GB

NATIONAL STANDARD OF THE

PEOPLE'S REPUBLIC OF CHINA

ICS 27.200
J 73

GB/T 18836-2002

Ducted air-conditioning (heat pump) units

风管送风式空调（热泵）机组

(ISO 13253:1995, Ducted air-conditions and air-to-air heat pumps – Testing and rating for performance, NEQ)

Issued on: September 11, 2002 **Implemented on: April 01, 2003**

Issued by: General Administration of Quality Supervision, Inspection and Quarantine of the People's Republic of China;

Standardization Administration of the People's Republic of China.

Table of Contents

Foreword

This Standard was formulated for the first time.

This Standard is not equivalent to ISO 13253:1995 *Ducted air-conditions and air-to-air Heat pumps - Testing and rating for performance.*

In this Standard, Annex A is informative and Annex B is normative.

This Standard shall be under the jurisdiction of National standardization technical committee on refrigeration equipment.

The responsible drafting organizations of this Standard: Shenzhen McQuay Air Conditioning Co., Ltd. and Hefei General Machinery Research Institute.

The participating drafting organization of this Standard: Trane Air Conditioner Co., Ltd.

The chief drafting staffs of this Standard: Wang Yibin, Wang Xiangkui, Hu Jixun and Zhang Weijia.

Ducted air-conditioning (heat pump) units

1 Scope

This Standard specifies the definition, type and basic parameters, technical requirements, test, inspection rules, mark, packaging, transportation, storage and others of ducted air-conditioning (heat pump) units.

This Standard applies to ducted air-conditioning (heat pump) units.

2 Normative references

The articles contained in the following documents have become part of this document when they are quoted herein. For the dated documents so quoted, all the subsequent modifications (including all corrections) or revisions made thereafter do not apply to this standard. However, the parties who reach an agreement according to this standard are encouraged to study whether the latest versions of these documents may be used. For the undated documents so quoted, the latest versions (including all modification sheets) apply to this document.

GB/T 191-2000 Packaging - Pictorial markings for handling of goods

GB/T 2423.17-1993 Basic environmental testing procedures for electric and electronic products - Test Ka: Salt mist (eqv IEC 68-2-3:1981)

GB/T 2828-1987 Sampling procedures and tables for lot-by-lot inspection by attributes (apply to inspection of successive lots or batches)

GB/T 3785-1983 Electric, sonic properties and measuring methods for sound level meters

GB 4208-1993 Degrees of protection provided by enclosure (IP code)

GB 4706.1-1998 Safety of household and similar electrical appliances - Part 1: General requirements

GB 4706.32-1996 Safety of household and similar electrical appliances - Particular requirements for electrical heat pumps, air-conditioners and dehumidifiers

GB/T 4798.2-1996 Environmental conditions existing in the application of electric and electronic products - Transportation

GB/T 5226.1-1996 Electrical equipment of industrial machines - Part 1: general requirements

GB/T 6388-1986 Transport package shipping mark

GB 9237-2001 Mechanical refrigerating systems used for cooling and heating - Safety requirements

GB/T 13306-1991 Plates

GB/T 17758-1999 Unitary air conditioners

JB/T 7249- 1994 Terminology of refrigeration equipment

JB/T 9066-1999 Cabinet type fan coil unit

3 Definition

For the purpose of this Standard, the following definitions given in JB/T 7249-1994 shall apply.

3.1

Ducted air-conditioning (heat pump) units

Equipment that provides centralized processed air to confined space, room or area through ducts. It mainly includes refrigeration system, air circulation and purification device and also including heating equipment, humidification equipment and ventilation equipment. it is hereinafter referred to as air conditioner.

3.2

Auxiliary electric heater for heating

Electric heater that is used for heating with heat pump (including post-installation electric heaters).

3.3

Heat water coil

Equipment of which the air, guided by fan, flows through and gets heated by the coil-pipe in which the external heat-water flows through.

3.4

Heating equipment with electric beater

5.1.7 The action of magnetic exchange valves of heat pump air conditioner shall be sensitive and reliable, and be able to ensure the normal operation of air conditioners.

