

Causes and countermeasures of concrete cracks in construction engineering

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Abstract: Concrete is the most widely used building material in current construction projects. The quality of concrete construction directly determines the overall quality of the entire building. As a common problem in concrete engineering, cracks greatly reduce the safety and stability of buildings. Therefore, this article elaborates the classification of concrete cracks in building construction, analyzes the main causes of concrete cracks, and proposes concrete crack control measures for building construction according to the reasons.

1 classification of concrete cracks

1.1 Microcracks

Not all cracks can be seen with the naked eye. There is a type of crack that is invisible to the naked eye. This is the micro-crack often said in buildings. This kind of crack is a kind of crack inherent in the concrete, and its width is generally not More than 0.05 mm. If the load of raw materials is controlled within a reasonable range, such micro-cracks will generally not affect the engineering quality[1]. In order to effectively measure this kind of micro-cracks, an ultrasonic detector is needed. In addition, microscopic fractures can also be measured by seepage. If the pressure of water exceeds a certain range, water will seep out of the fracture.

1.2 surface cracks

This kind of surface crack is a kind of surface crack caused by the rapid evaporation of moisture on the surface of the concrete during the hardening process. Under normal circumstances, after cracks occur in concrete, it cannot protect the steel bars better, and is rusted by external air, acids and alkalis[2], which causes the rust of the steel bars. Becomes larger, and once the weather is bad, the rebar will soon completely rust. As a kind of stress material, steel bar is widely used in construction projects. Once rusted, it will seriously damage its structural integrity.

2 Causes of concrete cracks during construction

2.1 Causes of surface cracks

The concrete surface itself will appear shrinkage deformation and internal constraint changes caused by the temperature change of the concrete itself. That is to say, the surface concrete is cooled but the interior is subject to the thermal stress caused by the concrete itself, and this temperature difference will cause cracks. If the temperature stress is higher than the tensile strength of the concrete at the same age, it will cause cracks. If there is no other factor to affect it, the concrete will not have through-type cracks or deep cracks.

2.2 Origin of internal cracks

Internal cracks in concrete are mainly caused by cracks appearing on the top surface of the pouring block, because new concrete is poured on it, which makes the original surface cracks become internal cracks in concrete[3].

2.3 Origin of deep cracks

If the concrete is out of the basic constraint range, the surface cracks may continue to spread or deepen, especially after a long period of cooling, the internal temperature of the concrete will increase, and a complex temperature gradient will be formed inside the concrete. In the temperature field, the spread and continuation of this kind of problem will cause the problem of the deep development of cracks, and even deep cracks will be directly formed, which is still in a continuous state inside[4].

2.4 Causes of penetrating cracks

It is mainly to cut the deep-developed cracks of the concrete structure. The reason is mainly because the temperature of the concrete is higher and the effect of the temperature rise of the hydration heat on the concrete is more obvious. A higher temperature will form. It will cause the retention of the base temperature difference and affect the later quality of the overall concrete. If the temperature stress caused by this uniform cooling is greater than the tensile strength of the concrete of the same age, it will cause through cracks.

In addition, the micro-crack phenomenon of concrete in construction projects is more common and is possessed by all concrete, because it will affect the deformation and strength of the concrete structure. Therefore, the construction department is in the process of technical analysis[5], The design department must be required to control the strength and crack resistance of the concrete in accordance with the design specifications. It is worth mentioning that many micro-cracks will develop macro-cracks after the structure is stressed, resulting in a small number of cracks that cross the mortar. This requires the construction department to dynamically detect and control the actual construction process to reduce the impact of crack problems on the construction process.

3 countermeasures for concrete cracks in building construction

3.1 Strengthening post-conservation

After the project is completed, its maintenance work has become an important content and an important measure to control concrete cracks. The person in charge of the project should be based on the actual situation of the project, and a special person will be responsible for the maintenance work, which also provides an important guarantee for the quality of the construction project. Focus on curing concrete, in order to prevent concrete cracks caused by excessive evaporation of water, engineering managers can choose to cover a layer of straw curtain or plastic film on the concrete surface, and at the same time, during the project curing process, the concrete wall The surface of the body is sprayed with some water, which also ensures the wetness of the concrete surface. This treatment method also effectively improves the internal load of the concrete material and eliminates the formation of concrete cracks.

