Discussion on grouting construction method and technology in civil engineering

Peng Wang¹, 2, 3, 4, *, Yan Li¹, 2, 3, 4
¹Shaanxi Provincial Land Engineering Construction Group Co., Ltd
²Institute of Land Engineering and Technology, Shaanxi Provincial Land Engineering Construction Group Co., Ltd
³Key Laboratory of Degraded and Unused Land Consolidation Engineering, the Ministry of Natural Resources
⁴Shaanxi Provincial Land Consolidation Engineering Technology Research Center

*Corresponding author: wangpeng2021@shanxidichan.com

Abstract. With the rapid economic development in recent years, the development of civil engineering has become more and more rapid. Therefore, in order to ensure the quality of civil engineering construction, it is necessary to reasonably modify and upgrade the grouting construction method of civil engineering construction. By improving the grouting construction method, the quality of civil engineering can be guaranteed as much as possible. Therefore, this article mainly analyses and discusses the application of grouting technology in civil engineering construction. Through the analysis of the importance of grouting technology in civil engineering construction, we can further enhance the construction unit's attention to grouting technology and promote the effective development of grouting construction technology in civil engineering.

Keywords: Civil Engineering, Grouting construction, Grouting method.

1. Introduction
With the current rapid development of science and technology, the development of civil engineering has become more and more perfect. Therefore, in the process of civil engineering development, in order to ensure that its construction technology is in line with the trend of the development of the times, grouting technology needs to be modified and upgraded reasonably, and the quality of civil engineering construction can be further ensured by introducing modern technical means. In order to strengthen the attention of relevant units to the grouting technology of civil engineering construction, this article mainly analyzes the construction method of grouting technology. Through the effective analysis of grouting technology, it is also helpful to promote the grouting technology of civil construction engineering.

2. Introduction of grouting technology construction method

2.1. Theory of grouting technology
Simply put, the grouting technology is to inject the slurry configured in a certain proportion into the soil layer of the building, so that the space of the building soil layer is tighter due to the adhesion of the

---

Content from this work may be used under the terms of the Creative Commons Attribution 3.0 licence. Any further distribution of this work must maintain attribution to the author(s) and the title of the work, journal citation and DOI. Published under licence by IOP Publishing Ltd
slurry, so as to achieve a denser building and reduce civil construction diseases. With the development of technology, there are mainly two common grouting technologies: high-pressure jet grouting and split grouting. High-pressure jet grouting is the use of high-pressure water jets to inject grout into the building soil to improve the stability and compactness of the building soil; the split grouting method uses relevant professional equipment to realize the automatic flow of grout and fill the building cracks. Improve building deformation and increase stability. The grouting technology will not cause harm to other building parts during the implementation process, the impact range is small, and the implementation is strong.

2.2. Selection of grouting material
As far as current construction is concerned, the commonly used grouting materials include cement, organic polymer materials, cement-water glass, etc. Among them, cement is the most stable because cement has better adhesion and can form a stable cement. The performance of high molecular polymers is also relatively good. As a grouting material, it must have the following characteristics: aging resistance, high strength, good filling, strong adhesion, permeability and good mechanical properties. Only by achieving these characteristics can the grouting construction effect be achieved.

3. Application of Grouting Technology in Building Construction

3.1. Application of grouting technology in kitchen and bathroom
The kitchen and bathroom are the most prone to problems such as cracks and leakage in civil buildings, because the kitchen and bathroom require a lot of water and it is easy to corrode the concrete, which leads to problems. Water erodes the waterproof layer of the wall for a long time, causing the waterproof layer to fail, causing problems of penetration and cracks. The construction personnel can use epoxy grouting to cut off the infiltrating sewer channel to avoid water loss from the cracks. When performing grouting technology in the kitchen and bathroom, first open a small groove with a hole diameter of 20cm~30cm in the joint of the brick, then use epoxy mortar for inlay, and inject the epoxy mortar for enrichment. In order to achieve the best fullness, more Repeat grouting times. The grouting method is simple and easy to implement, and the grouting liquid can be selected in the same color as the original cement to improve the ornamental performance. After the grouting is completed, the waterproof glue is applied, which is convenient and fast, saves costs, and has an obvious grouting effect.

