Research on Water Supply Reconstruction Design of Fire Pool

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Abstract: With the continuous promotion of secondary water supply in urban high-rise buildings, the corresponding difficulty of water supply management is also increasing. In order to facilitate water supply management, enable users to use tap water that meets the requirements of the national standard, and improve the living standards of urban residents, this paper analyzes the design of the secondary water supply reconstruction, and puts forward corresponding suggestions for its design, aiming to further improve the secondary water supply. Renovation lays the foundation.

1. Introduction

Secondary water supply is mainly in the form of water supply to households in the form of pipelines after individuals or communities have stored and pressurized the urban water supply after treatment. Under the background of national urbanization development, the real estate industry is rapidly emerging, and the secondary water supply of relevant high-rise floors is also further promoted and applied. With the development of "green economy", people's awareness of environmental protection has been further improved, and people have put forward new requirements for the quality of water resources. It is necessary to strengthen the transformation of secondary water supply, so as to ensure that users' water use meets the requirements of relevant documents of national standards, and explore a good solution for municipal water supply. plan.

2. The status quo of secondary water supply in buildings

2.1 Buildings and structures pollute water quality

(1) Unreasonable laying of the water pipe network leads to secondary pollution of water quality. The water supply pipes and sewage pipes of some buildings are in the same groove, and the location is too close. Once the drainage pipe leaks and the equipment supplies water regularly, the water pump will be shut down, and the pipeline will form a siphon phenomenon. Bacteria breed.

(2) The outlet pipes of some secondary water supply pools are unreasonably set, which may easily lead to deterioration of water quality. Some of the outlet pipes are too high, the water below the outlet pipes is stagnant water, and there are many sediments in the water. Long-term use will cause sediment and stagnant water to enter the pipes, enter the water supply system, and pollute the water quality.

(3) In the secondary water supply equipment, the construction of the pool is not standardized and implemented. Some pool inlet and outlet pipes are located on the same side, and the water flow forms a short circuit in the pool, which will inevitably lead to the formation of stagnant water in some water, and the water quality is polluted to varying degrees.

2.2 Lack of management leads to increased water pollution

Most of the secondary water supply equipment is in charge of the construction party and the housing management department. The lack of maintenance funds for the secondary water supply system causes the water tank and water pump to be unmaintained for a long time, and the rust and screw loosening are serious, which will cause external bacteria to enter the pipeline. Some secondary water supply pump houses are not specially supervised or locked. Once the water inlet valve is abnormal, the maintenance cannot be notified in time, which will lead to water leakage in the pump house and a large amount of sewage into the system, resulting in water pollution. In some pump rooms, the ventilation holes of the pool are closed, resulting in abnormal ventilation of the water in the pool and deterioration of the water quality. There are also some ventilation holes without insect nets, which will cause flying insects to enter the pool and cause secondary pollution to the pool water. And most of the secondary water supply equipment is not equipped with corresponding disinfection devices. Once polluted, the water quality will continue to decline.

3. Analysis of the design of secondary water supply reconstruction

Take a city's secondary water supply reconstruction design scheme as an example for analysis. This scheme needs to consider the continuity of residents' normal water use, and implement the reconstruction without affecting

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the residents' water use. Combined with the site conditions, consider drilling through walls, foundation bearing capacity, Equipment installation control, water quality control, investment and other requirements, and research and analysis of water pressure, water quality and other issues in advance, and ultimately ensure the feasibility of the design.

3.1 Method design and system partition analysis

The secondary water supply transformation is not only to cancel the "water tank", but to supply the water supply in the newly built community by means of pipe network stacking, pool with frequency conversion pressure, pool with power frequency pressure, and high-level water tank water supply. The system has two partition modes: equipment and decompression. The urban district water supply system of the case is shown in Table 1.

Table 1 System settings of each receiving cell

Type	Number of cells/piece	Number of users/household System type	System type, equipment quantity/set		
			No negative pressure water supply facilities	pool coordination	Frequency conversion power frequency with water tank
Under construction	250	89201	134	110	9
Under construction	89	49653	35	128	8
New	33	12681	20	18	1
Total	68	153964	200	180	12

It can be seen from Table 1 that some of the renovated communities are affected by their own system settings, and the renovation space is limited. Reasonable selection of water supply methods and system partitions directly affects the renovation effect. Retrofit should follow:

(1) The pressure of the municipal pipe network is determined by me and the water volume is surplus. The water tank can be cancelled and the pipe network is superimposed for water supply.

(2) For buildings with floors > 25, priority should be given to adopting pools with frequency conversion pressure, pools with power frequency pressure, and high-level water tanks for water supply.

(3) It is recommended to implement equipment partitioning. If this cannot be achieved, riser decompression partitioning can be adopted.

3.2 Water usage quota and household water pressure

The water quota is obtained by applying the experience value. The daily water quota for residential buildings in the case area is designed at 200L/(person·day). The water pressure entering the house must comply with local regulations, taking into account the user's water habits.

(1) During the renovation, due to the use of pressure reducing valves, some equipment cannot be used normally in the community, which may lead to insufficient water pressure for some users. The pressure reducing valve used is a piston type pressure reducing valve. The pressure reducing valve of the working device is supported by Bernoulli's energy conservation formula. Considering the flow continuity equation, set the flow velocity at both ends of the inlet and outlet valves (v1=v2), we get: (wherein , P1, P2 are the inlet and outlet pressure, hf is the local head loss)

When the water equipment behind the pressure reducing valve increases, hf also increases, and the corresponding P2 decreases. In the system partition design, the riser pipe should be decompressed first, and then the branch pipe should be decompressed, and the proportional pressure relief valve should be used to adjust the inlet pressure in the high floor area to ensure the stability of water consumption for users.

