

Prevention and treatment of the cracks in the cast-in-place reinforced concrete floor in the northwest area

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Abstract. Hot and dry climate in northwest region, framework structure concrete crack is easy to produce, especially of cast-in-place reinforced concrete floor due to the design, construction and application of reason, of various shapes, common features cast-in-place reinforced concrete floor in the Northwest Region, from theoretical and practical point of view to analyze the causes of cracks and prevention measures put forward to help avoid structural damage caused by the appearance of cracks of cast-in-place reinforced concrete floor structure.

Keywords: Northwest Region, Cast-in-place Reinforced Concrete Floor, Crack, Features, Control.

1. Introduction

Most of the current residential projects in the northwest of the frame structure is cast-in-place reinforced concrete floor, the use of commercial concrete pump delivery form. Due to the cast-in-place reinforced concrete floor is a kind of large surface of the force components, so a little careless, very easy to produce cracks. Study crack characteristics, looking for cracks and crack control measures have become an important part to ensure the quality of cast-in-place concrete floor is determined, the following for representative residential projects of several cracks form, make a concrete analysis of its characteristics, causes and methods of prevention and treatment, provide theoretical basis for the future cast-in-place reinforced concrete crack prevention and control work.

Pouring concrete in northwest region is generally in a hot and dry summer, cracks in cast-in-place concrete slab, mainly angle cracks, toilet floor cracks and roof board cracks three cases, which features similar. Among them, the crack width of the plate angle is small, basically through; the bathroom floor will along the floor embedded pipelines of the direction of the emergence of small cracks and only stay on the surface of the concrete; crack house panel is fixed to free up and down through the slit and crack width changes with the roof board temperature changing. For these three kinds of common cracks, we must make the corresponding preventive measures according to the causes.

2. Cause of cracks in cast-in-place concrete floor

2.1 Causes of slab angle cracks

(1) Because of the design of the internal force analysis and reinforcement calculation, the selection of the supporting conditions of the plate is not completely consistent with the actual situation, the negative bending moment of the support is not enough. In addition, on the edge of the building exterior wall, frame beam to end cross supporting plate is often considered to be simply supported. Also on the edge of the building exterior wall, frame beam to end cross supporting plate is often considered to be simply supported. Therefore, this supported edge according to the configuration of negative moment reinforcement, but the fact in the corners of the cast-in-place floor, frame beam constraints in plate load deformation is large, is not entirely a simply supported. Especially for large residential projects span a larger plate size, its reinforcement value is small, resulting in the corners of the plate inclined cracks appear, and even the emergence of local parallel to the support side of the cracks on the surface.

(2) Due to improper construction operation and the construction mixture proportion is not reasonable cause cracks. Among them, the construction operation improper is refers in the concrete pouring process of the cast-in-place concrete floor, edge supported slab bearing negative reinforcement often support is not strong, construction personnel human trampling sinking, resulting in bearing negative reinforcement not at the surface of the plate, unable to bear the role of negative moment on the support floor. The mix is mainly due to unreasonable construction, in order to obtain large slump, increase of pumpability. Site blindly increase the water cement ratio, rather than by adding admixtures, moreover the concrete pouring coincided with the northwest region of high temperature, air dry season, after pouring not timely maintenance, making rapid dehydration shrinkage of concrete, and in the free shrinkage deformation is constrained by the relative stiffness of the frame beams, when the constraint column, will form such cracks.

2.2 The cause of the cracks in the toilet floor

(1) Because the bearing capacity of the floor is reduced. On the one hand, the toilet floor of the surrounding support to the floor with a larger constraint, and the floor live load is large. If you only consider the design configuration constructed in accordance with the requirements of bearing negative reinforcement moment, we cannot meet the requirements of the board cracking. And drainage pipe is installed through floor, you need to open holes in the toilet floor, some area of hole is too large, weaken the floor of the structure bearing capacity and crack resistance. On the other hand, toilet plate bottom and the surrounding supporting beam base flat, and bottom plate by ends of the tendons and must be placed in the bottom of the beam by the tendons above. If it does not project the floor under pressure in the middle of the bottom rib construction, so that the plate bottom protective layer of muscle force exceeds the design requirements. The total thickness of the floor in the same circumstances, the effective thickness of the floor in the middle of a corresponding decrease, so that the plate and crack the actual carrying capacity is reduced accordingly.