3.2. Application of wall grouting construction technology
In the process of civil construction, non-standard construction is the main cause of wall diseases, which can easily lead to problems such as wall cracks and roof floor cracks. Generally speaking, the cracks and deformations of walls and floors are caused by uneven temperature. For the deformation and expansion of the floor slab, it is difficult for conventional materials to deal with the expansion floor slab better. Therefore, the construction requirements of the grouting technology for the crack deformation of the wall and the floor are higher, and the grouting material must have higher adhesion. During construction, firstly drill holes for the diseased parts, then arrange the pipes, and finally carry out grouting. The grout here is preferably cement grout. After the grouting is completed, the sealing treatment is carried out to control the drying shrinkage caused by the grout. In addition, for the leaking wall, the constructor must not only find the leaking wall, but also punch and grouting at multiple parts of the wall. To improve the wall density and the anti-leakage ability of the wall, it is necessary to ensure that the grouting pressure is 0.5MPa~0.8MPa to ensure the grouting effect.

4. The role of grouting technology in civil engineering
In the development process of civil engineering construction, grouting technology plays a very important role. The grouting technology mainly uses pressure to inject a relatively loose soil layer into the gel slurry. Therefore, apply the relevant after the slurry solidifies The scheme stabilized the crack. Therefore, the role of grouting technology in civil engineering construction has become more and more
important, and with the economic development in recent years, there are more and more buildings in
cities. In order to ensure the quality of urban buildings, it is necessary to apply grouting technology to
further solve the problems of cracks in the walls, basements, etc. in civil engineering buildings. A
reasonable grouting plan can be selected according to the different building locations. Further ensure
the quality of civil engineering construction.

Under normal circumstances, the application of grouting technology in civil engineering can improve
the stability of construction projects as much as possible, and the development of grouting technology
has a long history. Therefore, in the application process of grouting technology, reasonable grouting
technology should also be selected according to the different characteristics of the construction project.
In order to ensure the quality of grouting technology, foreign advanced methods can also be introduced
to promote the development of grouting technology.

5. The scope of application of grouting technology in civil engineering
The application of grouting technology plays a very important role in the problems in soil and civil
engineering construction, and in the process of social development in recent years, the scope of
application of grouting technology has become larger and larger, even involving rock Multiple fields of
civil and civil engineering. Therefore, in construction projects, in order to ensure the quality of civil
construction projects, grouting technology can be introduced to further ensure the stability of the
foundation, and the effective development of the building can be promoted by strengthening the
foundation.

The application of grouting technology is not only limited to the properties of the grouting material,
but also depends on the technology and method of the grouting technology. Therefore, in the selection
process of the grouting method, a reasonable grouting technology should be selected according to the
characteristics of the construction project. Grouting method. In the grouting process, the selection of
grouting equipment should also be based on the needs of strong mines to select appropriate equipment
for application. In fact, during the grouting process, the influence of the surrounding environment should
be considered and the surroundings should be reduced as much as possible. The environment has an
impact on the grouting process. At the same time, during the grouting process, the grouting personnel
should perform effective grouting according to a reasonable method, once to ensure the effective
function of the grouting technology.

6. Construction method and technology of grouting in civil engineering
With the rapid development of civil engineering construction in these years, the application of grouting
technology has become more and more frequent. Therefore, in order to promote the effective application
of grouting technology in civil engineering, it is necessary to improve the grouting construction
technology in civil engineering Methods for effective exploration.