5.1.8 The thermal-protective coating of air conditioners shall have good heat insulation performance, and shall be non-toxic, odor-free and has self-extinguishing function. It shall have no condensation phenomena on the surface in normal operation.

5.1.9 The parts of air conditioner refrigerating system shall be able to ensure the normal operation of the whole unit without degradation under the affection of refrigerants, lubricants and their mixture.

5.1.10 The compressor of air conditioners shall be equipped with measures against vibration or be equipped with anti-vibration spring washers when being fixed.

5.1.11 Salt-frog resistance of electroplated parts

After the test to electroplated parts is done according to the method in 7.3.22, each rust spot in the electroplated layer shall not exceed 1 mm^2; the electroplated layer of each 100 cm^2 shall have at most 2 rust spot and rust stain; when the area is less than 100 cm^2, there shall not be rust spot and rust stain.

5.1.12 Coating adhesion of painted parts

After the test is done according to the method in 7.3.23, the number of shedding of paint film shall not exceed 15% of the total number.

5.1.13 All parts and materials of air conditioners shall comply with relevant provisions of their standards respectively, meet the requirements of use performance and ensure safety.

5.1.14 The electrical systems of air conditioners shall be equipped with overload protection, vacant phase protection (three-phase power) to their motors. When the nominal refrigerating capacity of air conditioners is larger than 4500 W, the refrigerating system shall be equipped with necessary protection functions or devices for high voltage, low voltage and others. If necessary, it shall also has reverse phase protection function or devices.

5.1.15 The selection of electrical components of air conditioners and installation and wiring of electric appliances shall comply with requirements of GB 4706.32 -1996 and GB/T 5226.1-1996.

5.2 Performance requirements

5.2.1 Sealing performance of refrigerating system

There shall not be refrigerant leak in each part of the refrigerating system in the test conducted according to the method in 7.3.1.

In the test conducted according to the method in 7.3.10, the water resistance of heat water coil shall not be more than 110% of its nominal water resistance.

5.2.11 Maximum load refrigeration operation

a) In the test conducted according to the method in 7.3.11, each part of air conditioners shall not be damaged and shall be able to operate normally;

b) Air conditioners shall be able to operate normally during the first hour of continuous operation;

c) Continue to operate air conditioners for 1 hour after 3 minutes of halt; however, it allows the overload protector to trip off within the first 5 minutes of operation and do not allow it to trip off after that; when the overload protector does not reset within the first 5 minutes of operation AND it resets within the period not exceeding 30 minutes after halt, then it shall continue to operate the air conditioner for 1 h.

d) For manual reset overload protectors, if they trip off within the first 5 minutes, then it shall be reset forcibly after 10 times when they trip off, they shall be able to operate for further 1 hour continuously.

5.2.12 Minimum load refrigeration operation

In the test conducted according to the method in 7.3.12, the safety devices of air conditioners within 4 hours, after the air conditioners starts 10 minutes, shall not trip off; the area of frost condensed on the interior face surface of the evaporator room shall not be more than 50% of that of the face surface of evaporator.

5.2.13 Maximum load heating operation of heat pump

a) In the test conducted according to the method in 7.3.13, each part of air conditioners shall not be damaged and shall be able to operate normally;

b) Air conditioners shall be able to operate normally during the first hour of continuous operation;

c) Continue to operate air conditioners for 1 hour after 3 minutes of halt; however, it allows the overload protector to trip off within the first 5 minutes of operation and do not allow it to trip off after that; when the overload protector does not reset within the first 5 minutes of operation AND it resets within the period not exceeding 30 minutes after halt, then it shall continue to operate the air conditioner for 1 h.

d) For manual reset overload protectors, if they trip off within the first 5 minutes, then it shall be reset forcibly after 10 times when they trip off, they shall be able to operate for further 1 hour continuously.

5.2.14 Minimum load heating operation of heat pump

The safety performance of refrigeration systems of air conditioners shall comply with relevant provisions of GB 9237-2001.

