

JIS

JAPANESE INDUSTRIAL STANDARD

Fan Convector

JIS A 4007—1987

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In the event of any doubt arising,
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1. Scope

This Japanese Industrial Standard specifies the fan convector, a finished product of 35 kW or under in rated heating capacity, and an integration of a heating coil and a blower assembled in workshop and the heating apparatus, which uses hot water of 100°C in temperature and 0.3 MPa or under in pressure or steam of 0.2 MPa or under in steam pressure, and which, devoid of a heat source part ⁽¹⁾, directly blows air into a room or otherwise through the duct of 5 mm or under in static pressure loss water column.

Note ⁽¹⁾ The heat source part herein means a combustor, an electric heater, a heat pump etc.

Remark: The units and numerical values shown in { } in this Standard are based on the traditional units and are currently the criteria in force.

2. Definitions

For the purposes of this Standard, the following definitions apply:

- (1) nominal set position In the fan convector having variable rotational speed, the set position of airflow regulators, such as switch or the like, capable of developing the blower rotational speed taken as standard by manufacturer.
- (2) rated heating ability The heating ability of fan convector, when operated by the method of 8.1 under the conditions of Table 4.
- (3) rated electric power consumption The electric power consumption of fan convector, when operated by the method of 8.4 under the conditions of Table 5.
- (4) rated water flow In the fan convector using hot water, the applied water amount by which it is capable of developing the rated heating ability taken as standard by manufacturer.
- (5) rated water flow resistance When the rated water flow is applied to fan convector using hot water, the resistance of water measured by the method of 8.2.
- (6) applicable rated heating ability Heating ability under the conditions ordinarily met with in room heating use, a criterion useful for the selection of a fan convector.

3. Classification

The classification of fan convector shall comply with the combination of divisions given in Table 1.

Applicable Standards and Reference Standards: See pages 13 and 14.

Table 1. Classification

Division	Class	Remark
Division by heat source	For hot water	Using hot water
	For steam	Using steam
Division by function	Variable airflow type	Having airflow regulating device
	Fixed airflow type	Airflow is constant and fixed
Division by construction	Surface type	All contour is exposed in the room
	Concealed type	To install with whole or a portion concealed
Division by installation form	Floor type	To install on floor or in proper place
	Wall type	To install on wall or in proper place
	Ceiling type	To install on ceiling or inside ceiling

4. Materials

The materials shall be those given in Table 2 or those at least equal in quality.

Table 2. Materials

Principal parts		Names of materials
Copper tube of element		Tough pitch copper seamless tube or phosphorus deoxidized copper seamless tube of JIS H 3300
Fin of element		JIS H 4000 JIS H 4160
Header of element		JIS G 3101 JIS G 3131 JIS G 3141 JIS G 3452 JIS G 5501 JIS G 5502 JIS G 5702 JIS H 3100 JIS H 3250 JIS H 3300 JIS H 5111
Metal fittings		JIS G 3101 JIS G 3141 JIS G 3302 JIS G 3313
Blower	Casing	JIS G 3141 JIS G 3302 JIS G 3312 JIS G 3313 JIS K 6744 Plastics (Those durable at 55°C or higher)
	Blade	JIS G 3141 JIS G 3302 JIS G 3313 JIS G 4051 JIS H 4000 JIS H 4040 JIS H 4100 JIS K 6744 Plastics (Those durable at 55°C or higher)
Casing		JIS G 3141 JIS G 3302 JIS G 3313 JIS K 6744 Plastics (Those durable at 55°C or higher)

5. Structure

5.1 General Structure The structure of fan convector shall conform to each of the following requirements:

- (1) The casing shall be free of deformation, cracks or welding failure.
- (2) The principal structural portions shall be made from materials specified in 4. (Materials), endure ordinary force and shall have adequate durability.
- (3) The portions in contact with human body shall be free from sharp projections.
- (4) The materials of each part shall endure the temperature under an ordinary service condition and shall incur no thermal deformation or the like.
- (5) The coating of the casing surface of the surface type convector shall be smooth and the thickness, gloss and colour tone of its paint film shall be uniform and free of defects such as unevenness in coating, dripping, etc.
- (6) The fan convector shall generate no remarkable vibration and noise during use and shall work safely.
- (7) The insulation distance shall be not less than the value given in Table 3.
- (8) The main body shall be so constructed as to be securely mounted to the floor, ceiling, etc. in a posture befitting the individual classes.
- (9) The fan convector using warm water shall have a suitable device or structure for extracting the air in the element.
- (10) The fan convector fitted with an air filter shall be so constructed as to facilitate mounting and dismounting.

