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# GB/T 19413-2010

Replacing GB/T 19413-2003

# Unitary air-conditioners for computer and data processing room

计算机和数据处理机房用单元式空气调节机



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**Standardization Administration of the People's Republic of China.**

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# Foreword

This Standard is drafted according to the rules given in GB/T 1.1-2009.

This Standard replaces GB/T 19413-2003 “Unitary air-conditioners for computer and data processing room”. Compared with GB/T19413-2003, main changes of this Standard are as follows:

- ADD the definition, calculation method and limit requirement of “annual energy efficiency ratio” of air conditioners for computer and data processing room (see 3.7, 5.4.6);

- DELETE IPLV assessment method;

- MODIFY the noise limit requirements for the outdoor unit of air conditioners for computer and data processing room (see 5.4.5);

- MODIFY some test conditions (see Table 6);

- MODIFY the test method for humidification capacity of air conditioners for computer and data processing room (see Annex A);

- ADJUST the type classification of air conditioners for computer and data processing room (see Clause 4).

This Standard is proposed by China Machinery Industry Federation.

This Standard is under the jurisdiction of National Technical Committee on Refrigeration and Air Conditioners of Standardization Administration of China (SAC/TC 238).

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# Unitary air-conditioners for computer and data processing room

## 1 Scope

This Standard specifies the terms and definitions, types and basic parameters, requirements, test methods, inspection rules and marking, packaging, transportation and storage of unitary air-conditioners for computer and data processing room ("computer and data processing room" is hereinafter referred to as "room") ("unitary air-conditioners for computer and data processing room" is hereinafter referred to as "air conditioners").

This Standard applies to unitary air-conditioners for computer, data processing and stored program control exchange rooms, etc.

## 2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the dated edition cited applies. For undated references, the latest edition of the referenced document (including all amendments) applies.

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

GB 4343.1 Electromagnetic compatibility - Requirements for household appliances, electric tools and similar apparatus - Part 1: Emission

GB 4343.2 Electromagnetic compatibility - Requirements for household appliances, electric tools and similar apparatus - Part 2: Immunity - Product family standard

GB 4706.1 Household and similar electrical appliances - Safety - Part 1: General requirements

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

GB 5226.1 Safety of machinery - Electrical equipment of machines - Part 1: General requirements

GB/T 7778 Number designation and safety classification of refrigerants

**sensible cooling capacity**

Under the specified cooling capacity test conditions, the power of the sensible heat removed by air conditioners, in watts (W). Hereinafter referred to as “sensible cooling capacity”.

**3.6**

**sensible heat ratio**

The ratio of the sensible cooling capacity and the cooling capacity. The nominal value of the sensible heat ratio is an integral multiple of 0.01, expressed as a value equal to 1 or less.

**3.7**

**annual energy efficiency ratio (AEER)**

The ratio of the sum of the heat removed from the room and the sum of the consumed electricity during the whole-year of air conditioners.

**3.8**

**glycol (water) drycooler**

A cooler using the outdoor air to cool the glycol solution (or water) with heat in the tube. The cooled glycol solution (or water) can be used as the cooling medium of the refrigeration system’s condenser, or use the glycol free cooling fluid economizer cycle cooler in the low temperature season to cool the circulating air in the room. Hereinafter referred to as “drycooler”.

**3.9**

**glycol (water) free cooling fluid economizer cycle cooler**

A cooler using the glycol solution (or water) in the tube to cool the circulating air in the room to achieve the energy saving effect. Hereinafter referred to as “economizer cooler”.

**3.10**

**chilled water cool**

The unit using the chilled water that is provided externally for cooling and having the function of air conditioners.

**3.11**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| - dual water cool | — | √ | — | √ | — | — | √ |
| - dual chilled water cool | — | — | — | | √ | — | √ |
| NOTE: "√" is the cooling method chose. | | | | | | | |

**4.1.2** The air conditioner is divided into the following according to the structure type:

a) integral;

b) separated.

**4.1.3** The air conditioner is divided into the following according to the air supply type:

a) lower air supply;

b) upper air supply:

- direct air supply;

- with air tube;

c) horizontal air supply.

### 4.2 Model

The model of air conditioners can be determined by the manufacturer; the model shall reflect the cooling capacity of air conditioners under nominal working conditions.

## 5 Requirements

### 5.1 General requirements

The air conditioner shall meet the requirements of this Standard and shall be manufactured in accordance with the drawings and technical documents approved by the prescribed procedures.