6.2 Safety control device

The air conditioners shall have safety protection measures or devices to prevent operation parameters (such as temperature, pressure, etc.) from exceeding the specified range; the protection devices shall comply with design requirements and be sensitive and reliable. Air conditioners shall have units of auxiliary electric heater and shall have at least two thermal overload releasers. The thermal overload releaser predetermined to act first can be an self-resetting thermal overload releaser; other thermal overload releasers can be non-self-resetting thermal overload releasers.

6.3 Machinery safety

6.3.1 The design of air conditioners shall ensure the reliable stability of air conditioners in normal transport, installation and use. The air conditioners shall have enough mechanical strength; their structure shall be able to ensure possible abnormal operations in normal use. Determine whether the air conditioners are qualified with impact test specified in 21.1 in GB 4706.1-1998.

6.3.2 In normal use, appropriate protective covers or protective fences shall be arranged for operation parts that may be touched by personnel, high-temperature parts and others to provide full safety protection to personnel. Protective covers, protective fences or similar parts shall have enough mechanical strength. Inspect whether it is safe through test specified in 20.2 in GB 4706.1-1998 and the test shall not touch the dangerous operation parts and the high-temperature parts.

6.4 Electric safety performance

6.4.1 Electric-shock safeguard

Air conditioners are accessible to the public, so the electric-shock safeguard shall comply with requirements of class I appliance specified in GB 4706.1-1998.

6.4.2 Temperature limit

When air conditioners operate under nominal refrigeration conditions and nominal heating conditions in Table 6 and are tested with the method in 7.3.21.2, the winding temperature of compressor motor shall not exceed requirements of other product standards and the temperature of parts; housings and other heating parts that may be touched by personnel shall not be more than 60°C. There shall not be abnormal temperature rise in other parts.

6.4.3 Electric strength

In the test conducted according to the method in 7.3.21.3, there shall not be breakdown or

flashovers between air conditioner live parts and accessible parts when applying specified test voltage.

6.4.4 Leakage current

In the conducted according to the method in 7.3.21.4, the leakage current of exposed metal parts and power lines of air conditioners shall not exceed 2 mA/kW of rated input power. The maximum leakage current is 10 mA.

6.4.5 Ground resistance

Air conditioners shall have reliable grounding devices and the grounding devices shall be marked clearly. In the test conducted according to the method in 7.3.21.5, the grounding resistance shall not exceed 0.1Ω.

6.4.6 Moisture resistance

The waterproofing grade of air conditioners shall comply with IPX4 specified in GB 4208-1993. In the test conducted according to the method in 7.3.21.6, the leakage current of exposed metal parts and power lines of air conditioners shall not exceed 2mA/kW of rated input power. The maximum leakage current is 10 mA.

6.4.7 Electromagnetic compatibility

The control systems of air conditioners shall consider to have the performance against radio and television interference.

6.4.8 Safety signs

Safety signs (such as grounding sign), warning signs and others shall be marked in salient positions on air conditioners under normal installation status; the signs shall not be easy to disappear.

6.5 Under the conditions that the user complies with the provisions of transport, storage, installation, use and maintenance of air conditioners, the manufacturer shall replace or repair the damaged air conditioners for poor manufacturing quality or air conditioners that cannot work normally, free of charge, within 18 months after the date of factory delivery or 12 months after the user confirms the acceptance through trial run (whichever comes first).

7 Test method

7.1 Test conditions

The test equipment for refrigeration capacity of air conditioners and heating capacity of heat pump is detailed in Annex A in GB/T 17758-1999.

7.1.2 The test working conditions are shown in provisions in Table 6; the test shall be done

	Outlet	± 0.1°C	±0.2°C
Liquid volumetric flow rate		±1.0%	± 2.0%
External resistance of air flow		±5 Pa	± 10 Pa

Table 9 Reading tolerance in performance test

Test working condition	Measurement value	Maximum tolerance between reading value and prescribe value
Minimum operation temperature	Air temperature	±1.0°C
	Water temperature	±0.6°C
Maximum operation temperature	Air temperature	±1.0°C
	Water temperature	±0.6°C
Other tests	Air temperature	±1.0°C
	Water temperature	± 0.6°C

7.2 General requirements of test

7.2.1 Unless otherwise stated in this Standard, the test of air conditioner shall be done according to the rated voltage and rated frequency on its nameplate.