3.2 Reasonably control the temperature of the concrete material itself

In construction engineering, in addition to the quality of raw materials, temperature is also an important factor that causes concrete cracks. This also puts forward higher requirements for the majority of construction enterprises in China. It is necessary to reasonably control the temperature of concrete itself and strictly screen the type and thickness of concrete materials[6]. And dosage. At the same time, because of the large temperature difference between the inside and outside of the wall, concrete cracks occur. Therefore, in order to fundamentally avoid the occurrence of concrete cracks, it is necessary to keep the temperature inside and outside the wall material consistent. Even if there is a certain temperature difference, do not exceed 3 ° C. The construction unit is best to

measure the temperature before construction. Once found, The temperature difference is too high, it must be dealt with in a timely manner. This has been effectively implemented in a construction company in Shanghai. The construction company is well-known in the country and has undertaken a large number of construction projects. Each time before construction, it will strictly check the raw materials and measure the temperature, thereby avoiding concrete cracks. Breed.

3.3 strict control of material quality

In order to fundamentally manage the cracks in the concrete of construction projects, the first task is to reasonably control the quality of the materials and select a fixed material supplier. However, when selecting a material supplier, it must be checked whether it has a full qualification and Reputation in the industry, etc. It is necessary to strictly check the raw materials provided by it, and it can only be transported to the construction site if the building materials meet the standards[7], which also fundamentally provides a safe guarantee for the quality of construction projects. For some construction companies in China, for the selection of raw material suppliers, most construction companies are more optimistic about the quality of raw materials provided by suppliers. 30% of construction companies are more concerned about whether suppliers have complete qualifications, and some construction companies are focusing on Its reputation in the industry

4 Cases of Concrete Cracks in Building Construction

A certain engineering project is a comprehensive building structure with 29 floors above ground and 2 underground floors, which is a cast-in-situ structure with a height of 110m, the floor size of the project is $36\text{m} \times 36\text{m} \times 18\text{m}$, the overall strength level of the concrete is C40, and the impermeability label is S8. The pouring volume is 3300 cubic meters. Because of the high strength and volume of the engineering project, the steel bars in the overall engineering project are dense and the engineering conditions are very complicated. To meet the strength, stiffness and durability at the same time, we must pay attention to temperature deformation and cracks, and formulate corresponding construction process.

4.1 Construction plan

First, in the temperature measurement method, the measurement mechanism of the thermal resistance, thermocouple and glass thermometer is mainly used. The temperature measurement of the concrete inside the project is mainly applied to the temperature sensor, because the resistance value is different depending on the guide length. At this time, the length is used as 1m, 2m, and 3m wires were measured. The correction data is: (1) 1m long wires, minus 2 degrees Celsius; (2) 2m long wires, minus 4 degrees Celsius; (3) 3m long wires, minus 6 degrees Celsius.

Second, the layout of measuring points, combined with the surrounding environmental requirements of the actual construction area of the project, arranged 20 sets of testing points, each of which required 3 temperature measuring points to establish an information-based construction system. The specific requirements are as follows: (1) 1d-6d, temperature monitoring every 1 hour; (2) 7d, temperature monitoring every 4 hours; (3) 8d-9d, temperature monitoring every 6 hours; (4) 9d, temperature monitoring is performed every 12 hours.

For concrete mold temperature measurement, the construction department should control and supervise the actual temperature of the concrete mold in accordance with the construction requirements, and effectively establish a corresponding testing mechanism based on the temperature parameters. It is not only necessary to analyze and analyze the temperature of the raw materials such as cement, sand, and stone before mixing For the measurement, it is also necessary to make a centralized comparison of the subsequent numerical changes, and make a reasonable temperature

control plan.

4.2 Construction technology

In order to effectively control the problem of concrete cracks in construction projects, the construction department should set up double-layer temperature bars in the middle, effectively conduct a comprehensive analysis of the reinforcement ratio, and exert the application effect of limiting expansion. On the basis of dispersing stress, the overall concrete resistance Cracking, laying the foundation for the comprehensive optimization of subsequent construction quality. In addition, because the size of the bottom plate is 36m * 36m, one-time continuous pouring is set up, and no post-casting belt is used. The construction of the project should be judged in accordance with the construction environment and actual temperature conditions. The project is to be constructed in the vicinity of winter and the temperature is relatively low. It is necessary to centrally establish the corresponding maintenance treatment procedures to effectively improve the basic level of the construction management project.

5. Conclusion

In a word, in the construction project, the quality of concrete construction should be supervised, the construction process should be rationally adjusted, the impact of crack problems on subsequent processing procedures should be reduced, the overall quality of the construction project should be improved, and a win-win situation of economic and social benefits should be achieved.

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