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PEOPLE'S REPUBLIC OF CHINA**

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**Requirements for the design and installation of multi-split air
conditioning (heat pump) systems**

多联式空调（热泵）机组应用设计与安装要求

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Foreword

The symbols listed in Table 1 apply to this document.

5.1 General Requirements

5.1.1 The use of the rooms in the building, their usage requirements, cooling (heating) load characteristics, climate conditions, and energy availability should be considered, in conjunction with relevant national regulations. Safety, environmental protection, energy conservation, and hygiene regulations determine the following types of multi-split air conditioning (heat pump) units.

- a) If the system is only operated in summer, a single-cooling system is recommended;
- b) For systems that require operation in both winter and summer, a heat pump system is recommended;
- c) When both cooling and heating are required in the same system, a heat recovery system is recommended;
- d) In locations with peak-valley electricity pricing policies, energy storage (cold storage, heat storage) systems are recommended when the technical and economic analysis

indicates their suitability.

e) In cold and frigid regions, when multi-split systems are used as the primary heating method, multi-split systems suitable for the corresponding environmental conditions should be adopted. Air conditioning (heat pump) unit.

5.1.2 The performance of the selected multi-split air conditioning (heat pump) unit shall comply with the provisions of GB 21454 and GB/T 18837.

5.1.3 The design of multi-split systems should be carried out according to the following steps.

- a) Calculate the cooling (heating) load of the air-conditioned room and initially select the capacity of the indoor and outdoor units;
- b) Based on the calculated load characteristics, the system should be rationally partitioned;
- c) Based on project requirements and according to airflow organization and user requirements, select a suitable type of indoor unit;
- d) Arrange indoor and outdoor units;
- e) Design the connecting pipes for indoor and outdoor units;
- f) Calculate the equivalent length of the connecting pipes for the multi-split system, and determine the equivalent length of the connecting pipes and the product specifications of the multi-split air conditioning (heat pump) unit. Verify the variable operating condition characteristics (curves or tables) provided by the manufacturer for the multi-split air conditioning system in terms of pipe length correction, elevation difference correction, and temperature correction. After adjusting the defrost (heating) and other data, check if the actual performance meets the requirements. If not, return to step a). Redesign;

5.2 Load Calculation and System Partitioning

5.2.1 The selection of indoor and outdoor design parameters and the load calculation of each room or area shall comply with the provisions of GB 50736.

5.2.2 Multi-split systems should be rationally zoned according to room orientation, function, usage time and frequency, and interior design conditions, and comply with... The following provisions apply.

- a) In larger buildings or building areas, multiple multi-split air conditioning systems should be used;
- b) For rooms or areas with many floor intervals, it is advisable to install separate multi-split air conditioning systems;
- c) For buildings with multiple independent energy-consuming units or multiple business types belonging to different units, it is advisable to install separate multi-split air conditioning

systems;

d) Based on the hourly load (L_i) of each room, the system hourly load rate (L_a) and load synchronization rate (CURS) of each zone should be calculated to determine the system load factor (L_a) and load synchronization rate (CURS) of each zone. The system load synchronization rate (CURS, τ) for each partition system during the statistical period should be used. If CURS, $\tau < 0.7$, the system partitions should be redefined.

5.2.3 When a room uses multiple multi-split air conditioning systems, a centralized controller should be used for overall management.

5.2.4 The design of multi-split systems shall comply with the following provisions.

- a) The number of indoor units connected to the outdoor unit should be within the allowable range specified by the manufacturer;
- b) The maximum length of the connecting pipe between indoor units after the first branch pipe of the system should not exceed the product's technical requirements;
- c) The maximum pipe length and maximum height difference between indoor and outdoor units, as well as between indoor units, should not exceed the product's technical requirements;
- d) Calculate the mass of refrigerant that needs to be added after the installation of the multi-split system, and the amount of additional refrigerant to be added compared with the amount of refrigerant pre-charged in the outdoor unit. The sum should not exceed the upper limit of refrigerant charge specified in the product's technical requirements.

5.3 Determination of the type and capacity of indoor and outdoor units

5.3.1 Indoor units can be classified into convection type indoor units, radiant type indoor units, and convection-radiant type indoor units according to their heat exchange method.

5.3.2 In scenarios where comprehensive protection of the indoor environment is not required, it is advisable to use indoor units designed for localized environmental protection (including radiant and convection-radiant types). (Type of indoor unit), and meet the following requirements in application design.

- a) Use indoor units designed for localized environmental protection. The horizontal relative position of the indoor unit's air supply (radiant surface) to the protected area should be smaller than that of the room. The indoor unit capacity should be determined based on 50% of the length and the size of the protected area.
- b) When using radiant indoor units for continuous heating, calculations have verified that the indoor unit temperature can be adjusted according to the required operating temperature. Calculate the room load based on temperature and determine the capacity of the indoor unit; when using radiant heating terminals laid on the floor, ensure they meet

operational requirements. The indoor temperature load corresponding to the temperature requirement is calculated, or the capacity of the hot water module is determined by reducing the indoor design temperature by 2°C.

c) When using convection-radiation type indoor unit units, the capacity of the indoor unit should be determined according to the peak load of intermittent operation. The adjustable capacity of the indoor unit... The lower limit of the quantity should not be higher than the load calculated based on the indoor temperature corresponding to the operating temperature during the steady-state stage.

5.3.3 Determine the capacity of the outdoor unit based on the calculated cooling (heating) load of each area (room) under the same multi-split system.

5.3.4 When the design operating conditions of the multi-split system differ from the nominal operating conditions of the multi-split air conditioning (heat pump) unit, the actual cooling capacity of the multi-split system... The heat capacity should be adjusted based on factors such as design conditions, temperature, configuration ratio, pipe length, installation height difference between indoor and outdoor units, and defrosting, to determine the required heat capacity. The nominal cooling capacity and nominal heating capacity of the outdoor unit to be selected must be determined.

5.4 System Engineering Energy Efficiency Requirements For actual projects employing air-cooled and low-ambient-temperature air-source multi-split air conditioning (heat pump) units, it is advisable to consider the specific engineering conditions and refer to the appendix. Record A provides the method to calculate the energy efficiency parameters EAPF*, ESEER*, or EHSPF* for multi-split air conditioning systems, in order to compare them with other air conditioning solutions. A comparison and selection process was conducted.

5.5 Layout of Indoor and Outdoor Units

5.5.1 The layout of indoor units should meet the room's airflow organization requirements; for rooms requiring heating in winter, if the ceiling is high and a top-supply and top-return air supply system is used... When determining the airflow organization method, it is advisable to use airflow organization analysis to determine its installation height.

5.5.2 Avoid installing the indoor unit outdoors, in environments susceptible to oil fume pollution, acid or alkaline conditions, or strong electromagnetic interference. If this cannot be avoided, [the following should be done]. Special measures should be taken.

5.5.3 The layout of outdoor units shall follow the following principles.

- a) It should be installed in a well-ventilated location, taking into account the impact of monsoons and outdoor wind fields on the exhaust of the outdoor unit;
- b) It should be placed in a cool, shaded area and should not be placed in dusty, heavily