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Causes and Control of Concrete Cracks

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Abstract: The problem of concrete cracks is a practical problem that is ubiquitous and di□cult to solve. In this paper, the causes of some cracks in concrete engineering are analyzed from the aspects of design, material, mix ratio, construction site maintenance and so on. According to the causes of concrete cracks, the measures to control the development of cracks are put forward in the aspects of concrete structure design, concrete material selection, mix proportion optimization and maintenance of construction site. According to the relevant literature, and summarizes the treatment methods of concrete cracks: surface treatment method, filling method, grouting method, structural reinforcement method, concrete replacement method, electrochemical protection method, bionic self-healing method and so on.

Keywords: concrete; crack; cause; control

1. Overview

1.1 Question

Concrete structure of the cracks, is a common with the engineering sector is very concerned about the problem. The continued expansion of some cracks may endanger the structural safety, because the final destruction of the structure is often from the cracks began to become a precursor to the destruction of the structure, which is mainly caused by cracks in the cracks; some cracks caused by engineering leakage, a□ecting the normal use , is the corrosion of steel, protective layer peeling, reduce the strength of concrete, seriously damage the project durability, shorten the service life, which mainly refers to the deformation of the cracks; there are coupling cracks and alkali reaction caused by expansion of cracks and freeze-thaw caused by cracks. At the same time the larger structural cracks, but also di□cult to accept the view of the people, resulting in fear of psychological pressure, a□ecting the architectural beauty, di□cult for the decoration. Due to the complexity of the microscopic and macroscopic mechanisms of the cracks, it is also a technical problem that plagued the engineering and technical personnel.

1.2 The research content of this paper

In this paper, the causes of concrete cracks are studied from the following aspects:

Design reasons.

Material reasons.

Concrete mix design reasons.

Construction and site maintenance reasons.

Use reasons.

For the analysis of the causes of concrete cracks in the following aspects to take control measures:

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Design aspects.
Material selection.
Concrete mix design
Construction
Management aspects.
Environmental aspects.
The research methods of this paper:
Data collection and research program
The following are the same as the '
Data, data collation, statistical analysis
The following are the same as the '
Using the relevant theory and technology analysis and related entities combined with engineering, analysis and research
The following are the same as the '
Analysis of concrete cracks caused by specific reasons for the corresponding measures put forward in the project application and validation
The following are the same as the '
The following are the same as the '
Summary of results, preparation of reports

2.Causes of cracks

Cracks are produced in a variety of forms and types, and there are design reasons, but more is the combination of various factors in the construction process, to fundamentally solve the problem of cracks in concrete, or the need for concrete cracks from the formation of manpower. Correctly determining and analyzing the causes of concrete cracks is the most e□ective way to e□ectively control and reduce the cracks in concrete. Cracks are due to the design, construction, materials, environment and management of the mutual impact of the integrated problem, to solve the problem of crack control should take an integrated approach.

Design reasons

The structural cracks produced by the stress concentration in the design structure.

In the design of the components of the prestressed improper, resulting in component cracks (eccentric, stress is too large, etc.).

In the design of structural steel structure is too small or too thick and other components caused by cracks (such as wall panels, floor).

The shrinkage deformation of concrete members is not fully considered in the design.

The concrete grade used in the design is too high, resulting in too much ash, which is disadvantageous to shrinkage.

He contract, the use of ambient temperature changes, improper pipeline configuration, protective layer thickness, lack of resistance to temperature shrinkage reinforcement.

Material reasons

Thick aggregate mud is too large, resulting in increased shrinkage of concrete. Aggregate grain gradation is poor or improper intermittent gradation is adopted, which is likely to cause the increase of concrete shrinkage and induce the occurrence of cracks.

The finer the aggregate size, the greater the content of the needle, the amount of concrete with the amount of ash, water consumption increased, increased shrinkage.

Concrete admixture, mixed material selection improper, or improper content, a serious increase in concrete shrinkage.

Cement varieties reasons, slag portland cement shrinkage than ordinary portland cement shrinkage, fly ash and alumina cement shrinkage value is small, fast hard cement shrinkage.

Cement grade and concrete strength grade reasons: the higher the cement grade, the finer the finer, the higher the early strength of the concrete cracking a great impact. The higher the strength of the concrete design, the greater the brittleness of concrete, the easier the cracking.

