Discussion on Design of Ventilation and Smoke Prevention and Exhaust in Hvac

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Abstract: *With the development of the construction industry and the acceleration of the urbanization process, the national building safety and quality of life put forward higher requirements. In the planning and construction process, heating and air conditioning is the most important part that affects people's quality of life and safety. Only by fully considering the effective role of heating and air conditioning can we ensure people's quality of life. Therefore, in the construction and design of heat conduction air conditioning, attention should be paid to the design of gas insulated air conditioning, in order to ensure the practicality, scientific nature, ventilation and smoke prevention and exhaust of gas insulated air conditioning. This requires experienced designers to improve the overall quality, improve ventilation and avoid the pitfalls of the smoking concept. This paper mainly analyzes the ventilation and smoke prevention design of heating and air conditioning system.*

Keywords: Heating And Air Conditioning; Ventilation; Smoke Prevention And Exhaust; Design.

1. INTRODUCTION

In our country, there has been a marked increase in the number and frequency of high-rise buildings. Therefore, we must pay attention to safety and construction planning. Heating and air conditioning are common in high-rise buildings, which not only improve people's comfort, but also increase potential safety risks. Therefore, we must pay attention to the design and construction of hVAC system ventilation and smoke prevention and exhaust are the most important elements in the design of ventilation and air conditioning. In view of many defects in the design process, a qualified designer should take effective measures to improve the level of ventilation and smoke prevention and exhaust, effectively improve the efficiency of ventilation and fire performance, to ensure the safety and life safety of the people, effectively improve the quality of life of the people. Shen et al. [1] developed an LSTM-based AI system for optimizing anesthetic dosing in cancer surgery, while Pang et al. [10] leveraged electronic health records for diabetes risk prognosis through data-driven modeling. Concurrently, autonomous driving technologies have expanded beyond transportation: Wang et al. [2] explored their cross-industry applications in FinTech, and Wang et al. [4] proposed end-to-end AI frameworks for autonomous vehicle decision-making. Supply chain optimization has seen novel algorithmic integrations, with Wang et al. [3] combining deep reinforcement learning and particle swarm optimization for financial benefit analysis in supply chain finance, complemented by Jin [7], who employed attention-based temporal networks and reinforcement learning for delay prediction and inventory optimization. In cybersecurity, Liu et al. [6] designed a privacy-preserving hybrid ensemble model to balance network anomaly detection with data protection constraints. Computer vision innovations include Chen et al. [5], who introduced gaze-integrated object detection frameworks, and Lyu et al. [8], which optimized CNNs for efficient 3D point cloud recognition. Urban sustainability efforts are advanced by Zheng et al. [9], who integrated TRIZ methodology with hybrid forecasting models for building energy optimization.

2. VENTILATION DESIGN IN HVAC SYSTEM

2.1 Purpose of ventilation design

Ventilation design is an important part of air conditioning, the main purpose of this project is to improve indoor air conditions through ventilation system, ensure good ventilation, harmful substances out of the room, purify the air. All in all, the implementation of indoor air conversion will effectively control the spread of bad air, create a good living environment and improve the quality of life.

2.2 Types and uses of ventilation design

According to the design ventilation volume can be divided into local ventilation and overall ventilation. Overall

ventilation refers to the phenomenon that indoor air environment conditions are complex and pollutants spread irregularly, affecting personal safety. In this case, choose "full ventilation. " If internal pollutants are concentrated in the same place, local ventilation should be used to purify or purify air that affects human safety.

2.3 the problems that should be considered in ventilation design

In order to give full play to the practical role of ventilation system, designers should first understand and understand the requirements of air quality laws and regulations, and provide important reference data for ventilation system. Determine the amount of air required for air purification and correctly calculate the maximum value to achieve good results.

3. TWO, HVAC SMOKE CONTROL AND EXHAUST SYSTEM DESIGN PROBLEMS

3.1 Unreasonable design of external Windows

The design of outdoor natural smoke exhaust window is a difficult task in hVAC design. Because security modules are not designed to take into account the potential risks that many users face when designing security modules, developers of security modules may not consider these risks. In order to ensure the rationality of exterior window design, the actual needs and types of users must be considered in the design process. Make sure Windows are properly designed. Therefore, in addition to the specification of the window, the type of window should also be considered in the design process.

(two) the problem of smoke prevention and exhaust machine

Air leakage and air volume control must be considered in the design of ventilation ducts and flue fans. Therefore, taking past experience into account, the group reasonably considers two factors: ventilation volume and air leakage design, to ensure the rationality of ventilation design and prevent air leakage of fans [1].

