

Analysis of Grouting Technology in Building Construction

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Abstract: The application of grouting technology in housing construction is to inject liquid grout into the cavities and cracks of housing construction. After it solidifies, the stability of housing construction can be improved. Grouting technology is not only very convenient but is also environmental-friendly, and it is relatively low-cost. Therefore, it is widely used in housing construction. In this paper, the types of grouting technology and its application advantages in housing construction are analyzed, and specific application strategies are put forward, in hopes of improving the quality of housing construction.

Keywords: Housing construction; Engineering construction; Grouting technology

Online publication: June 26, 2023

1. Introduction

In grouting technology, the grout is first prepared according to a certain proportion in advance, it is then injected into the cavities and cracks through pressure feeding. After some time, the grout will form a whole with the surrounding rock and soil layers, thus making the building more stable. Grouting technology is widely used in housing construction projects because it can not only ensure the quality of housing construction projects, but also improve the environmental protection and energy saving aspects of construction.

2. Types of grouting techniques

2.1. Jet grouting

High-pressure jet grouting technology is a grouting technology that combines chemical grouting and high-pressure waterjet cutting. After a hole is drilled with a drilling rig to the preset depth, high-pressure grouting fluid equipment and special nozzles are used to inject the grout into the desired area, which will cause certain damage to the surrounding soil. After curing, a grouting body will be formed in the area. The application of high-pressure grouting technology in housing construction can make the construction more stable and significantly improve the reinforcement effect of the project. Grouting technology is not only easy to operate and control, but also does not affect the structure of the upper building construction.

2.2. Static pressure grouting

In static pressure grouting, grout is injected into the cavity or crack using a grouting pipe through pressure difference or electrochemistry. After some time, air and water will be squeezed out from cracks or between particles, thereby forming a solidified substance and reducing pores. When the slurry solidifies, it will fill the entire crack or pore, making the previously loose granular soil stronger, thus improving the overall anti-

seepage performance of the soil structure.

2.3. Combined grouting technology

Combined grouting technology, as its name suggests, is a combination of jet grouting and static pressure grouting technology, which belongs to a grouting technology that is comprehensively applied sequentially. In housing construction, jet grouting can be used for the grouting of the pile body, and then static pressure grouting can be used to improve the grouting effect. Combined grouting is a new type of grouting technology, which not only has a wide range of applications, but also has a good reinforcement effect. This grouting technology can be applied to clay layers, silt layers, and gravel layers.

3. The main advantages of grouting technology in the construction of housing construction

In recent years, with the continuous development of science and technology, more research have been done on grouting technology. In order to adapt to the development of the overall housing construction industry, grouting technology has been able to progress and develop by leaps and bounds. As a result, grouting has been increasingly applied in housing construction, making the advantages of grouting technology more prominent. Firstly, grouting technology is easy to operate, because the equipment used is relatively simple, so it is easy for construction workers to complete the process correctly. Secondly, the effect of grouting is relatively ideal, because cracks or cavities can be filled through grouting, thus the building becomes firmer and more stable. Thirdly, grouting technology is comprehensive it can be applied in various housing construction projects. The grout can be used to fill the entire cavity or crack, and the grout will bond with the surrounding buildings. Lastly, grouting technology is environmentally friendly and energy-saving, because the materials used in grouting are usually synthesized from industrial waste that can be recycled, and this part of the material can also be recycled twice.

4. Effective strategies for applying grouting technology in building construction

4.1. Application of grouting technology in building wall structure

During the construction of housing projects, wall cracks often appear. In this case, grouting technology can be used to repair the cracks, and a suitable grouting method should be selected according to the specific conditions of the wall cracks. For example, when repairing cracks in the floor slab, it is necessary to select and use grouting materials with higher adhesion and shear strength according to the location of the cracks. If there is leakage in the wall, it is necessary to first determine the location of the leakage and then use cement slurry to repair the leakage by using the hole distribution method. When preparing the cement slurry, it is necessary to ensure that it has a certain fluidity and adhesiveness. If there are cracks in the door frame or window frame, a mixture of grouting materials should be used. The grout should be first injected around and on the top of the door or window frame, followed by the bottom position. In the process of grouting, it is necessary to prevent the loss of grout and minimize the possible adverse effects on the construction quality of the project due cement shrinkage.

4.2. Application of grouting technology in kitchen and bathroom construction of housing projects

The advantages of grouting technology in the kitchen and bathroom construction of housing projects are mainly reflected in the anti-seepage and waterproof properties. There are a lot of drainage pipes in the kitchen and bathroom of a building, so the chance of leakage is relatively high, which can easily cause the wall to be wet. Water seepage in the kitchen and bathroom is mainly due to the damage of the waterproof layer. Therefore, in the construction of kitchens and bathrooms, it is necessary to strengthen the anti-seepage treatment in advance. The anti-seepage effect can be achieved through the application of grouting technology. The construction personnel can first close the water pipe valve, and then dig the drainage

channel from the position adjacent to the ground and the bottom of the wall. The grouting material is mainly cement, and epoxy mortar is used to treat the drainage tank, and targeted grouting treatment can then be performed on the gaps to solve the problem of kitchen and bathroom leakage.

