

Experimental Study on Carbonation Resistance and Water Absorbing Property of Concrete Crack with Repair

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1 Introduction

Existing RC buildings ordinary have some cracks. These expand air permeation and water penetration (D. Breysee *et al.*), which cause irregular carbonation (Xiao-Hui *et al.*, 2018), and rebar corrossions rapidly.

On the other hand, cracks of the reinforced concrete components sometimes have been repaired, that last the buildings for long life.

And now, the durability of the reinforced concrete component is evaluated by several way as like as the carbonation resistance test, the permeability test, the water penetration test, and so on. Therefore, it need to be measured how much advantage the concrete crack with repair have for the durability. The aim of this paper is to study on advantage of repairing a crack of the concrete to the carbonation resistance and the water-absorbing property by the experimental way.

2 Specimens and Experiment

The specimens were prepared in the following point. The finishing (direct finishing and mortal tile finishing), crack width (0, 0.05, 0.5, and 2mm), and choice repairing or not. Generally used material and method was selected for repairing the crack. All concrete specimens were formed 10 x 10 x 20cm and those W/C were 0.55. Then, the specimens were experimented by the accelerated carbonation test. After 4, 8 and 26weeks of accelerated carbonation, the carbonation depth at 9 spots on x-x' direction in the Figure 1 were measured by the 1% phenolphthalein reaction. Also, the amount of the absorbed water were measured at 1, 3, 6, 24, 48, 72 and 168h from the water absorption test.

3 Results and Discussion

Figure 2 shows result example of the accelerated carbonation test at 8weeks. The carbonation went rapidly located in 2cm around the crack regardless of finishing type in the case of the no-repair specimens. On the other side, the carbonation of the specimens repaired went evenly from the exposure face, and this was the same process as no-crack specimens. But then, the carbonation depth in the area 10cm far from a crack of the no-repair case were close to the results of no-crack specimens.

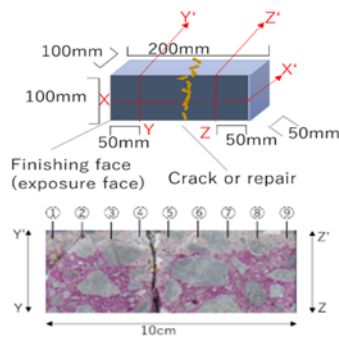


Figure 1. Cut directions and measurement spot in accelerated carbonation test

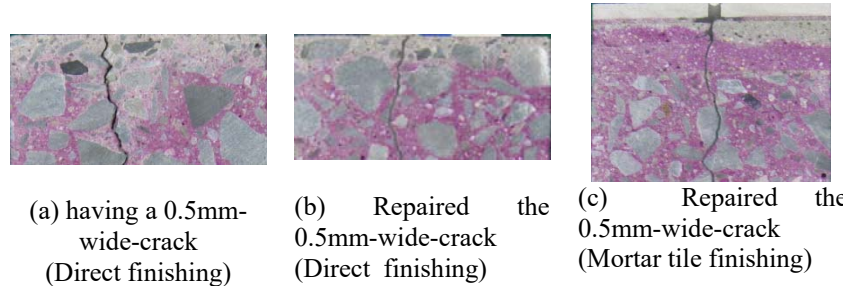


Figure 2. Example of the results of the accelerated carbonation test (8w)

From these results, the repairing service have advantage of the carbonation resistance compared to a crack left, though it is not confirmed durability of the repair materials in itself. Then, compared between different the finishing type, the results shows the mortal tile finishing have larger resistance to carbonation than the direct finishing have. That is as well as the previous studies (Kono *et al.*, 2008).

Then, the results of the water absorbing test shows that the water amount of the no-repair specimens were bigger than that of the no-crack specimens. Also, those of the specimens repaired were smaller than that of the no-repair specimens.

4 Conclusions

- The aim of this paper is to study on advantage of the repairing a crack of concrete to the carbonation resistance and water absorption resistance by the experimental way.
- The mortal tile finishing have larger resistance to the carbonation than the direct finishing have.
- The carbonation went rapidly located in the 2cm around the crack in the case of the no-repair, regardless of any finishing.
- From the results of the repair case, the carbonation went evenly from the exposure face. It was the same process as the no-crack case.
- The amount of the absorbed water of the specimens of having a crack were bigger than the no-crack specimens, and several specimens repaired a crack were smaller than that of the no-repair case.
- Many repairing service have advantage of the carbonation resistance as well as the resistance to water absorption compared to a crack left, though it is not confirmed durability of the repair materials in itself.

References

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