Concrete mix design reasons

In the design of cement grade or selection of improper varieties.

Mixing ratio of water-cement ratio (water-cement ratio) is too large.

The greater the amount of unilateral cement, the higher the water consumption, the performance of the larger volume of cement slurry, the greater the slump, the greater the contraction.

Mixing ratio in the design of sand rate, water-cement ratio selection caused by improper deviation of concrete, resulting in concrete from the xi, bleeding, water retention, increase the shrinkage value.

Mixing ratio of concrete expansion agent in the design of improper selection.

Construction and on-site conservation reasons

When pouring concrete in the field, vibrating or inserting improperly, leakage vibration, overturning or vibrating rods evacuated quickly, will a□ect the density and uniformity of concrete, induced cracks.

Mixing uneven (especially mixed with admixture of concrete), stirring time is too long or too long, after mixing to pouring time interval is too long, easy to produce cracks.

Continuous pouring time is too long, improper handling of stubble, easy to produce cracks.

High-altitude pouring concrete, wind speed is too large, sun exposure, concrete shrinkage value.

For mass concrete projects, the lack of two plaster, easy to produce surface shrinkage cracks.

Mass concrete pouring, the calculation of hydration is not allowed, the scene of concrete cooling and insulation work is not in place, causing the concrete internal temperature is too high or internal and external temperature di□erence is too large, concrete temperature cracks.

On-site conservation measures are not in place, early dehydration of concrete, causing shrinkage cracks.

Improper demolition of the site template, causing split mold cracks or mold removal too early.

On-site prestressed tension improper (super-zhang, eccentric), causing concrete tension cracks.

These factors will cause a larger concrete shrinkage, resulting in cracks or cracks in the cracks, resulting in rapid expansion of concrete micro-cracks, the formation of macro-cracks. Conservation is an important means of normal hardening of concrete. The condition of curing has a key effect on the occurrence of cracks. In the standard curing conditions, the concrete hardening normal, will not crack, but only for the test block or factory prefabricated production, site construction cannot have such conditions. However, it must be noted that the site of concrete curing closer to the standard conditions, the possibility of concrete cracking is smaller.

Use reasons (external factors)

Uneven settlement of the foundation of the structure, resulting in settlement cracks.

Brutal decoration, free to remove the load-bearing walls or holes, causing cracks.

The surrounding environment, acid, alkali, salt and other structures on the erosion, causing cracks.

Fires caused by accidents, fires, mild earthquakes, etc.

Use short or long-term overload.

Structural components of the regional temperature, humidity di□erence is too large.

3. Control of cracks

3.1 Design aspects

Design of the 'anti' and 'put'

In the architectural design should handle the structure of the 'anti' and 'put' relationship. The so-called 'resistance' is in the state of restraint, there is not enough room for deformation, to prevent the cracks taken by the strong measures,

and the so-called 'put' is completely free structure in the unconstrained state, there is enough room for deformation the measures taken.

Designers should be flexible use of 'anti-one put' combination, or to 'anti' mainly, or 'put' the main design principles. To choose the structure of the program and the use of materials.

Try to avoid structural stress caused by sudden changes in stress

Such as structural or modeling reasons and so on, should be fully considered the use of enhanced measures.

Using compensated shrink concrete technology

In the common concrete cracks, a considerable part is due to the contraction of concrete caused. To solve the cracks caused by shrinkage, concrete can be used in the expansion agent to compensate for the contraction of concrete, practice has proved that the e□ect is very good.

Design should pay attention to easy to crack the site

According to the survey, the structure of various types of cracks are as follows:

Frame mechanism and shear wall structure in the housing of the cast-in-place concrete floor cracked parts.

(1) The flat surface of the house has a large bump, in the concave and convex junction of the floor.

(2) At both ends of the corner and the gable at the floor.

(3) The south side of the building wall with a large area of glass windows, and south to the wall adjacent to the floor.

(4) Roof of the roof of the building.

(5) And L. Zhou, columns, walls and other components of the whole cast and constrained by the strong floor.

(6) In the floor when there are buried pipeline, the hole at the corners.

(7) The floor open when the hole, the hole at the corners.

(8) With the post-pouring with the floor, along the back with both sides of the site.

Frame structure The frame beam in the house is prone to cracks in the following parts

The upper section of the top longitudinal and transverse frame beams.

A longer longitudinal or middle longitudinal frame beam.