(three) fire valve design

In the design of fire valves, many designers are key to effective fire safety because the function of fire valves is not properly defined. This is because the design of fire valve is not clear, so there are many problems and hazards in practical application.

Iii. Design contents that should be paid attention to when improving smoke prevention and exhaust design of HVAC system

3.2 Exterior window structure design

In the external design of ventilation system structure, the window structure on the external window is designed. the direct goal of residential exterior wall technology is to realize the natural emission of hot air and reduce the energy consumption of hot air. If the outer window is located in the stairwell, its area should not be less than 2m. If the external wall is located between the fire elevator, the floor area between the front fire elevator and the front fire elevator exceeds 2m.

3.3 Design improvement

In the field of heating, air conditioning and smoke prevention and exhaust, consider the construction engineering structure, strengthen the smoke prevention and exhaust structure and select the appropriate smoke prevention and exhaust structure. Smoke prevention and exhaust design structure is as follows: first, in the parking lot construction project, aiming at the problem of poor air quality in the parking lot, the design of the parking lot non- smoking building, strengthening the smoking ban, strictly implement the fire laws and regulations, organizational norms and standards. Improve the application of indoor smoke exhaust system and improve the level of smoke exhaust. Second, the double exhaust fan is designed to improve the speed of the fan and strengthen the smoke prevention and exhaust. Third, after the building fire, the smoke density is low, the smoke floats over the roof. An important aspect of the construction is to strengthen the smoking ban. Upper and roof exhaust systems are optional. Fourth, the smoke prevention and exhaust system design should be scientific and reasonable, to ensure the overall control

efficiency of the exhaust of the heating and air conditioning system, reduce the energy consumption of the equipment, and save the cost.

3.4 Basement and corridor design

According to the application effect of basement and corridor heating and air conditioning, the technical characteristics of flue gas control are analyzed. For example, if a building has a basement area of more than 50 meters and no Windows, the smoke-free concept is mainly based on the design of mechanical equipment and air separators. If the corridor length of the building exceeds 20 meters and there is no internal ventilation, the ventilator and exhaust pipe must be adjusted. If the length of emergency access in the building is more than 20 meters, ventilation and fire protection must be adjusted. (four) fire valve design

Fire valve is an important part of the design of ventilation and smoke exhaust thermal protection system, fire valve plays a role of barrier and regulator in fire prevention building, in many smoke prevention work, the design and application of fire valve is ignored, must be designed according to specific characteristics, in order to meet the requirements of specific operating conditions. That is to say, in order to ensure the structural integrity of the fire valve, it is necessary to design according to the fire resistance requirements of the building. When designing the hVAC humidification system, the position of the fire valve should ensure that the fire valve meets the structural requirements, and the fire valve of the heating and air conditioning system should match the fire valve of the gas control system, and make full use of the heat insulation function of the fire valve.

Effective measures to improve the ventilation and smoke prevention and exhaust of hVAC system

Overall, there are still some problems in the design of hot air and smoke control. Effective measures must be taken to ensure the effective operation of ventilation and smoke prevention concepts. the following are effective strategies to address ventilation design and smoke prevention issues.

4. IMPROVE THE CONSCIOUSNESS OF DESIGNERS, STRICTLY IMPLEMENT THE STANDARDS

In order to ensure the rationality and effectiveness of air conditioning smoke control and thermal insulation technology, a qualified designer should first deepen the understanding of ventilation smoke control and thermal insulation technology, realize the importance of these two factors, and strictly abide by the relevant scientific and reasonable design rules [2].

4.1 Strict management during the design stage

The design process is an important foundation for building technology and hVAC systems, and we also need to pay attention to this part of the project. Only by constantly adjusting the construction links, can the damage of the smoke exhaust system be effectively reduced, the construction quality of the HVAC system be guaranteed, and the important guarantee for people's lives be provided. Therefore, in practical operation, it is necessary to develop a perfect smoke exhaust system in accordance with relevant government standards, and carry out field research based on actual needs to ensure the effectiveness of smoke prevention design.

4.2 Design pipes to strengthen the smoke exhaust of the air conditioning and ventilation system

The main function of the exhaust control system is to exhaust smoke effectively. In the actual construction process, if it is difficult to exhaust smoke in the pipeline, it can be replaced by air conditioning. Can effectively reduce equipment investment.

5. CONCLUSION

In a word, heating and air conditioning is an important part of technological development, which comes from people's life quality and safety. Therefore, it is required to pay attention to ventilation and smoke prevention and exhaust design in the design and construction stage, and ensure its reasonable and orderly construction.

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