

JIS

JAPANESE INDUSTRIAL STANDARD

Fancoil Units

JIS A 4008—1987

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Fancoil Units

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1. Scope

This Japanese Industrial Standard specifies the fancoil units used for environmental air conditioning, hereinafter referred to as the "fancoil units", which have rated delivery of not more than $40 \text{ m}^3/\text{min}$, are completed products manufactured by assembling cooling and heating coils and blower integrally in the workshop, and further, can blow out air directly into the room not aided by cooling source or heating source or can accommodate a duct having a static pressure loss of not more than 5 mm in water column. However, this Standard does not apply to the unit falling under the following items:

- (1) Electric cooling fan
- (2) Coils for refrigerant, coils for steam, or units having heating devices.
- (3) Units having the sole object of heating air, such as a convector fitted with a fan.

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 setting place In a fancoil unit having a variable rotary speed, the location for mounting an airflow controller, such as a switch, by which manufacturer can achieve a standard rotary speed of blower.
- (2) rated delivery The airflow indicated in m^3/min delivered from the fancoil unit, when it is operated by the method of 8.1 under the condition of Table 5.
- (3) rated electric power consumption The electric power consumption when the fancoil unit is operated by the method of 8.2 under the condition of Table 5.
- (4) rated cooling capacity The total quantity of heat indicated by kcal/h when the fancoil unit has been operated by the method of 8.3 under the condition of cooling time in Table 4.

Applicable Standards: See page 15.

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- (5) rated cooling quantity of sensible heat capacity The quantity of sensible heat when the fancoil unit has been operated by the method of 8.3 under the condition of cooling time in Table 4.
- (6) rated heating capacity The heating capacity when the fancoil unit has been operated by the method of 8.3 under the condition of heating time in Table 4.
- (7) rated amount of water passed The quantity of water converted from the rated cooling capacity by taking the temperature rise value ΔT K at the time of cooling during the state of water supply of Table 4 as the increase of water temperature.
- (8) rated water passage resistance The water passage resistance measured by the method of 8.4 when the rated water supply quantity has been passed through the fancoil unit.
- (9) applied rated capacity The cooling capacity (total quantity of heat and quantity of sensible heat), heating capacity, delivery and the like in the range of conditions normally encountered when used for environmental airconditioning and, in the aggregate, the capabilities to serve as a criterion in the selection of fancoil units.

3. Classification

The fancoil units shall be classified into the divisions given in Table 1.

Table 1. Classification

Division	Type	Remark
Division by function	Variable airflow type	Unit having the airflow control device
	Fixed airflow type	Unit designed so that the airflow is constant and fixed
Division by structure	Exposure type	Product with whole of outer blocks exposed to the view in the room
	Recessed type	Unit with whole or part of outer block concealed from the view
Division by setting form	Floor standing type	Unit to be set on the floor or an equivalent place.
	Wall type	Unit to be set on the wall or an equivalent place
	Hanging from the ceiling type	Unit to be set on the ceiling or inside the ceiling

4. Materials

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

Table 2. Materials

Principal parts		Name 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 3302 JIS G 3452 JIS G 5501 JIS G 5502 JIS G 5702 JIS H 3100 JIS H 3250 JIS H 3300 JIS H 5111
Blowoff opening		JIS G 3141 JIS G 3302 JIS G 3313 JIS H 4000 JIS H 4040 JIS H 4100 Plastics (Those durable at 55°C or more)
Blower	Casing	JIS G 3141 JIS G 3302 JIS G 3312 JIS G 3313 JIS K 6744 Plastics (Those durable at 55°C or more)

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Table 2 (Continued)

Principal parts		Name of materials
Blower	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 more)
Casing		JIS G 3141
		JIS G 3302
		JIS G 3313
		JIS H 4100
		JIS K 6744
		Plastics (Thsoe durable at 55°C or more)
Drain pan		JIS G 3141
		JIS G 3302
		JIS G 3313
		JIS G 4305
		Plastics (Those durable at 55°C or more)

5. Structure

5.1 General Structure The structure of fancoil units shall comply with the following items:

- (1) The principal part shall be made of materials specified in 4. Materials, endure ordinary external force and have a large durability.
- (2) The part to be loaded with the circulating water pressure shall have a sufficient strength.
- (3) Each part shall be finished adequately and have a structure not liable to corrosion or rust.
- (4) The structure shall be free from remarkable vibration or noise during its use and shall ensure safety operation.
- (5) The insulation distance shall be not less than the value in Table 3.