Table 3. Insulation Distance

Unit: mm

Line voltage or voltage to ground (V)		50 or under	Over 50 up to 150	Over 150 up to 300
Space distance (including creeping distance)	The fitting portion of power source wire	Clearance between the terminals connected by the user	-	6
		Clearance between the terminal part con- nected by the user and the noncharged metal part liable to earthing or the nonmetal part likely to be in contact with a human body	-	6
		Clearance between the terminals connected by the manufacturer	-	4
		Clearance between the terminal part con- nected by the manufacturer and the non- charged metal part liable to earthing or the non-metal part likely to be in contact with a human body	-	3
	Other portions	Clearance between the charged parts having different polarities (including the wire fitting terminal of that having a switching mechanism)	1.2	2
		The fixed part with little or not likelihood of incoming dust and adhering metal powder	1.5	2
		Other parts	1.5	3
		Clearance between the charged part and the noncharged metal part liable to earthing or the nonmetal part likely to be in contact with a human body	1.2	2
		The fixed part with little or not likelihood of incoming dust and adhering metal powder	1.5	2
		Other parts	1.2	2.5

5.2 Power Source Wire or the Like For the fan convector, using the power source wire (including the lead wire), the wire for connecting appliances and the wire unavoidably and functionally exposed to the outside of the apparatus, hereinafter referred to as the "power source wire or the like", polyvinyl chloride insulated flexible cords specified in JIS C 3306 or those having quality at least equal shall be used. Their nominal conductor cross section shall be 0.75 mm² or more and they shall conform to the following requirements:

- (1) The allowable current of power source wire or the like shall be not less than the maximum working current of the load connected to the power source wire or the like.
- (2) For the power source wire or the like (excluding the ones to be used as fixed and concealed under the fitted condition) shall be so constructed that tension is not exerted on the junction part between the power supply wire, etc. and the internal terminations and the bushing will in no way be dislocated when a tension of 100 N is continuously applied to it for 15 sec. in the direction away from the main body and, when pushed in toward the inside of the apparatus as it is held at a portion 5 cm from the apparatus.
- (3) The fitting terminal screw of power source wire or the like shall not serve an additional purpose of fitting some other items. However, this rule does not apply to items not likely to be dislodged at the time of attachment or detachment of the power source wire or the like.
- (4) The piercing hole of power source wire or the like, unless fitted with a protective spring, a protective bushing and other suitable protective devices, shall be chamfered, or otherwise treated with suitable protective working so that there is no fear of injuring the power source wire or the like, with the exception of the case where the piercing hole is guarded by materials other than metal, and the portion is smooth and has no possibility of injuring the power source wire or the like.

5.3 Earthing Terminal and Earthing Lead Wire The fan convector shall bear a marking for earthing in accordance with JIS C 0602 and shall be provided with the earthing terminal and earthing lead wire specified as follows in a portion readily seen. Exempted from this requirement is the case where the convector has no metallic portion exposed outside the main body or is so constructed as to make earthing with the blade of power source plug for earthing.

Further, a portion readily seen means an outside portion conspicuous under ordinary fitted condition or convenient for inspection, construction or the like without using special tools. However, for the concealed type, a portion which is easily seen before work of concealment is sufficient.

- (1) The earthing terminal shall be such that it makes possible an easy and reliable attachment of earthing wire.
- (2) The materials of earthing terminal screw shall be copper or copper alloy of 4 mm or more in nominal diameter (however, 3.5 mm or more for those of force tightening screw type).

(3) The earthing lead wire shall be one of the following:

- (a) Soft copper wire of 1.6 mm in diameter or metal resistant to corrosion having the strength and thickness at least equal.
- (b) A single core cord or single core cabtyre cord of 1.25 mm² or more in nominal conductor cross section.
- (c) A double conductor cord of 0.75 mm² or more in nominal conductor cross section, two lines of conductors of which are twisted at both ends and soldered or bonded by pressure.
- (d) One of the wire cores of multicore cord (excepting twisting cord) or multicore cabtyre cable of 0.75 mm² or more in nominal conductor cross section.

(4) The marking of earthing shall meet the following provisions:

- (a) Indication for earthing use shall be marked by an indelible method on the earthing terminal and the earthing lead wire, or near them. However, earthing terminal screws easy to remove are excepted.
- (b) The terminal connected to the earthing lead wire in the apparatus and the wire core connected to the earthing blade of power supply plug shall be marked with indication for earthing use by an indelible method.

6. Rating

6.1 Rated Voltage and Rated Frequency The rated voltage of the fan convector 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 exclusive use, 60 Hz exclusive use or 50 and 60 Hz common use.

6.2 Measuring Condition for Rated Heating Ability The operating condition used for measurements of the rated heating ability of the fan convector shall comply with Table 4.

Table 4. Measuring Condition for Rated Heating Ability

For warm water	Inlet air condition	Dry-bulb temperature	18.5°C
	Water feeding condition	Inlet warm water temperature	80°C
		Warm water amount	Rated water flow
For steam	Inlet air condition	Dry-bulb temperature	18.5°C
	Steam condition	Saturation temperature	102.0°C
Set position of airflow regulator		Nominal set position	