

Analysis of Characteristics and Design Key Points of Water Supply and Drainage Engineering for Fire Control in High-rise Buildings

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1. Characteristics of water supply and drainage engineering for fire control in high-rise buildings

1.1 Technicians are familiar with the installation of water supply and drainage engineering.

In the process of designing and installing water supply and drainage engineering for fire control in high-rise buildings, the corresponding data personnel are needed to implement it. Technicians must ensure that the installation methods of water supply and drainage pipelines are mastered skillfully, so that in the process of actual installation, they can apply different materials and keys fully combined with engineering practice and based on the site of different construction conditions to implement works strictly according to the corresponding construction sequence.

1.2 Seriously treat the design drawing of water supply and drainage construction.

The design drawing of construction is very important in the installation of pipes of water supply and drainage engineering for fire control in high-rise buildings, and the actual installation results of water supply and drainage engineering for fire control are very significant. The construction design group needs to examine and study the corresponding construction drawing in real time, whether it is basically the same as the actual construction environment or not and whether applying the design drawing is

scientific and reasonable or not to implement it.

1.3 The control work of site construction management is more rigorous.

In the installation of water supply and drainage engineering for fire control in high-rise buildings, it is general to strictly manage and control the construction site and conduct investigation timely on all kinds of risks so as to minimize security risks in the maximum level.

2. The design analysis of fire control system in high-rise buildings

2.1 The importance of water supply design for fire control

At present, there are more and more high-rise buildings. In case of fire, the difficulty and danger to fight a fire will be further increased and larger than that of ordinary buildings, so the losses are incalculable when firefighters arrive at the scene of the fire¹⁻³. Scientific and rational water supply design for fire control can effectively alleviate the further spread of fire and in good circumstances, it can be completely eliminated. Therefore, in the design of water supply for fire control in high-rise buildings, it is necessary to set up different fire control facilities according to the requirements of architectural structure and function and combined with the building height.

2.2 The importance of drainage design for fire control

Abstract: Nowadays, our country has a relative density of population, so once a fire occurs in the building, personnel evacuation is more difficult. Since fire and water have no mercy and the fire spreads quickly, it will endanger people's life and property safety if unable to fully guarantee the quality of water supply and drainage for fire control. Scientific and rational water supply and drainage system for fire control can effectively increase the efficiency and speed of fire rescue, reduce people's property loss and improve the residential safety index of the building itself. In view of this, this paper mainly analyzes the characteristics and design key points of water supply and drainage engineering for fire control in high-rise buildings.

Key words: high-rise buildings; water supply and drainage for fire control; design

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After a fire occurs in a high-rise building, it takes a lot of water to fight it. Although it is easier if we drain water using public rainwater pipes, the water used is much larger than the normal

amount of rainwater⁴. So ultimately it is difficult to achieve the final drainage purpose if there is no dedicated drainage design for fire control, only using building rainwater pipelines. A good design of water drainage for fire control is helpful to discharge the water used to fight fire out of the building immediately after the fire, to prevent causing escape obstacles for the affected people because of a large amount of water and prevent property damage due to prolonged immersion. And in the drainage design for fire control, considering that the upper layer of water may infiltrate to the lower level in high-rise buildings, it is necessary to take certain anti-overflow measures and also prevent the problem of rain-water pouring.

3. The design points of water supply and drainage engineering for fire control in high-rise buildings.

A multi-functional high-rise building in a city has a total of 25 floors, including the ground and underground floors. The total area of the building is 49264.23m². The total area of the underground floor is 2000.54m² and the total height of the building is 80.45m⁵⁻⁷. The underground building are mainly prepared for equipment warehouses, while commercial stores are set on the ground floor and hotels and ordinary houses are mainly set at 2 to 4 floors and 5 floors and above. In the construction design, emphasis should be given to the water supply and drainage and construction of fire control system, which basically can be divided into drainage engineering, fire hydrant systems engineering, water supply engineering and automatic sprinkler system engineering and so on.

3.1 The design technology of fire pump room.

First of all, in the selection of fire pumps, it is important to pay attention to it and to choose fire

pumps with small power scientifically and rationally on the basis of achieving various water conditions and in accordance with the provisions of energy conservation. Secondly, the pump speed should be carefully adjusted to ensure the pump operation efficiency. Meanwhile, it is important to carry out the design of the fire pump to prevent overpressure, so that it can effectively guarantee the normal operation of the pump⁸. Finally, if the area of the fire pump room is relatively small, in the design and use of fire pump room, it is necessary to reserve a position for the control box with propose. In addition, it should also avoid the conflict situation among fire pump out of pipe, wet alarm valve and fire pump room.

3.2 The design technology of automatic sprinkler system for fighting a fire.

First of all, sprinkler head should be installed strictly in accordance with the rules of fire protection design in high-rise buildings. After the installation is completed, it is necessary to test whether the sensitivity and corresponding design requirements are different. Secondly, emphasis should be given to the design of pressure relief at the inlet of the sprinkler head pipe. Based on the hydraulic loss and height of the water pipe, the pump head is calculated accurately, and then the pressure on the connection of the water pipe is defined⁹⁻¹⁰. If there is too much pressure, the corresponding decompression valve should be installed. Finally, the water test device at the end of the sprinkler head should be designed and the test of the water volume of the interface is done to determine the final appropriate model.

3.3 The application of drainage engineering technology for fire control.

Half of the water consumption is the actual amount of the building drainage for fire control. Using the principle of separating the

pressure pipe and the pressure-free pipe, the concrete construction is carried out in the cross arrangement of the drainage pipe and other pipelines. The lower end of the drain-pipe will be interspersed with water pipes, which will be attached to the air duct and wound to the lower end of the electrical pipe. The installation area of the fire control pump is usually designed in the basement of the high-rise building and in the pump room. The water pool, floor drain, open trench and catch basin are set up together here, and it can effectively discharge a large number of stagnant waters in the basement driven by sewage pump.

3.4 The design technology of hydrant system.

Water belt interface, fire water gun, fire hydrant box and fire hose are the main components of the fire hydrant system. After the launch of the operation, whether the water column can rise to the elevator room is the question to be considered before the design of the fire elevator room.

Meanwhile, in order to ensure that the fire hydrant will not be damaged caused by increased static water pressure, decompression device must be installed. In order to meet the requirements of outdoor fire-fighting water, a total of 7 sets of fire hydrants are installed in the outdoor basement in the above project cases. The fire water pump room and fire pool are designed in unified way and the volume area of the pool is 450m² above. The water consumption of sprinkler system in the fire pool can be stored for nearly 2 hours. The fire-fighting tank is placed between the water tanks of the building roof timely, covering an area of 20m².

4. Conclusion

In a word, water supply and drainage for fire control is most timely and effective measure to fight fire in the event of fire, so it is very important to achieve the

most reasonable and compliance design of water supply and drainage for fire control.

This requires the relevant designers in the design work of water supply and drainage for fire control continue to strengthen learning fire control technology and specification requirements, timely understand the updates of fire technology and related fire control specification, strictly and seriously follow the relevant provisions of the new fire control regulations. At the same time, in the further study of design of water supply and drainage system for fire control in buildings, they should solve the design problems of water supply and drainage for fire control in buildings specifically and maximize the timeliness and effectiveness of water supply and drainage system for fire control to fight a fire.

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