- (6) The fancoil unit shall have a suitable device or a structure to extract the air from the coils.
- (7) The fancoil unit body shall have a structure capable of being attached securely to the floor, ceiling, etc. on the occasion of installation.
- (8) The fancoil unit to be fitted with structurally an air filter shall be capable of attaching and detaching it easily.

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 creepage distance for insulation)	Mounting parts of the power source electric wire, etc.	Terminal connected by the user		—	6	6
		Between the terminals connected by the user and the dead metallic part liable to earthing or the nonmetallic part in danger of human contact		—	6	6
		Between the terminals connected by the manufacturer		—	3	4
		Between the terminals connected by the manufacturer and the dead metallic part liable to earthing or the nonmetallic part in danger of human contact		—	2.5	3
	Other parts	Between the live parts different in polarity (including the electric wire mounting terminal for the part having a switching mechanism)	Fixed part free from damage by incoming dust or metallic powder	1.2	1.5	2
			Other places	1.5	2.5	3
		Between the live part and the dead metallic part liable to earthing or nonmetallic part in danger of human contact	Fixed part free from damage by incoming dust or metallic powder	1.2	1.5	2
			Other places	1.2	2	2.5

5.2 Power Source Wire and Others For the power source wire of fancoil unit (including lead wires), the electric wire connecting appliances and the wire unavoidably exposed to the outside of appliance body for functional reasons, hereinafter referred to as the "power source wire and others", the vinyl cord as specified in JIS C 3306 or one at least equal in quality shall be used with the nominal sectional area of conductor not less than 0.75 mm^2 , and further, shall comply with each of the following items:

- (1) The permissible current of the power source wire and others shall be not less than the maximum used current of the load connected with its power source wire and others.
- (2) The structure of power source wire and others shall be such that when a tension of 100 N has been applied toward the outside of the body for 15 sec continuously or when a location of the wire 5 cm away from the side of appliance body of the power source wire and others is held and pushed in toward the inside of appliance body, the connecting part shall be safe from the tension and the bush shall not be disjointed.
- (3) The mounting terminal screw of the power source wire and others shall not be used for the mounting of the articles other than the power source wire. However, this requirement does not apply to the case where articles other than power source wire will not drop off at the time of attachment or detachment of power source wires.
- (4) Chamfering and other suitable protective work shall be carried out at the penetrated hole for the power source wire; etc. for fear of impairing the power source wire and others, except where the protective spring, protective bush and other adequate protective devices are used. However, this requirement does not apply where the penetrated part is nonmetallic, smooth, and further, free from fear of impairing the power source wire and others.

5.3 Earthing Terminal and Lead Wire for Earthing The fancoil unit shall be provided, at a conspicuous location, with markings specified in JIS C 0602 and equipped with such an earthing terminal and a lead wire for earthing as complies with the requirements of the items stated below. Except the fancoil units with no metallic part exposed to the outside the unit body and the ones with a structure capable of earthing by means of the blade for earthing the power source plug.

Further, a conspicuous location is defined as the outer surface easy to be seen in the ordinary state or a place where inspection, works, etc. can be easily made without using special tools, provided for the recessed type of fancoil, it may be any place easy to be seen in the state before the flush work.

- (1) The earthing terminal shall ensure easy and secure fitting of the earthing conductor.
- (2) The material of screws of earthing terminal shall be copper or copper alloy and the nominal diameter shall be not less than 4 mm (and not less than 3.5 mm for the pushing clamp screw).