7.2.2 Adjustable-speed air conditioners shall be tested under outdoor air flow rate specified by the manufacturer; nonadjustable-speed air conditioners shall be tested under specified outdoor air flow rate. It shall connect all auxiliary components (including pipes and accessories from the installation plant) and maintain the air circuit to be unchanged.

7.2.3 For the connecting pipes between indoor units of air conditioners and outdoor units, it shall be tested according to the full length of connecting pipe, or 5.0 m of connecting pipe of the air conditioners of which the nominal refrigeration capacity is less than or equal to 14000 W, or 7.0 m of connecting pipe of the air conditioners of which the nominal refrigeration capacity is more than 14000 W (whichever is longer). The length of external part of connecting pipe shall not be less than 3.0 m. The insulation and installation requirements of indoor parts shall comply with product instructions.

7.3 Test method

7.3.1 Sealing performance test of refrigeration system

Refrigerant of refrigeration system of air conditioners is filled up normally; use the refrigerant leak detectors with following sensitivities to conduct the inspection: for the air conditioners of which the nominal refrigeration capacity is less than 28000 W (including 28000 W), the sensitivity is 1×10^{-6} Pa•m^3/s; for air conditioners of which the nominal refrigeration capacity is more than 28000 W (excluding 28000 W), the sensitivity is 1×10^{-5} Pa•m^3/s.

7.3.2 Running test

test room and test room reach the minimum external static pressure or design static pressure; determine the air flow rate and static pressure.

b) The wind velocity passing through nozzle-throat shall be (15~35) m/s;

c) Calculate air flow rate D with methods given in Annex A in JB/T9066- 1999.

7.3.9 Heat supply capacity of heat water coil

Conduct test according to conditions specified to heat supply capacity in Table 6 and by using test equipment in Annex A in JB/T 9066-1999. The location of thermometer or sampler shall be 150 away from the unit's air inlet. When determining the wet-bulb temperature, shall ensure that air speed velocity flowing through web bulb thermometer is(4~10) m/s (being maintained to be 5 m/s is the best). When there is air inlet duct connected with the unit, the temperature at the air inlet shall be measured at the location with at least equal distance or by using sampling methods with same effect in unit air inlet area. The measurement of temperature in duct shall be done at the center of each gird with equal cross section; the measured location shall not be less than three, or appropriate samplers shall be used.

When determining temperature of water in pipeline, it shall place the temperature measuring instrument at the location in parallel to water flow and against the water flow; directly inject it into water. The water pipe shall be kept warm, especially the pipes beside water temperature measuring instrument; that is, it shall keep warm to connecting pipes between water temperature measuring instrument and tested unit AND the pipes within 200 mm at the other side of the device.

When determination to heat supply capacity of unit is done, the working condition shall be stable; after the working condition is stable, read the number for 4 times, at equal time interval, within 30 minutes; it shall record the atmospheric pressure at least once each time.

Take the average value of four readings; calculate the heat supply capacity beside the tested unit air and water according to Annex B in JB/T 9066-1999. The thermal equilibrium of the air beside unit and heat supply capacity of water shall be within 5% ; the arithmetic mean of the two values is the heat supply capacity of the unit.

7.3.10 Water resistance test

Determine the static pressure difference between inlet water and outlet water of water pipes by injecting water at about 60°C into the unit and according to provisions in Annex A in JB/T 9066-1999.

7.3.11 Maximum load refrigeration test

When, at rated frequency, the test voltages are 90% and 110% of rated voltage respectively, run the air conditioner for 1 hour after it is stable under maximum load working condition

Measure the noise of air conditioner under rated frequency and rated voltage according to provisions of Annex B.