Horizontal frame beam section middle.

Shear wall structure in the past the site prone to cracks

(1) The end of the mountain wall.

(2) Within the vertical wall.

(3) Top and bottom walls.

(4) The length of the larger (> 10m) wall.

When the winter downtime and then continue construction, the basement in the following parts prone to cracks.

(1) Basement roof.,

(2) The windows of the basement windows and windows under the wall.

For those parts that are prone to cracks, the current design of the use of the 'put', 'anti' or 'anti-combination of' control crack measures, engineering experience shows that the material, construction and other parts of the close cooperation, better e□ect.

3.2 Attention to structural steel

In the structural design, the designer should pay attention to the configuration of the construction of steel bars, especially in the floor, wall panels and other thin-walled components should pay attention to the construction of reinforced diameters and the number of options.

3.3 Material selection

According to the requirements of the structure to choose the appropriate level of concrete strength and cement varieties, grade, try to avoid the use of early strong high cement.

Selection of fine graded sand, stone raw materials, mud content should meet the specifications.

Active use of admixtures and concrete admixtures. Admixture and admixture targets have been used as the fifth and sixth component of concrete, and can significantly reduce the amount of cement, reduce hydration heat, improve the performance of concrete and reduce the cost of concrete.

Correctly grasp the application method of concrete compensating shrinkage technology. The expansion agent should be filled with different varieties, different content of the different expansion effect. The optimum amount of bulking agent should be determined by a large number of tests.

3.4 Concrete mix design

Concrete mix ratio should be in accordance with the 'ordinary concrete mix design rules' JGJ55 requirements, according to the requirements of the strength level, impermeability grade, durability and workability and other mix design, the preparation of concrete should also meet the 4.3 .2-4.3.10.

Shrinkage rate. The shrinkage of concrete 90d is less than 0.06%.

Slump to meet the requirements of the construction conditions, as far as possible the use of smaller concrete slump; foundation, beam, floor, roof concrete slump is easy to less than 120mm, column, wall concrete slump should be less than 150mm; pumping, high-rise building with the concrete slump according to the pumping height should be controlled at about 180mm, multi-storey and high-rise building at the bottom of the concrete slump should be controlled at 150mm.

Water consumption. Should not be greater than 170kg/m3.

The amount of cement. Ordinary strength grade of concrete should be 270-450 kg per cubic meter, high strength concrete should not be greater than 550 kg per cubic meter.

Water-cement ratio. Appropriate smaller water-to-glue ratio should be used. The ratio of concrete to plastic is greater than 0.60.

Sand rate. A smaller sand rate should be used to meet the requirements of the working conditions.

Air-entraining agent or air-entraining water reducing agent should be used.

With the design sta□ should be in-depth construction site, according to the construction site of the pouring process, the level of operation, component cross-section, etc., a reasonable choice of concrete design slump, for the scene of sand, stone quality of the timely adjustment of construction than to help the site to do a good job of conservation work.

3.5 Construction aspects

nstallation and removal of the template

The template and its bracket should be designed according to the conditions of engineering structure, load size, foundation soil type, construction procedure, construction tools and material supply. The stencil and its stent should have su□cient carrying capacity, sti□ness and stability to reliably withstand the weight of the

pouring concrete, the side pressure, the load generated during the construction, and the load generated during the construction of the upper deck.

The installation of the template to be structured, do not leak pulp, no water, does not a□ect the uniformity of concrete and strength development, and to ensure the correct shape of the components.

When installing the template, to ensure the thickness of the protective layer, should be accurately configured concrete blocks and steel locator and so on.

The support column of the template should be placed on a solid floor and should have su□cient rigidity, strength and stability, with a moderate pitch to prevent the support from subsidence and cause deformation of the template. The support column of the upper and lower stencils should be aligned.

The removal order of the template and its bracket and the corresponding construction safety measures should be considered in formulating the construction technology plan. When the template is removed, the impact load should not be formed on the floor. Remove the template and bracket should be with the removal with the clearance, not on the floor to form a local excessive construction load. Templates and their stents when the concrete structure may not yet form the design requirements of the force system, if necessary, should be added temporary support.

The strength of the concrete when the bottom mold and its bracket is removed should meet the design requirements. When there is no design requirement, the concrete strength shall meet the requirements of Table 3.1.

