When there is no risk of burning other components if one component burns, such a case is an exception.
 - (b) When the live parts of different polarity, the live part and dead metal part liable to be earthed, and the live part and accessible surface of non-metallic part are connected, the voltage to earth and line voltage of the dead metal part or non-metallic part and the exposed live part shall not exceed 30 V for a.c. or 45 V for d.c., or when 1 k Ω resistors are connected between the live part and the earth and between lines, the current that flows through the resistor shall not exceed 1 mA, if there is no risk of electric shock at a frequency not less than power frequency.