(2) In embedded pipeline and more larger diameter, concrete along the rectangular floor to due to the absence of vibration compacting and the formation of the line of weakness, constrained by the surrounding supporting and produced restrained shrinkage, will immediately along the length direction of the floor cracking. In the construction, the construction of the toilet floor is not focused on the maintenance, so that the floor concrete dry shrinkage cracking; in addition, the drainage pipe in the concrete shrinkage will lead to the occurrence of cracks in the drainpipe.

2.3 Cause of roof cracks

(1) When the roof insulation height is small, because the air does not flow under the insulation, the heat can not be quickly in the sunlight, temperature variations roof is still large, as the temperature changes in a larger expansion and contraction of the house panel produced a temperature cracks. To wear a pipeline of roof, and the reinforcement of its own relatively weak volume is small, it can not resist the temperature stress, more prone to temperature cracks.

(2) When the roof reinforcement design, if not considered separately resisting temperature stress reinforcement, negative reinforcement roof plate only side in the seat across the range of 1/4 plate set, and in the middle of the plate without plate negative reinforcement become plain concrete, in larger temperature shrinkage stress, middle of the plate can not resist tensile stress, resulting in board temperature cracks.

3. Preventive measures for cracks in cast-in-place concrete floor

3.1 Preventive measures for crack of slab corner

(1) In the analysis of internal forces and reinforcement floor computing design, fully consider the actual situation of the support plate conditions, configuration sufficient to support the reinforcement of negative moment at the support force plate. In the facades of the edge, increasing reinforcement value.

(2) In the concrete pouring process of the cast-in-place reinforced concrete floor, the horse stool way guarantee edge supported slab bearing negative reinforcement firmly supported by construction

personnel trampling sink, so as to ensure the bearing negative reinforcement plate to withstand the negative moment on the support plate. With regard to the problem of the mix proportion, the improvement of the ability of the concrete design is improved by adding additives. In addition, in the maintenance, to focus on the climate factor, strengthen the water retention of concrete.

3.2 Prevention measures for cracks in toilet floor

(1)When do the bathroom floor by the force analysis and reinforcement calculation, taking into account the effect of circumferential beam on the floor of the constraints and the opening of the floor area larger on board bearing capacity and crack resistance, an appropriate increase in reinforcement of bearing negative moment reinforcement and opening? During construction, the stress at the bottom of the slab reinforcement to take effective measures to fixed position, to ensure the plate thickness and design consistent; also in the bathroom floor after the pouring of concrete to in the toilet pit water strengthen maintenance, in order to prevent the shrinkage cracking of concrete.

(2)At the junction of the vertical drains and floor, preferably expansive concrete sealing, between the drain and the board to ensure that no shrinkage cracks. When concrete construction, to vibrators uniform to avoid leakage of vibration.

3.3 Preventive measures for crack of roof panel

(1)The reinforcement design of house panel should be considered separately resisting temperature stress reinforcement, in surface configuration bidirectional not less than $\phi 8@200$ full-length plate of reinforced, to resist the temperature shrinkage stress. Guarantee for the specification of steel bar thickness. Ensure that the position of the bar and the negative moment reinforcement is correct. In the electric wire tube diameter is less than 1/4 thick plate.

(2)Should be possible to reduce the temperature changes in the roof of the house, and strictly do a good job of insulation measures for the roof panel. In the concrete pouring construction, the vibration compaction, strengthen the concrete curing of the roof panel, as far as possible to reduce the weak area of the roof panel, to prevent the occurrence of temperature cracks.

4. Conclusions

In summary, northwest of cast-in-place concrete floor crack, and not a factor causing, but due to various problems existing in the course of design and construction to. Therefore, it is necessary to scientifically and reasonably develop preventive measures, taking full account of the design and construction phase of the various influencing factors based on, according to the actual situation formulation good preventive measures, and make a dynamic management, gradually adjust and improve prevention and control measures, in order to avoid possible cracks.

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