6.1. Penetration grouting
In the construction process of some civil engineering, because the geology is relatively fixed, in order
to ensure the effective progress of the grouting technology, the grouting effect can be further achieved
by the direct filling method. Therefore, the penetration grouting method needs to be applied in this
process. The application of the infiltration grouting method can effectively grout in the sandy soil. At
the same time, in the application process of the infiltration grouting method, it can also inject under the
action of the grouting pressure without changing the ground environment and reasonable arrangement
of the construction project. It will also be infused into the phoenix through the action of pressure, so as
to form a permeable grouting method deep in the formation. It can be seen that the greater the pressure,
the greater the amount of grouting.

6.2. Compaction grouting
Under normal circumstances, the compaction grouting method is suitable for sites with a lot of clay.
Under normal circumstances, higher pressure can be applied to inject the injection into the
corresponding areas. At the same time, the increase of grouting pressure during the grouting process will also ensure the orderly progress of grouting. During the grouting process, it is necessary to ensure that there is enough space around the grouting. At the same time, the grout will be locally uplifted due to the local conditions of the terrain during the pressure process. Therefore, in the face of this situation, local corrections can be adopted. To further ensure the flatness of ground buildings. In the process of filling and grouting, cement slurry can be used to further ensure the effective progress of grouting, and the uniformity of grouting can be promoted as much as possible by reducing water consumption. The compaction grouting method is suitable for application under viscous geological conditions, so in the actual application process, a reasonable grouting method should be selected according to the different geological conditions.

6.3. Split grouting
The split grouting method is suitable for the finer rock and soil layers. Therefore, the split grouting method can be used for effective grouting in the fine silt salt layer, and at the same time in the low permeability stratum, it can be applied Higher grouting pressure is used to ensure the orderly grouting as much as possible. For the stratum encountered during grouting, the tensile strength can be further reduced by applying hydraulic fracturing to further reduce the damage to the rock, soil and upper body structure, and ensure that there are sufficient gaps in the stratum for effective grouting. In the application of split grouting, greater pressure should also be used to further ensure. The effective permeability of formation grouting is constantly overcoming the formation. Under high pressure, the water in the formation will form a huge pressure. This situation is also conducive to the effective application of grouting methods. At the same time, during the grouting process, if there are cracks on the surface of the formation, you can apply the pe column Ways to expand the scale of the cracks to promote the effective grouting.

7. Measures to improve the technical level of grouting construction methods in civil engineering

7.1. Reasonable choice of grouting material
Before the grouting construction of civil engineering projects, it is necessary to comprehensively analyze the actual situation of the construction site, and according to the existing construction standards, the reasonable selection of grouting materials is required. Under normal circumstances, the choice of the main material is mainly the application of cement. According to the actual situation of the implementation, appropriate organic polymer auxiliary materials can be added to the material. From the analysis of the use of cement materials, the main consideration is its own stability characteristics. According to the area that needs to be constructed, the grouting materials are proportionally distributed, and then they are stirred. The stirring speed should be moderate until Stir it into a gel and place it so that it is in a solidified state to gradually form a gel. If organic polymer auxiliary materials are added to the material, the main operation purpose is to improve the abrasion resistance and aging resistance of the cement, to ensure that the solidification strength of the cement continues to increase after the construction is completed, and to ensure the stability of the building. In addition, before the grouting material is solidified, it is necessary to ensure that the material has good permeability and can completely penetrate into the cracks in the wall cement, so that the wall cracks can be reasonably repaired.

7.2. Correct use of grouting construction technology
The grouting construction technology is one of the important construction technologies in the civil construction project technology. Generally, the high-pressure jet grouting method and the split grouting method are mainly used. The application of the two construction technologies needs to be combined with the actual situation. , Comprehensive analysis of various influencing factors, adopt reasonable construction techniques to avoid adverse effects on civil engineering projects. However, the two construction techniques have the same characteristics, that is, they can reasonably solve the related
problems of civil engineering, let alone cause damage to the civil engineering project. Based on this, we conducted a detailed analysis of the two construction techniques.