(2) The energy consumption of the pump and valve is sacrificed in the transformation of some communities to ensure the increase of water pressure. However, in this way, the entry pressure will exceed the critical value, and the water pressure will be lowered in time after the renovation. Excessive pressure changes before and after can easily cause user dissatisfaction. Therefore, when taking the water pressure value at the unfavorable point, it is necessary to analyze the water supply pressure of the pump valve and the current inlet pressure of the water supply to minimize the degree of pressure change. Some communities do not have a direct supply area, but after the renovation, a direct supply area is added to improve water quality and reduce energy consumption. When setting up a direct supply area, a pressurized area should also be set up, and relevant backup equipment should be reserved to fully control the hidden dangers within the allowable range.

3.3 Optimization of water tank control

The traditional water tank cooperates with the frequency conversion pressurized water supply, which requires an actual large-capacity water tank, and cannot be effectively separated, resulting in the water standing for a long time and the water quality being deteriorated. And high-rise residential water tanks are difficult to clean, and a large amount of water is wasted once cleaning. At the same time, the linkage positions of the high-level water tank and the water pump are both vulnerable positions. If an abnormality occurs, it will pollute the water quality inside the water tank and even cause damage to other public facilities. To optimize and transform it, the following measures can be taken:

(1) Control the volume of the water tank to be more than 80m3, and set up two independent water tanks, and the two water tanks are connected in parallel to ensure the continuity of water supply.

(2) For the low water level pool, an electric butterfly valve should be installed, which is linked with the liquid level control device. The high-level water tank is controlled by both the liquid level controller and the float valve.

(3) The water inlet pipe of the pump house is installed with a sewage pipe >DN50, which is connected to the sewage well. The optimization measures of the water tank are shown in Figure 1.

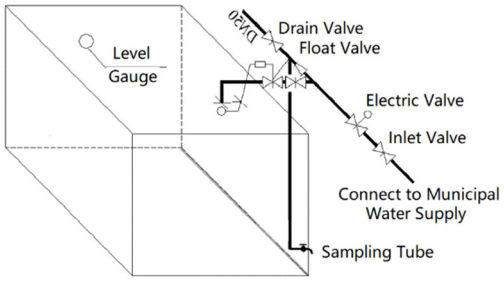

Figure 1 Display of tank optimization control

3.4 Design of fire water supply system

The set fire water system shall be separated from the normal life user system. However, in the process of water supply transformation, it is difficult to completely separate the two, so the following methods are adopted for transformation.

On the one hand, for the transformation of residential areas where living and fire fighting systems are mixed, the original pump room can be used as a fire pump room, and the original metering meter can be set as the corresponding fire fighting meter. Other areas are fully constructed.

On the other hand, in some residential areas with higher floors, the water supply method is mostly the water supply of the roof water tank, and the roof fire water tank is supported by the pressure of the living pump room. For the secondary water supply renovation design of this type of community, a modern diversion blocker can be installed in front of the water inlet pipe of the fire water tank, and a meter can be set.

When implementing the renovation, the community management department should pay attention to the following key points: First, set up a fire meter, and observe the readings on the meter in time.

Through readings, you can find out if the fire protection system is leaking, and avoid water bill disputes caused by residents.

Secondly, a resistance-type diversion blocker should be installed, and it should be installed on the roof to facilitate drainage, so as to prevent the sewage and fire water from entering the user's domestic water system after the drain valve leaks.

Finally, when calculating the pump head, the normalized water head loss after the installation of the diversion blocker should be considered. Generally, the loss can reach the range of 3 to 5 m. This range should be taken into account to ensure the normal water intake of the fire water tank and ensure the absolute safety of residents' lives. Safety.

3.5 "Moving the meter out of the household" design

The overall secondary water supply renovation design insists on one meter for one household. However, it can be designed to "move the meter out of the household" to facilitate water supply management and reduce the inconvenience caused by maintenance and maintenance to users. However, "relocating the meter out of the house" is the key and difficult point of the renovation design. A little carelessness will cause the "relocation of the meter out of the house" to become a social "hot spot", which also restricts the orderly development of the secondary water supply renovation work. "Moving the meter out of the house" needs to transfer the construction work indoors, which may involve drilling, pipe laying, road modification, etc. It needs to be well coordinated with the users. Some users may not approve the renovation work, so the "removing the meter out of the house" cannot follow the steps. implement. In order to ensure the effective implementation of the secondary water supply, the following scheme is designed: maintain the parallel operation mode of the two systems, install it in the indoor open pipe, respect the user's wishes, and the user can choose a certain design content. Using this method, the pilot analysis of several communities in the case area found that the transformation rate reached 100%, and the implementation effect was satisfactory. The main measures are:

(1) Contact the residents of the community to understand their views on the reconstruction of the secondary water supply, and invite users to participate in the discussion on the reconstruction of the pipeline.

(2) According to the interior decoration situation of different users, set up personalized transformation plans.

(3) Make a model project first, publicize the specific implementation plan, pay attention to the publicity of the renovation design, and plan to carry out the renovation construction.

4. Conclusion

The transformation of secondary water supply is a necessary measure to adapt to the urbanization development in the new era, and its core lies in the implementation of the community transformation policy and funds. The transformation plan prepared in this paper meets the requirements of the existing technical specifications, and takes into account the conditions of each community, the water supply and the later management take into account the needs of users. After the renovation design was adopted in the case area, the renovation work was completed smoothly, the water quality of users was greatly improved after the renovation, and the problems of incomplete completion materials in some old residential areas were solved by visiting, consulting materials, and inquiring. In the future secondary water supply reconstruction work, it is necessary to further optimize the technical parameters and design contents, give full play to the maximum value of the reconstruction, and truly seek a happier life for the people.

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