Study on the Secondary Pollution of Building Fire Water Storage and Domestic Water

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Abstract. In order to solve the maintenance and management problems of the fire water tank in the fire water supply system, the problem of how to prevent the secondary pollution of domestic water by using the water source for fire storage water and domestic water is discussed. The countermeasures and the concept of intrinsic safety using shared fire-fighting water tanks are proposed, and it is clear that fire-fighting pools (boxes) need to strengthen water quality and the intrinsic safety of the pools. The innovative construction of the fire water tank system architecture is conducive to improving the reliability of fire water supply for buildings.

Keywords: Fire storage water; Domestic water; Secondary pollution.

1. Introduction

In fire water supply, fire water tanks and fire water tanks had play an important role in the reliability of fire water supply. The core issue of its maintenance and management was the safety and security of water quality and quantity. Fire water tanks and fire water pools had been in reserve for a long time in large storage water volume and were connected to the atmosphere. Especially high-level fire water tanks installed outdoors were greatly affected by the environment. As the fire water tank was different from the domestic water tank in use, the situation of water shortage and water pollution often could not be found in time. The design code had clear regulations for fire water storage capacity, but the scope of water quality requirements was relatively broad. The fine water mist fire extinguishing system had higher requirements on water quality, which directly affects the function of the system's fire extinguishing function. This issue needs to be taken seriously and was also an issue that need to be addressed urgently. To ensure that the water quality and quantity of fire water supply can be reliably guaranteed and to detect problems in the fire pool in time, it is necessary to strengthen the monitoring and early warning management of the fire pool. Using intelligent technology to improve the management level of fire water supply facilities, it is particularly important to grasp the information about the water quality and quantity of fire pools online, in real time dynamically. It had a positive significance for the performance improvement of the fire water supply system throughout its life cycle.
2. Statement of problem Section Headings

In order to ensure the safety of people's lives and property, prevent and reduce the danger of high-rise civil building fires, and improve their ability to withstand high-rise fires, this article, based on the size of the building and in accordance with relevant national building technology fire protection regulations, how to ensure and comply with buildings (groups) according to the requirements of the water consumption of fire protection, a brief analysis is made on the capital savings of underground storage tanks, fire booster pumps and supporting electrical control facilities, and people's drinking water, so as to attract the attention of relevant departments and people and solve them. In order to ensure the firefighting water consumption of high-rise buildings, according to the relevant national regulations, the firefighting water storage capacity can last for 3 hours, calculated according to the second-class high-rise civil buildings:

- Indoor fire hydrant water consumption 72 m³/h (calculated based on water consumption of 20 L/s);
- Water consumption of outdoor water hydrant 108 m³/h (calculated based on water consumption of 30 L/s); Automatically spray water for firefighting. Based on the calculation of the medium-risk level, the effective area is 200 m², the water spray intensity was 61 (min · m²), and the water consumption is 72 m³/h. Therefore, the total fire water consumption for this building was (72+ 108) × 3+ 72 = 612 m³.

When the fire pump worked, the amount of water flowing into the pool from the outdoor pipe network: When the pipe diameter was DN = 100 mm and the flow velocity (v) was 2.19 m/s, the amount of water flowing in 68.4 m³/h. The amount of water flowing in for 3 hours was 68.4 × 3 = 205 m³. Therefore, the water storage capacity of the fire pool should be 612-205 = 407 m³.

According to the survey of people's actual domestic water consumption, domestic water consumption is very small. Take the comprehensive building as an example. There are public toilets in each room. Each floor is equipped with electric heating boilers and a small number of office toilets. The daily domestic water consumption is 8.1 m³ (each the daily maximum water consumption), in this way, 407 m³ of water can be completely recycled once in 59 days. In this way, it can be seen that the storage water time is too long, and the pool wall and the top of the pool are prone to breed a lot of bacteria. 35 standards, the use of liquid chlorine in the pipe network for disinfection, but because the water storage time is too long, the liquid chlorine volatilizes, no sterilization effect, so the microorganisms in the water can easily breed new harmful bacteria, so the quality of the backwater is not Sanitation standards for drinking water (usually fire-fighting and living pools) make people's bodies directly polluted, which affects their health.

3. Solutions

In order to solve the above problems, in the building design work, the fire water consumption was calculated as one fire. It is necessary for building groups within the fire protection radius to share fire storage tanks and fire pressurization equipment. This reduces the difference between fire water and domestic water and shortened the time for new water circulation in the pool, which not only ensures water quality but also saves a lot of money (investment in pressurized equipment, investment in water storage equipment, and investment in electrical control equipment). For example, three high-rise buildings in X city occupy a small area and a high number of floors, with a total area of 100 m, as shown in Figure 1.
Each building was provided with an independent fire storage tank and fire water pressurization equipment, which not only occupied the ground surface area and space, increased a large amount of personnel and material expenditure management and consumption, and invested a large amount of money to maintain normal operation. Domestic water (combined use) caused long-term savings, and it was easy to cause secondary pollution that was not conducive to drinking water quality. In this way, if three buildings used a set of fire protection facilities, it would save a lot of investment and reduce water cycle time, as shown in Figure 2.

In this way, direct investment in equipment could save two-thirds, and indirect investment such as land, housing, facilities, water resources, etc. could save two-thirds. Therefore, it could be seen that it is scientific and reasonable to design and build a building (group) for use in this way, and saved a lot of money. Of course, such a design would have economic accounting problems for each unit. However, scientific calculation methods such as water meters and electricity meters could be used. However, to truly solve these problems of the above-mentioned building groups, the close cooperation of relevant functions and supervision departments is required. Some policies or regulations restrict the strengthening of resource management and conservation.
4. Summary
(1) According to the fire protection technical requirements for high-rise civil buildings, the fire protection pool is within the protection radius, and multiple buildings can share a fire protection pool. The fire supervision department can make reasonable opinions on the design of fire protection water according to the fire protection requirements, Supervise its implementation process and actively coordinate relevant government departments to do a good job in supervision of construction projects.
(2) In the overall design and planning of urban buildings, the urban construction department shall first consider the design of water fire protection for a certain building in the process of approving building groups in accordance with the "Urban Planning Law of the People's Republic of China".
(3) In the implementation of urban planning, all functional departments of the government should also cooperate closely and perform their duties, especially the departments of urban construction, water supply, power supply, municipal administration, etc., must perform coordination in strict accordance with the safety layout of the city.

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