Post-pouring template with the removal of the stent and easy to be ignored, which often cause structural defects, should be given special attention, must be strictly in accordance with the construction technology program implementation.

The structure of the template and its stent has been removed and the load can be used after the strength of the concrete has reached the required design. When the e□ect of the construction load is more unfavorable than the e□ect of the load, it must be calculated and added Set up temporary support.

Preparation of concrete

Pre-mixed concrete should be given priority. The quality should be in accordance with the requirements of 'ready-mixed concrete' GB/T14902, and the same type of concrete should be ordered in the same ready-mixed concrete plant. If two or more ready-mixed concrete plant orders, should ensure that the ready-mixed concrete plant used by the same material and the same, the preparation process conditions are basically the same.

Construction workers should be prepared in advance on the concrete preparation of technical procedures and quality control measures.

Transport of concrete

Transport of concrete, should be able to maintain the uniformity of concrete mix, should not produce layered segregation phenomenon, transport containers should not leak pulp, the inner wall smooth, with sunscreen, wind, rain and snow, cold facilities Fast transport. Transport frequency, should ensure the continuity of concrete construction.

The truck should be filled with residual concrete and water before loading. When it is necessary to add the admixture before discharge to adjust the workability of the concrete mix, the admixture after the vehicle should be fast mixing, stirring time should be experimentally determined.

Transport to the pouring of concrete slump should meet the requirements, when there is separation, should be the second mixing, mixing time should be determined by the experiment. It is strictly forbidden to add any water to the concrete that is transported to the pouring site.

From mixing, transport to pour into the mold when the temperature is not higher than 25 ℃, the duration should not be greater than 90min, when the temperature is higher than 25 ℃, the duration should not be greater than 60min. When the admixture of concrete or the use of fast hard cement, the duration should be experimentally determined.

Pouring of concrete

In order to obtain homogeneous dense concrete, pouring to consider the structure of the pouring area, component type, steel configuration and the quality of concrete mix, the choice of appropriate equipment and pouring method.

Before pouring to check the template and its stent, steel and protective layer thickness, embedded parts and other parts, size, confirmed correct, before pouring. At the same time, should also check the pouring concrete barrier, if necessary, to be amended.

The construction plan should be considered when

the project situation and practical work ability, so that the construction capacity of each link should be adapted to the concrete pouring, if necessary, continuous pouring of concrete.

On-site pouring of concrete to be monitored, arrived at the scene of the concrete slump cannot meet the construction requirements, can be confirmed by the laboratory to determine the reliable method of slump, is strictly prohibited free water. It is not advisable to pour concrete in the open air during rain and snow.

Pouring walls, columns and other high components, a pouring height to the concrete does not leave the quasi-quasi-general, each layer is not more than 500m, ramping and then pour the upper layer, pouring attention to the concrete when the concrete filled with the end of the corner.

When the floor, beam, wall, column with pouring, the first pouring walls, columns, until the concrete Shen real, and then pouring beams and floors. When the floor and the beam with the pouring, the first pouring beams, and then pouring floor.

When pouring to prevent the steel, templates, positioning tendons and other movement and deformation.

Pouring concrete to fill the steel, buried around the mold and the corner of the template, to vibrate dense, not leakage vibration, nor too wide, but not with the vibrator to drag the concrete.

Laying pouring concrete, pay attention to the upper and lower concrete integration. Should be in the next layer of concrete before the condensate will be a layer of concrete pouring finished. When pouring the upper concrete, the vibrator must be inserted into the next layer of concrete for about 5 cm to form a whole.

Due to the bleeding of concrete, aggregate sinking, resulting in plastic shrinkage cracks, then the concrete surface should be compacted; in the pouring of concrete, in case of high temperature, sun exposure, windy weather, pouring immediately after use plastic film cover, to avoid the occurrence of concrete surface induration.

For mass concrete, the maximum temperature inside the concrete after pouring and its temperature di□erence with the surface, the temperature di□erence between the concrete surface and the environment, the internal maximum temperature is generally not higher than 70 ℃, the internal and external temperature di□erence does not exceed 25 ℃, the concrete surface and environmental di□erence of not more than 15 ℃.

Slip form construction should keep the template smooth and smooth, and strictly control the concrete coagulation time and sliding mode rate match to prevent sliding die when the crack, collapse.

After the completion of the pouring of the board concrete surface, should be in the initial condensate before the second pressure.