### 5.2 Working conditions

**5.2.1** The electrical equipment of air conditioners shall be capable of working normally under the following conditions:

a) The fluctuation range of input AC power supply voltage is 90 % ~ 110 % of rated voltage at single phase 220 V, three phase 380 V, and 50 Hz;

b) The outdoor ambient temperature is -35 °C ~ +50 °C;

c) The electrical equipment shall be capable of working normally at the altitude below 1000 m; when the altitude exceeds 1000 m, the manufacturer and the user

- In addition to the usual safety protection functions, it shall have the following safety protection devices:

  ● electric reheater and indoor fan shall be interlocked, and shall have overheat protector;

  ● air supply system shall have filter clogging and overlow air pressure alarm functions;

  ● water cool and glycol economizer cool air conditioners' water system shall have water break and antifreeze safety protector;

  ● according to the agreement between manufacturer and user, air conditioners can have interfaces for interlocking with fire, smoke and water leakage alarm and other safety devices.

- When the microprocessor is used for electrical control equipment, the EMC shall meet the following requirements:

  ● electrical control shall have the performance of suppressing electromagnetic interference and harmonic current. Its continuous interference voltage, continuous interference power, intermittent interference voltage equivalent value shall not exceed the interference characteristics allowable value specified in GB 4343.1; the harmonic current value shall not exceed Class A equipment's harmonic current limit specified in GB 17625.1;

  ● electrical control shall have anti-electromagnetic interference performance, and shall not exceed class II equipment's immunity requirements specified in GB 4343.2.

- After the power failure and restore power supply, it shall be able to automatically start or delay start and start in order in accordance with the requirements.

- Long-distance monitoring of electrical control equipment:

  1) It shall have a communication interface, and the specification shall comply with the relevant provisions.

  2) One or more of the following items can be set according to the agreement between manufacturer and user:

     ● long-distance monitoring item;

     ● long-distance display and alarm item;

     ● long-distance control item;

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| outdoor unit | Water cool | Cooling water inlet temperature | 30 | 25 | 18 | 10 | 10 |
| | | Cooling water outlet temperature | 35 | The outlet temperature is controlled by the unit built-in valve | | | |
| | Glycol economizer cool | Solution inlet temperature | 40 | 30 | 20 | 10 | 5 |
| | | Solution outlet temperature | 46 | The solution outlet temperature is controlled by the unit built-in valve | | | |

**6.1.4** Type and accuracy of instrumentation

a) The instrumentation used for the test shall comply with the provisions in Table 4 of GB/T 17758-2010.

b) A density meter is used for the glycol solution density measurement, and the instrument accuracy shall be within ± 1 %.

**6.2 General requirements**

**6.2.1** The general requirements for the test shall comply with the provisions of 6.2 of GB/T17758-2010.

**6.2.2** The test shall be carried out at rated voltage and rated frequency. The tolerance of the reading of the working condition parameters shall comply with the provisions in Table 5 of GB/T 17758-2010.

**6.3 Test methods**

**6.3.1 Refrigeration system sealability**

Under the normal refrigerant filling capacity, the refrigeration system of air conditioners is inspected by the refrigerant leak detector with the following sensitivity: for air conditioners with cooling capacity less than or equal to 28000 W, the sensitivity is $1 \times 10^{-6}$ Pa · $m^3$/s; for air conditioners with cooling capacity more than 28000 W, the sensitivity is $1 \times 10^{-5}$ Pa · $m^3$/s.

**6.3.2 Operation test**

The air conditioner shall continuously operate under the conditions similar to the nominal cooling conditions; respectively measure the input power, operating current and inlet and outlet temperature of the air conditioner. Check the safety and reliability of the safety protection device, check if the action of temperature, electrical and other control components is normal.

#### 6.3.3 Cooling capacity test

The test is carried out according to the test working conditions specified in Table 6 and the method specified in Annex A of GB/T 17758-2010. The test shall also comply with the following:

a) It shall include cooling capacity and sensible cooling capacity;

b) The refrigerating consumed power of air cool air conditioners shall include the power of compressor, fan, electrical control equipment, air cool condenser and other components;

c) 3 % of the measured cooling capacity of water cool air conditioners is taken as the consumed power of chilled water circulation pump and cooling tower fan;

d) 5 % of the measured compressor refrigeration system cooling capacity of glycol economizer cool air conditioners is taken as the consumed power of drycooler fan and circulating pump;

e) The air volume of outdoor unit shall comply with the specified provisions of air conditioners, and the test shall be carried out without changing the structure of the outdoor unit of air conditioners.

#### 6.3.4 Refrigerating consumed power test

Tt the same time with the cooling capacity test, measure the input power and operating current of air conditioners.

#### 6.3.5 Maximum load refrigeration test

The air conditioner operates according to the maximum load working condition specified in Table 6, and running continuously for 1 hour after stabilization. Then, the air conditioner is turned off for 3 min (the voltage rises above 3 %) and then starts to run for 1 h.

#### 6.3.6 Low temperature working condition test

The test is carried out according to the low temperature refrigeration working condition specified in Table 6; the air conditioner is turned on and operating at cooling mode for 4 h.

