

Analysis of HDPE Pipe Construction Process in Municipal Water Supply and Drainage Construction

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Abstract: The construction of water supply and drainage pipelines is a very important part of municipal construction. The construction of HDPE pipe has been widely used in the construction field of water supply and drainage pipelines due to its many advantages. Therefore, the construction process of HDPE pipe has also been studied more and more in the construction of municipal water supply and drainage, which is of great significance for the application of HDPE in municipal water supply and drainage construction. This paper analyzes the HDPE pipe construction process of municipal water supply and drainage construction workers, and hopes to help the good application of HDPE pipe and the improvement of municipal water supply and drainage construction quality.

Keywords: Municipal water supply and drainage construction, HDPE pipe, Construction technology

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1 Introduction

In the continuous development of China's current social economy, the infrastructure construction has gradually improved. Because the construction of municipal water supply and drainage is closely related to the lives of people in the society, people also have high requirements for municipal water supply and drainage construction. Based on this situation, the importance of HDPE pipe application in municipal water supply and drainage construction is becoming more and more obvious. The material used in HDPE pipe is resin material, good in thermoplasticity, and has the advantages of non-polarity and high-strength

crystallization. Therefore, it can be used in engineering construction to achieve good waterproof performance, insulation performance and corrosion resistance performance.

2 Analysis of performance characteristics of HDPE pipe

Because HDPE pipe is made of resin material, HDPE has many superior properties. First of all, HDPE pipe has strong pressure resistance. This is a prominent performance of HDPE pipe. In the field of water supply and drainage, the good compressive performance of HDPE plays a key role in ensuring the quality of the project. Because the social and economic development is very rapid, the pressure on the municipal water supply and drainage pipelines under the influence of many factors such as gravity and the environment is also increasing. Therefore, only the pipeline has good compression resistance, which can meet the requirements of today's municipal water supply and drainage projects^[1]. The second is good chemical stability. Compared with other pipes, HDPE pipes have stronger chemical stability, and the erosion of soil will not seriously affect them. For municipal water supply and drainage projects, construction and material selection have a critical impact on the quality of the project. Therefore, the selection and application of HDPE pipes can further extend the pipeline usage time, and meets the requirements for pipeline quality for municipal water supply and drainage projects are very high. The third is the appropriate degree of curvature. Because many other pipes have strong rigidity, once the foundation is unevenly distributed, it will lead to pipe leakage and other phenomena^[2]. The HDPE pipe is a kind of flexible pipe. When the foundation is unevenly settled, the pipe will avoid the leakage problem by

virtue of its proper curvature, so that the effectiveness of the municipal water supply and drainage project can

be guaranteed^[3]. The following is an analysis of the performance of HDPE pipes and their causes:

Table 1. Performance characteristics and causes of HDPE pipes

Performance	The reason
Strong pressure resistance	Mainly because the interior of the HDPE pipe has a relatively smooth structure, the exterior is also designed as a ring-shaped corrugated pipe.
Good chemical stability	Mainly because HDPE is a high-density polyethylene, which is a very stable chemical molecule, which is not easy to corrode in acidic soil or alkaline soil.
Appropriate curvature	Mainly due to the flexible material used in HDPE, it can be bent moderately.

3 The connection mode of HDPE tube

Because HDPE pipes have a variety of interface forms, the most important ones are fused connection form, hot-melt connection form and socket-type flexible connection form^[4]. Therefore, in the process

of municipal water supply and drainage construction, the reasonable connection method must be selected according to the actual situation of the construction site and the required standards. The following is an introduction to these three main connections:

Table 2. Introduction to the connection mode of HDPE pipes

Connection method	Specific contents
Electrofusion connection	The special capacitor tube in the form of a buried resistance wire is tightly connected and energized by the connection portion of the tube, and the connected portion is heated by the embedded resistance wire, and the connected portions are fused together until the joint position is cooled. This type of connection is suitable for connection of different types of HDPE pipe connections, HDPE pipe connections with different solution flow rates, and connection of socket fittings. Mainly divided into electrofusion socket connection and fused saddle connection.
Hot-melt connection	It is a special connecting tool. Under the action of pressure, the HDPE pipe or pipe joint is heated to melt, and then the heating tool is removed. By applying pressure, the two molten faces are connected. Keep it under stable conditions for a while until the connection at the joint cools. Mainly divided into hot melt butt joints, hot melt saddle connections and hot melt socket connections.
Socket-flexible connection	As a reference, the principle of flexible connection of cast iron and PVC pipe is welded. A reinforced polyethylene socket is welded to one end of the HDPE pipe, and then one end of the HDPE pipe is inserted into the socket, and the socket will be locking, ring pressing and pulling the rubber sealing ring. The rubber sealing ring is pressed and sealed so as to achieve a good connection of the pipe.