The post-pouring zone should be set according to the design requirements. The pouring time of the concrete after pouring with the concrete should meet the design requirements. When there is no design requirement, the pouring is easy to be poured on the sides of the concrete after 8 weeks. To strengthen the conservation of the concrete.

Construction joints before pouring concrete, the crop should be ticked clean, watering wet, and in the stubble at the cement mortar or coated concrete interface agent to ensure that the construction joints combined with good.

Curing of concrete

Maintenance is an important measure to prevent cracks in concrete, we must pay full attention to, and develop conservation programs, send someone to carry out conservation work.

Concrete pouring is completed, in the concrete after the condensation must be properly insulated, moisturizing conservation, try to avoid rapid changes in vibration and external disturbance.

After pouring cover, drying, spraying or film moisturizing and other conservation measures; insulation, moisturizing curing time, portland cement, ordinary portland cement or slag portland cement mixed with concrete, not less than 7d; for the incorporation of retarding admixture or impervious requirements of concrete, not less than 14d.

Bottom plate and floor and other planar structural components, concrete pouring and wiping pressure, covered with plastic film to prevent the surface of water evaporation, concrete hardening to the master, you can peel o□ the plastic film, covered with sacks or straw, with water, through the conditions of conservation as much as possible.

Large cross-section of the pillars, it is appropriate to use wet sacks wrapped around the water conservation, or plastic film wrapped around the conservation, but also brushing maintenance liquid.

After the completion of concrete pouring concrete,

concrete to a certain intensity (1-3d), the time must be timely loose on both sides of the template, from the seam about 3-5mm, set up in the top of the wall shower, spray conservation. After removal of the template, should be hanging on both sides of the wall sacks or grass curtains and other cover, to avoid the sun through the wall, continuous water conservation time in line with the provisions of 5.6.3; basement wall should be back to fill as soon as possible.

Winter construction cannot be directly to the exposed parts of the concrete watering conservation, the application of plastic film and insulation materials for insulation, moisturizing conservation. The thickness of the insulation material shall be determined by thermal calculation.

When the concrete admixture of special requirements for conservation, should be strictly in accordance with its requirements for conservation.

Management aspects

Should determine the scientific standards of the control of cracks, a reasonable choice of construction progress, to avoid excessive construction in the concrete repair period, supervision of concrete construction in the development of technical measures must be strictly enforced. Should not be pre-designated design and construction methods, design drawings should not specify the construction unit is not yet mature admixture. During the construction process and after acceptance, a small amount of cracks shall be found and should be treated by chemical grouting method and closed method. Minor shrinkage cracks should not be treated as 'accident', and the engineering quality standards should not be reduced and appropriate measures should be taken to ensure that the normal and durable use, fully meet the

design requirements. Unless the carrying capacity of a serious shortage, do not easily destroyed the reconstruction, costly reinforcement. Noting the same design unit design, the same material supply unit, the same construction unit construction, in the same environment, the degree of cracks is completely different, which is often encountered phenomenon, the key is 'heterogeneity', the role of crack control E□ects and resistance are highly discrete and random problems.

3.6 Environmental aspects

Attention to the construction of the season, the environment temperature and humidity and weather changes on the deformation of concrete impact, strict control of the slump, wind, timely and weather stations to maintain close contact, should be as low as possible in the lower temperature environment began to pour concrete, the middle of special attention to the rapid cooling, rapid drying on the adverse e□ects of concrete. Note that heavy rain cannot be poured concrete.

4. Treatment of concrete cracks

4.1 Treatment of concrete cracks

Surface treatment

Surface coating and surface application of the surface coating is suitable for the scope of the slurry is di□cult to pour into the thin and shallow cracks, the depth of the surface did not reach the hair cracks, watertight joints, non-retractable cracks and no longer active cracks. Surface coating (geomembrane or other waterproof film) method for large area leakage (honeycomb or other di□cult to determine the specific location of the leak, deformation joints) of the seepage plugging

Filling method

With the repair material directly filled with cracks, generally used to repair a wide crack, homework is simple, low cost. Width less than 0.3mm, shallow depth of the cracks, or cracks in the filling, with the grouting method is di□cult to achieve the e□ect of cracks, and small cracks in the simple treatment can be taken to open V-groove, and then for filling.