#### 6.3.7 Condensation test

Without violating the provisions of the manufacturer, adjust the temperature controller, fan speed, etc. of the air conditioner to the state that the condensate water is most likely to generate, and operate at cooling mode; after achieving the condensation working condition specified in Table 6, the air conditioner continuously operate for 4 h.

**6.3.8 Condensation eliminating capacity test**

Without violating the provisions of the manufacturer, adjust the temperature controller, fan speed, etc. of the air conditioner to the state that the condensate water is most likely to generate; after the water tray is filled with water that is to reach the water outlet, operate according to the condensation working conditions in Table 6; after the water level of the water tray is stable, continuously operate for 4 h.

**6.3.9 Reheating capacity test**

**6.3.9.1** The test is carried out without turning on the cooling and humidification equipment of the air conditioner. The reheating capacity includes the consumed power of reheaters, fan motors, electrical control equipment and other components.

**6.3.9.2** The air volume of the reheater shall be the same as that of the cooling capacity test.

**6.3.10 Humidification capacity test**

**6.3.10.1** The test is carried out according to the test condition specified in Table 6.

**6.3.10.2** During the test, the air volume of the air conditioner shall be the same as that of the cooling capacity test.

**6.3.10.3** During the test, the cooling operation of the air conditioner shall be turned off to eliminate the influence of the cooling operation on the humidification test.

**6.3.10.4** The humidification power consumption is the power consumption of humidifier itself, excluding the power consumption of fan, control devices, etc.

**6.3.11 Noise test**

The noise test of air conditioners shall be carried out according to the method specified in Annex D of GB/T 17758-2010.

**6.3.12 Annual energy efficiency performance test**

**6.3.12.1 Annual energy efficiency test**

a) Under the working condition specified in Table 7, test the cooling performance of five working condition points - A, B, C, D, E; the cooling performance includes cooling capacity, refrigerating consumed power and energy efficiency ratio (EER);

b) DETERMINE the distribution ratio of the temperature range represented by each working condition point at the annual temperature, i.e., the temperature distribution coefficients $T_a$, $T_b$, $T_c$, $T_d$, $T_e$. The temperature distribution coefficient of some cities in China is shown in Annex B. This Standard adopts the

which shall indicate the following:

a) Manufacturer name;

b) Product model and name;

c) Main technical performance parameters, including: rated cooling capacity, refrigerant code, annual energy efficiency ratio, rated voltage, maximum current, frequency, phase number, quality;

d) Product factory-exit number;

e) Manufacture date.

**8.1.2** The air conditioner shall have marking indicating operating status, e.g. marking of the rotation direction of the fan, indicating instrumentation, control buttons, etc.

**8.1.3** Factory-exit documents

Each room air conditioner shall be accompanied by the following technical documents:

a) Product certification, including:

- Product model and name;

- Product factory-exit number;

- Signature or seal of the inspector;

- Inspection date.

b) Product technical documents may be provided in the form of paper or electronic copy, including:

- Product model and name, scope of application, implemented standards;

- Product structure diagram, refrigeration system diagram, circuit diagram and wiring diagram;

- Spare parts catalog and necessary vulnerability parts drawings;

- Installation instructions and requirements;

- Instructions for use, repair and maintenance precautions.

**8.1.4** Packing list

**8.2 Packaging**

**8.2.1** The air conditioner shall be cleaned before packing. According to the type of air conditioner and engineering installation needs, the manufacturer fills it with a rated amount of refrigerant or dry nitrogen. The nitrogen pressure shall be controlled in the range of 0.03 MPa ~ 0.1 MPa.

**8.2.2** The air conditioner shall be coated with plastic bags or moisture-proof paper and shall be fixed in the box, so as to avoid damp and mechanical damage during transportation.

**8.2.3** The packaging box of air conditioners shall have the following markings:

a) Manufacturer name;

b) Product model and name;

c) Net mass, gross mass;

d) Dimensions;

e) “HANDLE WITH CARE”, “THIS SIDE UP”, “KEEP DRY” and stacking layers.

**8.3 Transportation and storage**

**8.3.1** The air conditioner shall not be crashed, tilted and shall avoid rain and snow during transportation.

**8.3.2** The air conditioner shall be stored in a well-ventilated warehouse.

$M_{S2}$ - the mass of the water source container at the end of the test, in kilograms (kg);

$H_D$ - the water drainage amount, in kilograms (kg);

$M_{D2}$ - the mass of the drainage container at the beginning of the test, in kilograms (kg);

$M_{D1}$ - the mass of the drainage container at the end of the test, in kilograms (kg).

**A.3.2** The humidification capacity of air conditioners shall be calculated according to equation (A.3).

$$H_m = (H_S - H_D)\ 60/T \quad \text{..... (A.3)}$$

where:

$H_m$ - the humidification capacity, in kilograms per hour (kg/h);

$T$ - the humidification test time, in minutes (min).

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