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Discussion on the Application Management of Concrete Impermeable Wall in Water Conservancy and Hydropower Project

Haoyuan Wei

Xihua University, Chengdu, Sichuan 610039

Abstract: On the basis of the construction technology of concrete improof wall, this paper focuses on the difficult problems and application management measures in the construction process of concrete improof wall. This paper puts forward application management measures such as detailed analysis of geological conditions, determination of construction tools, using high quality wall mud, controlling the quality of concrete pouring, and treatment of joint holes. By adopting these measures, the construction quality of concrete anti-seepage wall can be effectively improved to ensure the safe operation of water conservancy and hydropower projects.

Keywords: Water conservancy and hydropower engineering; Concrete cut-off wall; Construction technology; Application management

Introduction

The construction technology of concrete anti-seepage wall is constructed by excavating deep grooves in the dam foundation or the shoulder of the dam, and pouring concrete in the groove, forming a continuous anti-seepage wall. This technology has the advantages of high construction efficiency, good seepage control effect and strong adaptability, and has become one of the important means of seepage control treatment in water conservancy and hydropower projects. However, in the actual construction process, the construction technology of concrete anti-seepage wall is also facing some difficult problems, so we need to take effective application and management measures to ensure the construction quality.

1. Construction difficulties of concrete cut-off wall

1.1 Treatment techniques for leakage in loose formation

In the construction process of concrete cut-off wall, when loose formation, it is easy to leak. These loose formations are usually composed of particles, such as sand and pebbles, with large gaps and strong water permeability. When the deep groove is excavated, the water in the loose formation will pour into the tank in large quantities, resulting in the collapse of the groove wall and a large amount of mud leakage, which will seriously affect the construction progress and quality. At the same time, the existence of loose formation also increases the leakage risk of concrete anti-off wall and reduces the seepage effect.

1.2 Treatment scheme for land leakage in the tank

In the construction process of concrete seepage wall, the leakage in the groove is also a common difficult problem. Land leakage in the groove refers to the loss of mud due to the complexity of formation structure and rock fragmentation, in the process of deep groove excavation, unable to form effective mud wall, causing the groove wall collapse and other accidents. The land leakage in the groove will not only affect the progress and quality of the deep groove excavation, but also increase the construction cost and safety risk. If the water leakage problem can not be effectively controlled, it may also lead to the quality defects of the concrete anti-seepage wall, and weaken its anti-seepage performance[1].

2. concrete cut-off wall construction technology application management measures

2.1 Detailed analysis of the construction geological conditions

The construction unit needs to fully understand the formation structure, lithologic characteristics, hydrological conditions and other factors of the construction site through exploration, drilling, geophysical exploration and other means. According to the analysis results, formulate a reasonable construction scheme and quality control measures. For example, for sites with complex geological conditions such as high permeability sand layer and pebble layer, key protection measures need to be taken, such as encrypted exploration points, adjusting excavation

depth, optimizing mud ratio, etc., to ensure the stability of the trough wall and the quality of concrete anti-seepage wall. At the same time, it is also necessary to pay attention to the environmental conditions of the construction site, such as the impact of temperature, rainfall and other factors on the construction quality, and take corresponding preventive and response measures. Through the detailed analysis of the construction geological conditions, the quality management strategy can be formulated to control the construction risk of concrete cut-off wall construction from the source, and improve the quality and safety of the project.

2.2 Scientific selection and application of construction machines and tools

The scientific selection and application of construction machinery is an important part of the construction quality management of concrete seepage wall. Construction units need to comprehensively consider the project scale, geological conditions, technical requirements and other factors, reasonable allocation of excavators, cranes, concrete pumps and other key construction machinery and equipment. The selected mechanical equipment must meet the requirements of the construction technology, and have reliable performance and good adaptability.

Taking the construction of anti-off wall with a depth of more than 60 meters as an example, the construction unit needs to choose large hydraulic grab excavator for groove wall excavation. This type of excavator is usually equipped with an engine of more than 300kW, with a grab capacity of more than 3m³, which can meet the requirements of high efficiency and high stability of deep groove wall excavation. At the same time, its hydraulic system and grab structure have been specially designed and optimized, which can adapt to the excavation operation under different formation conditions and effectively reduce the risk of groove wall collapse.