4 The application of HDPE pipe in municipal water supply and drainage construction

4.1 Excavation construction of the trench

The trench excavation construction is an indispensable step in the construction of municipal water supply and drainage. During the construction, the foundation pit must be controlled within a certain standard range, and the geological conditions in the construction area. These environmental conditions such as temperature conditions are effectively combined^[5]. On this basis, the base of the groove can be reasonably determined. At the same time, the construction structure may not be over-excavated or under-excavated. Once such a situation occurs, it should be rectified in time; otherwise it will have a serious adverse impact on the overall quality and progress of the project. During the construction

process, the soil layer cleaning work should be carefully carried out, and the height of the construction soil layer should reach a certain standard as the basis for the work. Normally, the standard value of the height of the construction soil is 25 cm. In addition, during the excavation of the soil layer, there are usually sliding objects such as gravel, brick and stone. Therefore, these sliding objects should be removed first, and then coarse sand and medium sand should be used for laying and compacting. If there is a partial over-excavation situation, the construction should be stopped immediately, and then the sand and medium sand should be applied in time to backfill^[6].

4.2 The basis of the pipeline

In the construction of municipal water supply and drainage projects, good pipeline foundation construction can effectively guarantee the construction quality of

HDPE pipes. Specifically, in the construction process of pipelines, the design standards must be strictly observed. In the process of construction of a general soil area, the thickness of the sand layer can be 10 cm, but in the process of construction of the soft soil foundation, it is necessary to first lay a thickness of about 15 cm in the base. The diameter of the gravel should be controlled between 5 mm and 40 mm, and then a certain thickness of the cushion layer is laid on the gravel layer. The thickness of the cushion layer should be controlled at about 5 cm^[7]. Therefore, in the process of laying the cushion layer, there is no fixed thickness standard, and the specific situation should be determined according to the actual conditions of the construction area. In the process of constructing the interface position of the pipeline, a concave groove should be reserved, the width should be between 40 cm and 60 cm, and the depth should be between 5 cm and 10 cm, which are more conducive to the later pipeline. The construction was carried out smoothly. In the construction of the concave groove, the relevant parameters must be strictly calculated according to the diameter of the pipe. In the actual working process, it is generally calculated according to the pipe diameter of 1.1 times, and the result

can be used as the groove parameter^[8].

4.3 Laying of pipelines

In the process of pipe laying construction, there are mainly two ways of lower pipe selection, the first is the mechanical lower pipe, and the second is the artificial lower pipe. When applying the artificial down pipe for construction, the personnel passing the pipe through the ground should be transferred to the bottom personnel according to the standard process, and the rolling method should not be used for transmission. After the pipeline is laid, it should also be done. When constructing the connection between the pipeline and the inspection well, the interface between the well and the pipe is sealed according to the cement slurry of 1:2:5 ratio, so that the inner wall and the nozzle of the inspection well are in a flush state^[9]. In the final part of the pipeline laying operation, the effect of laying should be carefully checked by pressure test and water avoidance test.

At the same time, in the process of laying the pipeline, in order to ensure the quality of the construction and the HDPE pipeline is not damaged, the following two aspects should be noted:

Table 3. Two issues that should be noted during the laying of HDPE pipes

Problems that should be noted	Content
Pipe handling problem	For semi-circular pipes, care must be taken to handle the HDPE.
Pipeline construction problem	When carrying out construction work, it must be operated in accordance with the construction plan standards.

4.4 Backfilling of trenches

After the pipe laying work is completed, the backfilling operation should be started. In the construction of this link, construction should begin at the joint of the bottom of the pipe and the foundation, and then the symmetrical backfilling work should be carried out along both sides of the pipe^[10]. The height of the backfill should be controlled between 15 cm and 20 cm. With 70 cm as the dividing line, when the top of the pipe exceeds the dividing line, mechanical construction should be applied^[11]. In the process of mechanical construction, it should be backfilled symmetrically through both sides of the pipeline, and then mechanical equipment is used for rolling.

5 Conclusion

In summary, in the construction process of municipal water supply and drainage projects, the rational

application of HDPE technology can not only significantly improve the construction quality, but also effectively improve the construction level of HDPE pipelines. However, due to the complicated construction process of the HDPE pipeline, in the specific construction process, the relevant staff should be familiar with the characteristics of the pipeline and clarify the connection mode of the pipeline so that the pipeline can be correctly determined according to the characteristics of the project and the actual connection situation. At the same time, in the process of laying HDPE pipes, attention should be paid to the protection of pipes, and the pipes should be laid in strict accordance with the standard process of construction. After the completion of the laying, backfilling work should be done. In this way, the construction process of the HDPE pipeline can be reasonably applied in the construction of the municipal water supply and drainage project, and the quality of the municipal water supply

and drainage project can be further improved, so that the demand for water supply and drainage in the society today is well satisfied. This will play a very positive role in promoting the progress of China's society and the development of the economy.

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