7.3.19 transportation test

Packaged air conditioner units shall be tested according to GB/T 4798.2-1996; the manufacturer shall determine the test conditions and test methods according to possible subjected environment conditions in transportation (see Table A1 in GB/T 4798.2- 1996), or conduct test according to requirements of the contract.

7.3.20 Test of machinery safety

Conduct test according to impact test specified in 20.2 in GB 4706.1-1998 and the test specified in 21.1 in it; the test results shall comply with requirements of 6.3.1 and 6.3.2 respectively.

7.3.21 Test of electric safety

7.3.21.1 Test of protection against electric shock

Conduct test of protection against electric shock according to 8.1 in GB 4706.1-1998; the test result shall comply with provisions of 6.4.1.

7.3.21.2 Temperature limit test

Determine compressor motor winding temperature with resistance method, determine the remaining temperature with thermocouple wire when conducting refrigeration test or heat pump heating test to air conditioner in Table 6; the test result shall comply with requirements of 6.4.2.

7.3.21.3 Electric strength test

Conduct test according to the method in 16.3 in GB 4706.1 -1998; the test result shall comply with requirements of 6.4.3.

7.3.21.4 Leakage current test

Conduct test according to the method in 16.2 in GB 4706.1-1998; the test result shall comply with requirements of 6.4.4.

7.3.21.5 Ground resistance test

Conduct test according to the method in 27.5 in GB 4706.1-1998; the test result shall comply with requirements of 6.4.5.

7.3.21.6 Moisture resistance test

Conduct spray water test according to class IPX4 in GB 4208-1993 and conduct moisture

a) Name and address of the manufacturer;

b) Name and model of the product;

c) Main technical performance parameters (refrigerating capacity, heating capacity, cold-producing medium code name, voltage, frequency, phase number, total power and weight);

Note: If the air conditioner is equipped with electric heater, then a bracket shall be appended behind the values of “heating amount” and “total power”; in the bracket, indicate the nominal power of the electric heater.

d) Climate type model (for type T1, it may be omitted)

e) Manufacturing number of the product;

f) Manufacturing date.

9.1.2 Mark of operating state in air-conditioner shall be indicated, such as, arrow of direction of rotation of ventilator, mark of indicating instrument and control button.

9.1.3 Exit-factory documents

The following technical documents shall be accompanied with each air-conditioner.

9.1.3.1 Product qualification certificate that includes the following contents:

a) Model and name of the product;

b) Manufacturing number of the product;

c) Inspection conclusion;

d) Signature or sealing of inspector;

e) Inspection date.

9.1.3.2 Product instructions that includes the following contents:

a) Model and name of the product, application scope, executive standard and noise;

b) Structure diagram, circuit diagram and wiring diagram of the product;

c) Spare parts catalog and drawings of easily-damaged parts;

d) Specification and requirements of installation;

e) Instructions for use, precautions of care and maintenance.

Annex B

(Normative)

Methods of noise test method of ducted air-conditioning (heat pump) units

B.1 Application scope

Methods of noise testing of ducted air-conditioning (heat pump) units are specified in this Annex.

B.2 Determination workplace

Determination workplace shall be half free sound field on reflection plane; the difference between noise of units under test and background noise shall be above 8db.

B.3 Measuring instruments

Type 1 or above sound level meter specified in GB/T 3785-1983 *Electrical and Acoustic Performance and Testing Methods of Sound Level Meter,* and other testing instruments with the same precision.

B.4 Operation condition

Machine shall be installed on rack in accordance with requirement of relevant technical condition, and be operated in rated voltage and rated frequency. The operation condition shall be close to refrigerate condition and heating condition specified by technical condition. Under the circumstance that the noise of refrigerant cycling of the split-type units can be omitted, it may also measure the noise of indoor units under ventilation condition. For units with adjustment device, the noise of each level shall be tested.

B.5 Determination position

B.5.1 Indoor side

a) Ceiling-mounted type

Measurement shall be carried out as shown in Figure B.1; the units shall be adjusted to the operating condition of maximum noise.

This is an excerpt of the PDF (Some pages are marked off intentionally)

------ The End ------