4.3. Application of grouting technology in the construction of foundations housing projects

Nowadays, the application of grouting technology is very extensive, and it can be applied in many construction projects, and its application effect in the construction of foundations in housing projects is very ideal. Grouting technology can not only be applied to soft soil foundations, but also other foundation structures, which can make the overall construction effect of more standardized and reduce construction quality problems of foundations in house construction. It is first necessary to use a drilling rig to drill a hole, and then tightly seal the hole to avoid mud outflow, and finally control the moisture of the grouting material to achieve the ideal effect.

4.4. Application of grouting technology in concrete structure of housing construction projects

When grouting technology is applied to the concrete structure of housing construction projects, the hole position needs to be designed according to the location of the defect, and the hole distance should be controlled within 300–400 mm, and the hole diameter needs to be between 0.6 and 1.2 mm^[1]. If the crack is in a wet state, you can use the grooving method for grouting; if it is a dry joint, holes are first created at about 25–45 mm from both ends of the crack, and then epoxy glue are applied to the seal to prevent the slurry from flowing out. Strong cement is required for pipe burying and groove sealing. If it is a wet joint, some water can be added to the material to increase the affinity of the material, avoid bonding during grouting, and ensure reinforcement at the same time. If it is a dry joint, material of lower viscosity can be used, and it is important to control the curing time, which is usually about 14 hours, so that not only can the cracks be fully filled, but also the bonding effect can be improved.

4.5. Application of grouting technology in basement construction of housing construction projects

For the construction of basements, the environment is generally relatively humid, and the ventilation is often relatively poor, so there is usually water seepage. In addition, the basement is a hollow structure, which will weaken the load capacity of the foundation^[2]. For this reason, during the construction of basements, the mechanical properties of the basement can be enhanced through the application of grouting technology. In the process of basement construction, it is necessary to strictly control the drilling depth to ensure that the drilling depth is within the thickness of the basement concrete structure, and the drilling angle must be controlled between 30° and 40°, and all exposed cracks should be cut simultaneously. It is important to control the pressure while grouting. A relatively low pressure is used for grouting in the initial construction stage, and the grouting pressure is gradually increased until the grouting process is completed. The environment in the basement is quite different from the above-ground environment, so the grout solidifies at a slower rate in basements. If there is still water seepage at 4 to 5 days after grouting is completed, then a second grouting process is required. Grouting is repeated until the water seepage problem is resolved.

5. Measures to control the quality of grouting in housing construction

5.1. Reasonable selection of grouting materials

The grouting materials that are often used in the grouting construction of housing construction are the chemical-type and granular-type grouting materials. In recent years, chemical grouting materials have been widely used, including epoxy resin slurry, polyurethane, and water glass^[3]. Chemical grouting materials are not only easily injected, but it also has a low viscosity. Granular grouting materials are mainly composed

of water, cement paste, and admixtures. Among them, the properties of cement materials are relatively stable. After sufficient mixing, a stable cemented body can be formed, so cement is widely used.

When choosing grouting materials for housing construction projects, it is also necessary to consider whether the materials will pose a threat to the health and personal safety of the occupants. At the same time, it is also necessary to ensure that the selected materials will not cause adverse effects on the nearby environment, so the materials selected need to be non-toxic ^[4]. In order to ensure the quality of grouting, the selected grouting materials must meet the following conditions: first, the material must have be highly adhesive, fallibility, and comprehensive mechanical properties ^[5]; secondly, the affinity and permeability of the grouting material must be good, so that the gaps and holes can be filled properly; thirdly, the material must be easy to use; finally, the material must have cost-efficient. In addition, it should also be noted that if the quality of the grouting materials used is not up to standard, it will be difficult to improve the reinforcement effect of the project, so it is necessary to strictly control the quality of grouting materials ^[6].

The conditions of the construction site are often different for different housing construction projects, and the grouting materials selected are also different ^[7]. For example, different grouting materials should be used for different types of cracks. Ordinary cracks can be filled with grouting materials with better permeability and affinity. For the cracks that are very humid, it is necessary to choose grouting materials with good hydrophilicity, so as to improve the stability of the building structure ^[8].

5.2. Key points of applying grouting technology in building construction

In order to effectively control the quality of grouting construction, it is not only necessary to pay attention to the selection of grouting materials and technical methods, but also to ensure the functionality of the equipment needed, that is, before construction, it is necessary to carefully check the equipment and piping systems used in the entire grouting process, and the grouting parameters should be set reasonably according to the construction requirements ^[9]. Besides, it is also important to strengthen the management of the construction site, allocate sufficient human resources depending on the specific conditions of the construction site, and do a good job in the inspection and supervision of the grouting process. Furthermore, it is also necessary to pay attention to the real-time monitoring of the construction site to find out problems in the construction in time and resolve them in time ^[10]. In addition, it is necessary to strictly check the quality of grouting construction and employ special quality inspectors and technicians to check and verify the quality of grouting construction, so as to effectively guarantee the quality of grouting.

6. Conclusion

In conclusion, it is necessary to strengthen the application of grouting construction technology in housing construction, so as to ensure the stability and quality of the overall project and maximize the value of grouting construction technology.

Disclosure statement

The author declares no conflict of interest.

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