Grouting method

This method covers a wide range, from fine cracks to large cracks can be applied, the treatment e□ect is good. The use of pressure equipment (pressure 0.2 - 0.4Mpa) will fill the slurry into the concrete cracks, to achieve the purpose of occlusion, the method is a traditional method, the e□ect is very good. But also can use the elastic sewing machine will be injected into the cracks into the cracks, no electricity, very convenient e□ect is also very satisfactory.

Structural reinforcement method

Due to over-load caused by cracks, cracks do not deal with a long time to reduce the durability of concrete, cracks caused by fire and other structural strength can take structural reinforcement method. Including the cross-section reinforcement method, anchor reinforcement method, prestressing method and other concrete crack treatment effect inspection including repair material test; drilling sampling test; water pressure test.

Concrete replacement method

The concrete replacement method is an e□ective

way to deal with serious damage to the concrete by removing the damaged concrete and then replacing it into new concrete or other material. Commonly used replacement materials are: ordinary concrete or cement mortar, polymer or modified polymer concrete or mortar.

Electrochemical protection method

Electrochemical corrosion is the use of electric field in the application of electrochemical effects, change the concrete or reinforced concrete in the environmental state, passivation of steel, in order to achieve the purpose of corrosion. Cathodic protection method, chlorine salt extraction method, alkaline recovery method is the chemical protection method commonly used and effective three methods. The advantage of this method is that the protection method is less affected by environmental factors, suitable for steel, concrete long-term corrosion, both for the crack structure can also be used for new structures.

Bionic self-healing method

Bionic self-healing method is a new method of crack treatment, which mimics the biological tissue of the wound site automatically secrete a substance, and the wound site to get healing function, in the traditional components of concrete by adding some special components (such as binder-containing liquid core fiber or capsule), in the concrete inside the formation of intelligent bionic self-healing neural network system, when the concrete cracks occur when the secretion of part of the liquid core fiber cracks can be re-healing [4].

5. Conclusion

5.1 Causes of concrete cracks

The causes of concrete cracks are:

The design of the existence of cross-section mutation, the application of improper prestressed, reinforced or too coarse configuration, not fully consider the shrinkage of concrete components deformation, concrete grade is too high, the reasons for shrinkage.

Material selection aspects of the thickness of the aggregate material is too large, aggregate size is too fine, concrete admixture and admixture selection improper, cement varieties, cement grade and concrete strength grade reasons.

Concrete mix design aspects of the existence of cement grade or improper selection of varieties, water-cement ratio is too large, the greater the amount of cement and the higher the amount of water, sand and water-cement ratio of improper selection of concrete expansion agent dosage selection properly.

Construction and site conservation are mainly vibrating concrete or improper insertion, mixing uneven, continuous pouring time is too long, on-site conservation measures are not in place, the site template removal and prestressed tension and other reasons.

5.2 Control measures for concrete cracks

Concrete cracks control measures are:

Design from the design of the anti-combination with the release, to avoid the structural section of the sudden changes in stress concentration, the use of compensation shrink concrete technology, attention to structural steel and other control measures.

Material selection from the selection of the appropriate concrete strength grade and cement varieties, grade and grading excellent sand, stone raw materials, active use of admixtures and concrete admixtures and other control measures.

Concrete mix ratio design from the shrinkage, slump, water consumption, cement consumption, water and cement ratio, sand rate of the preparation, the use of air-entraining agent or air-entraining agent and other control measures.

Construction from the installation and removal of the template, the preparation of concrete, transportation, pouring and maintenance control.

Management should determine the scientific control of crack standards, a reasonable choice of construction progress. And in the environmental aspects should pay attention to the construction of the season, the environment temperature and humidity, strict control of the slump, wind, timely and weather stations to maintain close contact.

5.3 Treatment of concrete cracks

Through the research of this paper, the concrete crack treatment methods are: surface treatment method, filling method, grouting method, structural reinforcement method, concrete replacement method, electrochemical protection method, bionic self-healing method.

Cracks are a common phenomenon in concrete structures. Its appearance not only reduces the impermeability of buildings, influences the function of buildings, but also causes corrosion of steel bars, carbonization of concrete, and reduces the durability and impact of materials. The building capacity of the building, so the concrete cracks to be carefully studied, different treatment, the use of reasonable methods for processing, and

in the construction to take a variety of e□ective preventive measures to prevent the emergence and development of cracks to ensure the safety of buildings and components, work steadily.

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