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Low ambient temperature air source heat pump (water chilling) packages - Part 2: Heat pump (water chilling) packages for household and similar application

低环境温度空气源热泵（冷水）机组 第2部分：户用及类似用途的热泵（冷水）机组

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Table of Contents

1 Scope

This Part of GB/T 25127 specifies the type and basic parameters, technical requirements, test methods, inspection rules, marking, packaging, transportation, storage of low ambient temperature air source heat pump (chilling water) packages (hereinafter referred to as "packages"), which are driven by motors for household and similar applications.

This Part is applicable to packages with a nominal heating capacity of no more than 35 kW, using air as the heating (chilling) source, capable of producing hot (cold) water at an ambient temperature not lower than -25 °C. Other similar packages may refer to this for implementation.

2 Normative references

The following documents are essential to the application of this document. For the dated documents, only the versions with the dates indicated are applicable to this document; for the undated documents, only the latest version (including all the amendments) is applicable to this standard.

GB/T 2423.17 Environmental testing for electric and electronic products - Part 2. Test method - Test Ka. Salt mist · GB 2894-2008 Safety signs and guideline for the use · GB/T

3785 (all parts) Electroacoustics - Sound level meters · GB/T 4208-2017 Degrees of protection provided by enclosure (IP code) · GB 4706.1-2005 Safety of household and similar electrical appliances - Part 1. General requirements · GB 4706.32-2012 Safety of household and similar electrical appliances - Part 32. Particular requirements for electrical heat pumps, air-conditioners and dehumidifiers

3 Terms and definitions

The terms and definitions defined in JB/T 7249, as well as the following terms and definitions, apply to this document.

3.1 Low ambient temperature air source heat pump (water chilling) packages. A package which uses air as the heat (cold) source and using a vapor compression refrigeration cycle driven by an electric motor, to produce hot (cold) water at an ambient temperature not lower than -25 °C.

3.2 Performance coefficient of nominal condition, COPc, COPh. Under the specified nominal condition, the ratio of the heating (cooling) capacity of the package expressed in the same unit to the total input power.

3.3 Coefficient of heating performance under low temperature condition, COPdh. Under the specified low temperature heating condition, the ratio of the heating capacity of the package expressed in the same unit to the total input power.

3.4 Seasonal energy efficiency ratio, SEER. In the cooling season, the ratio of the total heat removed from the room by the package to the total power consumed.

3.5 Heating seasonal performance factor, HSPF. In the heating season, the ratio of the total heat delivered to the room by the package to the total power consumed.

4 Type and basic parameters

4.1 Type. The packages are classified according to the structural type, the package function, the end equipment the package is matched with, and the power supply used.

4.2 Model. The compilation method of the package model can be determined by the manufacturer; however, the model shall reflect the heating capacity of the package under the nominal working conditions of this Part.

4.3 Basic parameters. The performance coefficient and its limit of the package are shown in Table 2.

5 Technical requirements

5.1.1 The package shall comply with the provisions of this Part and be manufactured according to the drawings and technical conditions approved by the prescribed procedures

(or according to the agreement between the user and the manufacturer).

5.1.8 The coating of the painted parts of the package shall have good adhesion. After the coating adhesion test in 6.3.7, the result shall not be greater than 0.30.

5.1.9 The components and materials of the package shall meet the requirements of the package's performance.

5.1.10 Before charging the refrigerant, the surfaces in contact with the refrigerant and lubricating oil in the package shall be kept clean and dry; the outer surface of the package shall be clean.

5.2.1 Sealing performance. The refrigeration system pipeline of the package shall have good sealing performance. When the air tightness test is carried out according to 6.3.1.1, there shall be no leakage in all parts of the system.

5.3 Operation test. The package shall be able to start normally during the operation test; there shall be no abnormality during the operation.

5.4.5 Low temperature heating capacity. When tested according to the method of 6.3.2.3 and Appendix A, the measured heating capacity of the package shall not be less than 95% of the indicated value of the low temperature heating capacity, meanwhile it shall not be less than 80% of the indicated value of the nominal heating capacity described in 5.4.3.

5.4.6 Low temperature heating power consumption. When tested according to the method of 6.3.2.3 and Appendix A, the measured heating power consumption of the package shall not be greater than 110% of the indicated value of the low temperature heating power consumption.

5.4.11 Performance coefficient. When tested according to the method in 6.3.2.1, the package's nominal cooling performance coefficient shall not be less than the provisions of Table 2, and not less than 95% of the stated value; its value shall be rounded to two decimal places. When tested according to the method of Appendix B, the package's annual performance factor shall not be lower than the provisions of Table 2; meanwhile it shall not be lower than 95% of the stated value.

5.4.12 Water side pressure loss. When the package is tested according to the method of 6.3.2.9, the water side pressure loss shall not be greater than 115% of the package's stated value.

5.4.13 Auxiliary electric heating power consumption. For packages with auxiliary electric heating, the actual power consumption of electric heating shall be 90% to 105% of the package's stated value of electric heating power.

5.5.1 Insulation resistance. The insulation resistance value of the package shall not be less than 2 M?.

5.7 Degree of protection. The degree of protection of the package shall be at least IPX4 as

specified in GB/T 4208-2017.

6 Test methods

6.1.1 The accuracy of the test instruments and meters shall comply with the provisions of Appendix C of GB/T 10870-2014 and shall be calibrated or verified. For instruments and meters that are susceptible to on-site wiring or installation, such as temperature and pressure, it should calibrate the sensors, secondary instruments and software as a whole at the measurement site.

6.2.1 During the test, the average fluctuation range of relevant water temperature, flow rate and other readings shall comply with the provisions of Table 7; the maximum fluctuation range shall comply with the provisions of Table 8.

6.2.2 The package shall operate at the rated voltage and rated frequency specified on its nameplate. The voltage deviation shall not exceed ±2%; the frequency deviation shall not exceed ±0.5 Hz.

6.3.1.1 Air tightness test. The refrigerant side of the package is placed in a room with an ambient temperature of 16 °C to 35 °C under the design pressure without power; then tested using a leak detector with a sensitivity of not less than 5 x 10-2 Pa·m3/s or using a helium leak detector. The test results shall comply with the provisions of 5.2.1.

6.3.1.2 Vacuum test. When the water side of the package is under 1.25 times the design pressure (hydraulic pressure) or 1.15 times the design pressure (air pressure), observe all parts and joints, which shall comply with the provisions of 5.2.2.

6.3.2.9 Water side pressure loss. For the water side pressure loss in the cooling state, when conducting the nominal operating condition cooling performance test, measure the package water side pressure loss according to the provisions of Appendix B in GB/T 18430.1-2007.

6.3.3 Noise test. The package shall be tested in accordance with the provisions of Appendix C; the results shall comply with the provisions of 5.4.14.

6.3.4 Operation test. Before leaving the factory, the package shall be powered at rated voltage and rated frequency, to perform at least one startup test run.

6.3.7 Coating adhesion test. Select an area of 10 mm x 10 mm on the outer surface of the coated part; use a new blade to make 11 parallel cuts at a spacing of 1 mm and a depth to the substrate. Use medical zinc oxide tape to firmly stick to the scratched part; then quickly tear off the tape along the direction of one group of scratches.

6.3.8 Detection of harmful substance content. The detection of harmful substance content in the package shall be carried out in accordance with the provisions of GB/T 26572; the results shall comply with the provisions of 5.1.15.

6.3.9 Variable working condition test. The package operates within the temperature range