GB

NATIONAL STANDARD OF THE

PEOPLE'S REPUBLIC OF CHINA

ICS 27.010

CCS F 01

GB 21454-2021

Replacing GB 21454-2008

Minimum Allowable Values of the Energy Efficiency and Energy Efficiency Grades for Multi-connected Air-condition (heat pump) Units

多联式空调（热泵）机组能效限定值及能效等级

Issued on: October 11, 2021 **Implemented on: November 1, 2022**

Issued by: State Administration for Market Regulation;

Standardization Administration of the People's Republic of China.

Table of Contents

Minimum Allowable Values of the Energy Efficiency and Energy Efficiency Grades for Multi-connected Air-condition (heat pump) Units

1 Scope

This document specifies the energy efficiency grades, minimum allowable values of energy efficiency and test methods for multi-connected air-condition (heat pump) units and low ambient temperature air source multi-connected heat pump (air conditioning) units, as well as requirements for the implementation of the Standard.

This document is applicable to multi-connected air-condition (heat pump) units (hereinafter referred to as multi-connected units) and low ambient temperature air source multi-connected heat pump (air conditioning) units (hereinafter referred to as low-temperature multi-connected units) adopting air-cooled or water-cooled condensers.

2 Normative References

The contents of the following documents constitute indispensable clauses of this document through the normative references in the text. In terms of references with a specified date, only versions with a specified date are applicable to this document. In terms of references without a specified date, the latest version (including all the modifications) is applicable to this document.

GB/T 18836-2017 Ducted Air-conditioning (heat pump) Units

GB/T 18837-2015 Multi-connected Air-condition (heat pump) Unit

GB/T 25857-2010 Low Ambient Temperature Air Source Multi-connected Heat Pump (air conditioning) Unit

3 Terms and Definitions

The terms and definitions defined in GB/T 18837-2015 and GB/T 25857-2010, and the following terms and definitions are applicable to this document.

3.1 minimum allowable values of energy efficiency for multi-connected air-condition (heat pump) units

Minimum allowable values of energy efficiency for multi-connected air-condition (heat pump) units refer to the minimum allowable values of measured actual performance factor (APF),

cooling seasonal energy efficiency ratio (SEER), integrated part load value (cooling) [IPLV(C)] or cooling energy efficiency ratio (EER) during the cooling and heating operation under the specified operating conditions. For single-cooling products, only the SEER is assessed.

3.2 minimum allowable values of energy efficiency for low ambient temperature air source multi-connected heat pump (air conditioning) units

Minimum allowable values of energy efficiency for low ambient temperature air source multi-connected heat pump (air conditioning) units refer to the minimum allowable values of heating seasonable performance factor (HSPF) and coefficient of performance (COP) of multi-connected heat pump (air conditioning) units that adopt a motor-driven compressor and can generate hot air at an ambient temperature not lower than –25 °C during the heating operation under the specified operating conditions.

3.3 energy efficiency ratio at the minimum-load operating conditions for multi-connected air-condition (heat pump) units

EER_{min}

Energy efficiency ratio at the minimum-load operating conditions for multi-connected air-condition (heat pump) units refer to the ratio of the cooling capacity to the total electric power consumption of the units when turning on an indoor unit with the minimum cooling capacity for continuous and stable cooling operation under the specified cooling capacity test conditions.

4 Energy Efficiency Grades

4.1 The energy efficiency of multi-connected units and low-temperature multi-connected units is classified into three grades, in which, Grade-1 represents the highest energy efficiency.

4.2 The energy efficiency of air-cooled single-cooling multi-connectors is classified in accordance with the measured SEER of the products. The measured SEER of each energy efficiency grade shall not be less than the stipulations of Table 1.

temperature multi-connectors outdoor units with a nominal heating capacity of less than or equal to 18,000 W, the standby power shall not be greater than 15 W (additional functions that can be turned off during the test shall be turned off).

5.3 Products adopting electric auxiliary heating shall be able to manually turn on and off the electric auxiliary heating system. Meanwhile, the working status of the electric auxiliary heating system shall be indicated in an obvious position.

5.4 When the outdoor dry-bulb temperature of the multi-connectors is higher than or equal to 0 °C, the electric auxiliary heating shall not be automatically turned on.