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

- (a) Annealed copper wire with a diameter of 1.6 mm or metallic wire having a strength and a thickness at least equal and difficult to corrode.
- (b) Single core cord or single core cabtire cord with the nominal conductor area of not less than 1.25 mm².
- (c) Cord with two cores, whose nominal conductor area is not less than 0.75 mm² and whose two conductors are braided at both ends and brazed or contact-bonded.
- (d) Cord with multicores whose nominal conductor area is not less than 0.75 mm² (except twisted cords), or one of the cores of the cabtire cable with multicores.

(4) The markings of earth shall comply with the following:

- (a) The markings of the terminal and lead wire shall be made on themselves (excluding the detachable terminal screw for earth) or near them by an ineffaceable method with the information of "for earth".
- (b) The terminal connected to the lead wire for earth inside fancoil unit body and the core connected to the blade for earth of power source plug shall be marked by an ineffaceable method with the information of "for earth".

6. Rating

6.1 Rated Voltage and Rated Frequency The rated voltage of fancoil units shall be single-phase alternating current 100 V, single-phase alternating current 200 V or three-phase alternating current 200 V; the rated frequency shall be 50 Hz exclusively or 60 Hz exclusively or 50 Hz and 60 Hz for common use.

6.2 Measuring Condition of Rated Air Conditioning Capacity The operating condition used for the measurement of the rated air conditioning capacity of fancoil units shall be as specified in Table 4.

Table 4. Measuring Condition of Rated Air Conditioning Capacity

Condition of inlet air	At the cooling time	Dry-bulb temperature	$27 \pm 1^{\circ}\text{C}$
		Wet-bulb temperature	$19.5 \pm 0.5^{\circ}\text{C}$
	At the heating time	Dry-bulb temperature	$21 \pm 1^{\circ}\text{C}$
Condition of water supply	At the cooling time	Water temperature at inlet	$7 \pm 0.2^{\circ}\text{C}$
		Temperature rise	$5 \pm 0.2 \text{ K}$
	At the heating time	Water temperature at inlet	$60 \pm 1^{\circ}\text{C}$
		Amount of water supply	The same amount of water as that at the cooling time
Setting place of airflow controller	At both cooling and heating times		At the nominal setting position, provided that the service voltage shall be $\pm 2 \%$ of the rated voltage
Difference of the static pressure of inlet air and outlet air	At both cooling and heating times		$0 \pm 2 \text{ Pa}$

6.3 Measurement Condition of Rated Delivery The condition for measurement of the rated delivery of fancoil units shall be as specified in Table 5.

Table 5. Measuring Condition of Rated Delivery

Condition of dry-bulb temperature of inlet air	14 to 26°C
Condition of water supply	No water is supplied
Setting place of airflow controller	At the time of nominal setting place
Difference of the static pressure of inlet air and outlet air	$0 \pm 2 \text{ Pa}$

6.4 Applied Rated Capacity The applied rated capacity should preferably be indicated by taking the following items as parameters.

- (1) Dry-bulb temperature of inlet air
- (2) Wet-bulb temperature of inlet air (only at the cooling time)
- (3) Temperature of inlet water
- (4) Increase or decrease temperature of water temperature
- (5) Amount of water passed
- (6) Setting place of airflow controller

Further, the test of applied rated capacity shall conform to the method for testing the rated values.

7. Performance

The performance of fancoil units shall comply with the requirements of Table 6.

Table 6. Performance

Item	Performance	Test method	
Delivery	100 ± 10 % of rated delivery	8.1	
Consumed electric power		8.2	
	Rated consumed electric power (W)		Tolerance
	30 or under		125 % max.
	Over 30 up to 100		120 % max.
	Over 100 up to 1000		115 % max.
Cooling capacity (Total quantity of heat capacity and quantity of sensible heat capacity)	100 ± 10 % of rated cooling capacity	8.3	
Heating capacity	100 ± 10 % of rated heating capacity	8.3	
Water passage resistance	100 ± 10 % of rated water passage resistance	8.4	
Characteristic of voltage fluctuation	To continue a normal operation without abnormality	8.5	