First, it is the selection and analysis of high-pressure jet grouting method. The high-pressure jet grouting method mainly uses drilling rigs and high-pressure water jets to spray the grouting liquid into the cracks of the wall in the most direct way. It cannot only effectively improve the deformation of the wall cracks, but also make the injection the grout is directly poured into the cracks in the wall to enhance the stability of the cracks in the wall. In the actual construction process, the methods of single-tube, double-tube, multi-tube high-pressure grouting and jetting are generally selected, mainly to comprehensively analyze the grouting technology and the actual situation of the construction project, taking into account various influencing factors, the most It is suitable to choose silt soil, gravel, artificial filling, etc. During the implementation process, professional requirements are put forward to related staff. Before implementation, it is necessary to conduct a detailed survey of the actual situation of the construction project, accurately record the relevant information and data involved, provide a scientific basis for the subsequent analysis process, and effectively judge the rationality of the high-pressure jet grouting method selection. In the field survey of the engineering project, if it is found that the soil contains rocks, plant rhizomes, and the speed of groundwater is relatively fast, the use of high-pressure jet grouting methods cannot be considered singularly, which will cause a certain amount of solidification of the grouting liquid. Therefore, other treatment methods and measures need to be selected according to the actual situation.

Secondly, it is the analysis of split grouting method. The split grouting method requires the use of special construction equipment in the construction process of the project to ensure the fluidity of the grouting liquid, which can be combined with the cracks of the civil engineering construction to fill, and ensure the overall qualitativeness of the civil engineering project. For the implementation of split grouting method, the main consideration is the selection and application of special equipment and tools. Taking into account the limitations of the scope of application, in general, split grouting method will be used for cracks and penetrations inside buildings. In addition, in the implementation process, it will not affect other construction work. However, in the implementation process, the integrity of the building must be considered. There are strict requirements on the drilling depth, pile bottom pressure, and drilling verticality. Once the comprehensive consideration of factors is ignored, the implementation process is not standardized. Then it will aggravate the form of building leakage, especially the problem of aging water pipes. Once a factor does not meet the construction standards, it will cause kitchen and bathroom leakage problems, which will have a serious impact on the overall safety of the building. Therefore, it is still necessary to consider the actual situation and choose suitable implementation methods and technologies to ensure the stable development of civil engineering projects.

8. Conclusions
With the rapid development of society in recent years, the development of grouting technology in my country has become more and more rapid. The application of grouting technology can ensure the quality of construction projects as much as possible. Therefore, in the process of construction engineering, the effective development of construction engineering can be further promoted by improving the grouting technology of civil engineering construction. In order to ensure that the grouting technology can fully play its role, the effective application of grouting technology can be further promoted by the effective discussion of the scope of application of grouting technology in civil engineering. Secondly, a reasonable analysis of specific grouting technology can be carried out to recommend the development of grouting technology to ensure the quality of civil engineering. Able to combine the actual situation of the construction project, comprehensively analyze the various influencing factors, correctly choose the treatment method, adopt the grouting construction method and technology, effectively solve the leakage problem of the construction project, strengthen the reasonable choice of building materials, each construction stage has clear requirements to ensure the standardization of construction projects, thereby improving the quality of construction projects.
References

[1] Weng Qiuping. Analysis on the Application of Grouting Construction Method and Technology in Construction Engineering [J]. Jiangxi Building Materials, 2018, (3). 49, 51.

[2] Huang Bin. Analysis of key points of grouting construction technology in civil engineering [J]. Technology Wind, 2018, (3). 109.

[3] Yi Fangbin. Practical application of grouting construction methods in civil engineering [J]. Urban Construction Theoretical Research (Electronic Edition), 2018, (5). 180.

[4] Wang Heyong, Sang Lin. The application and construction technology of grouting technology in civil engineering [J]. Urban Construction Theory Research (Electronic Edition), 2019 (09): 181.

[5] Liu Haiwei, Xu Deliang. Discussion on the construction method of grouting standard in civil engineering [J]. China Standardization, 2017 (20): 193 - 194.