5.5 When the outdoor dry-bulb temperature of the low-temperature multi-connectors is higher than or equal to – 20 °C, the electric auxiliary heating shall not be automatically turned on. For the low-temperature multi-connectors whose electric auxiliary heating is selected by the user, a port is reserved for the controller, and the start and stop of the auxiliary electric heating system is controlled by the units, the method of turning on and off the auxiliary electric heating shall be explained in the instruction manual (or operation manual).

5.6 The tolerances shall satisfy the following stipulations:

a) The stated value of energy efficiency of the product shall not be less than the specified value of the index corresponding to its rated energy efficiency grade, and shall be within the value range corresponding to its rated energy efficiency grade.

b) The measured values of the SEER and EER_{min} of single-cooling multi-connectors, the APF and EER_{min} of heat-pump multi-connectors, the IPLV(C) and EER of water-cooled multi-connectors, the HSPF, $COP_{-12°C}$ and $COP_{-20°C}$ of low-temperature multi-connectors shall not be less than 95% of the stated values. The measured values and the stated values are in integral multiples of 0.01.

c) The stated nominal cooling capacity and the measured value of the multi-connectors shall be within the range of the nominal cooling capacity corresponding to its rated energy efficiency grade. The stated nominal heating capacity and the measured value of the low-temperature multi-connectors shall be within the range of the nominal heating capacity corresponding to its rated energy efficiency grade.

d) The measured cooling seasonal total energy CSTE (single-cooling) and the calculated annual power consumption APC (heat-pump) of the multi-connectors shall be less than or equal to 110% of the stated values; the measured heating seasonable total energy HSTE of the low-temperature multi-connectors shall be less than or equal to 110% of the stated value.

6 Test Methods

6.1 Test Method for Energy Efficiency

6.1.1 The indoor unit combination stipulated by the producer and for the purpose of testing shall be included in the producer's product manual or accompanying documents, with the shell sizes clearly stated. In addition, there shall be sales records. The annual sales volume of the indoor unit series, to which, the various shell sizes in the indoor unit combination belong, shall not be less than 4% of the total annual sales volume of the indoor units of the multi-connectors, or the annual sales volume shall be greater than 12,000 sets; if the annual sales volume does not reach the specified proportion or quantity, the indoor unit series with the maximum sales volume shall be taken as the indoor unit combination for the test.

NOTE 1: the indoor unit series refers to indoor units with the same size of shell, installation method and basic structure.

NOTE 2: the annual sales volume of the indoor unit series refers to the number of sets sold within 12 consecutive complete calendar months after the first release of the indoor unit series.

NOTE 3: the total annual sales volume of the indoor units of the multi-connectors refers to the total number of indoor units sold that can be matched by the outdoor units of the multi-connectors within 12 consecutive complete calendar months.

NOTE 4: if the statistical period of sales volume is less than 12 months, convert it into 12 complete calendar months [annual sales volume of indoor unit series = (total sales volume of indoor unit series within the statistical period / statistical period) × 12].

NOTE 5: the indoor units that can be matched by the outdoor units of the multi-connectors can be products of the same brand and different manufacturers.

6.1.2 The SEER and EER_{min} of single-cooling multi-connectors, the APF and EER_{min} of heat-pump multi-connectors, the IPLV(C) and EER of water-cooled multi-connectors shall be tested in accordance with the relevant stipulations of GB/T 18837-2015. The measured values shall retain two decimal places.

6.1.3 The $COP_{-12°C}$, $COP_{-20°C}$ and HSPF of low-temperature multi-connectors shall be tested in accordance with the stipulations of GB/T 25857-2010 and Appendix A. The measured values shall retain two decimal places.

6.1.4 The modular multi-connected units shall be tested by the basic modules.

6.2 Test Method for Standby Power

The standby power shall be tested with reference to the relevant stipulations of GB/T 18837-2015.

6.3 Test Method for Auxiliary Electric Heating

For the multi-connectors and low-temperature multi-connectors with built-in auxiliary electric heating system, under the heating mode, set the auxiliary electric heating to the default state and maintain the indoor temperature at 16 °C. In accordance with the product type and the

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

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