In the concrete pouring link, the construction unit needs to choose the appropriate concrete conveying pump and distribution rod according to the size of the anti-seepage wall section and the concrete performance. For example, for the anti-off wall with a thickness of more than 1.0m, the concrete pump with a conveying capacity of no less than 60m³/ h can be selected, combined with the cloth rod with a diameter of 125mm ~150mm, to ensure the continuous supply and uniform filling of concrete. The model selection of the conveying pump should also consider the concrete mix ratio, pumping distance, construction environment and other factors, to ensure that the pumping pressure and flow meet the construction requirements.

2.3 Use control of high-quality wall protection mud

The use control of high quality wall mud is the key content of construction quality management of concrete seepage wall. The wall protection mud plays a key role in maintaining the stability of the groove wall and preventing collapse and leakage. The construction unit needs to strictly control the preparation, circulation and treatment of mud to ensure that the mud performance meets the construction requirements[2]. Mud preparation should be based on the geological conditions and construction technology, choose high-quality clay, bentonite and other raw materials, scientific control of the amount and proportion of solid phase materials. Mud density should be controlled in 1.05~1.30g/cm³, viscosity should be controlled in 20~50s (horse type funnel), sand content should be controlled within 4%. In the construction process, we should detect the mud performance in time, and adjust the problems found in time. At the same time, it is necessary to strengthen the management of the mud circulation system, and regularly clean up the sedimentation tank, vibration screen and other equipment, to ensure the continuous supply and stable quality of the mud. Through the use and control of high-quality wall protection mud, it can effectively prevent the channel wall collapse and leakage, and create good conditions for the concrete pouring, so as to ensure the construction quality and anti-seepage effect of the anti-seepage wall.

2.4 Strict control of concrete pouring quality

Strict control of concrete pouring quality is the key to ensure the performance and durability of concrete seepage wall. The construction unit needs to start from the concrete material selection, mix ratio design, mixing and transportation, pouring technology and other aspects to control the quality of concrete in the whole process. Concrete materials should be made of high quality cement, sand aggregate and admixture to ensure that their physical and mechanical properties meet the design requirements. The concrete mix ratio shall be optimized according to the construction conditions and performance requirements to ensure the workability, tightness and durability of the concrete. In the process of concrete mixing and transportation, the mixing time, transportation distance and time should be strictly controlled to prevent the segregation and water loss phenomenon. Concrete pouring shall be made with catheter, cloth rod and other equipment to ensure the continuous and uniform fall of concrete and avoid segregation and cold joints. In the process of pouring, the performance indexes of concrete slump and gas content should be detected at any time, and the problems should be adjusted in time. At the same time, to do a good job of concrete vibration and maintenance work, to ensure that its density and strength to meet the requirements. Through the strict control of concrete pouring quality, the integrity, compaction and seepage prevention performance of concrete seepage wall can be ensured, and its durability and safety can be improved.

2.5 Application of processing technology of slot joint holes

The application of joint hole is an important link to ensure the continuity and performance of concrete seepage wall. Trough section joint is due to the construction section, concrete initial coagulation and other reasons of the weak parts, such as improper treatment, easy to become a leakage channel. The construction unit shall take effective technical measures to ensure that the quality of joints meet the requirements of seepage prevention. Commonly used joint treatment techniques include gouging, high pressure water gun washing, installation of water stop copper plate, etc.chisel is in the joint concrete reached a certain strength, the surface chisel to rough, to increase the connection force of new and old concrete. High pressure water gun washing is to use high pressure water flow to wash the joint surface, remove impurities and loose objects, and improve the bonding performance of new and old concrete. The installation of water stop copper plate is an embedded water stop copper plate at the joint, blocking the leakage channel of the copper plate through the deformation and sealing effect of the joint. In the actual construction, according to the site conditions and technical requirements, reasonable selection and application of joint processing technology, strictly control the construction quality. For example, the method of combining chisel hair and high-pressure water gun washing can be adopted, which can not only increase the roughness of the joint, but also remove impurities and improve the connection quality.

The construction technology of concrete anti-off wall plays a key role in the seepage control treatment of water conservancy and hydropower projects, and its application management level is directly related to the project quality and safety. Only by constantly learning advanced construction technology, summarizing practical experience and optimizing application management measures can we give full play to the anti-seepage benefits of concrete cut-off wall and provide reliable guarantee for the safe operation of the project. In the future, we will continue to strengthen the innovative application and fine management of the concrete anti-seepage wall construction technology, so as to contribute wisdom and strength to promote the high-quality development of water conservancy and hydropower undertakings.

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