

Experimental Approach to Investigate Watertight Performance of Self-Healing Concretes

[INTRODUCTION]

Crack self healing concrete (SHC) is a promising concrete that can fill in the crack width of 0.2mm by rehydration & re-crystallization processes through chemical & physical mechanisms. It is believed that crack containing water inside activates self healing agent products (Figure 1). As a result, leakage of water is partly reduced or totally stopped over the time of exposure. The water tightness behavior of SHC may contribute to reduce the maintenance of water retaining structures.

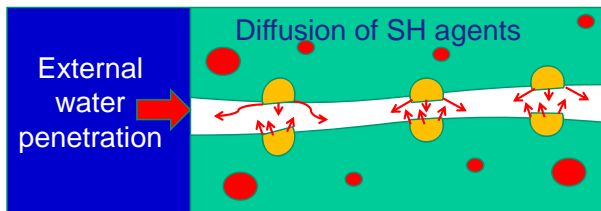


Figure 1. Concept of self healing (SH) phenomenon

[EXPERIMENT]

Evaluation methods for self-healing

A constant water head of 10-cm is used to investigate the effect of SH on different types of concretes by monitoring the amount & pH values of water passing through the pre-cracked specimens (Figure 2). In this experiment, crack width ranges from 0.2 to 0.3mm.

PVU Pipe H100xD105mm



Cylinder H100xD200mm



Figure 2. Test set up Figure 3. SH in small size (left) & in large size (right)

Specimen preparation

Name	Material	Note
FRC	PVA Fiber & OPC	Controlled concrete
SHC-Type S	SH agent in small size	SHC
SHC-Type L	SH agent in large size	SHC

[RESULTS]

The effect of SH on proposed crack SHCs until 28 days is shown below.

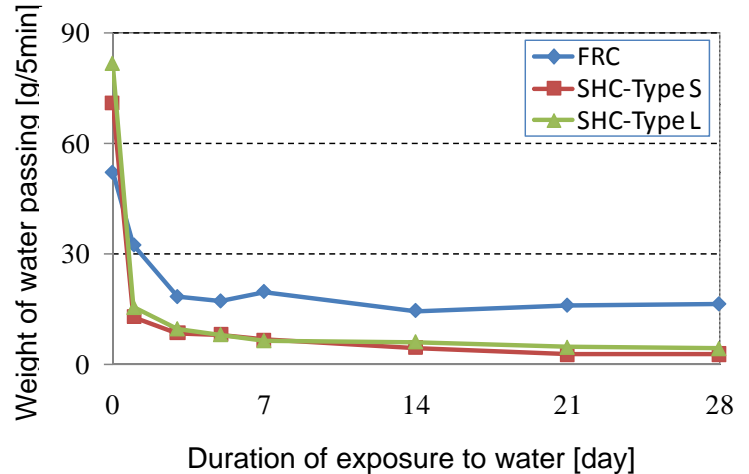


Figure 4. Amount of water passing in 5 minutes

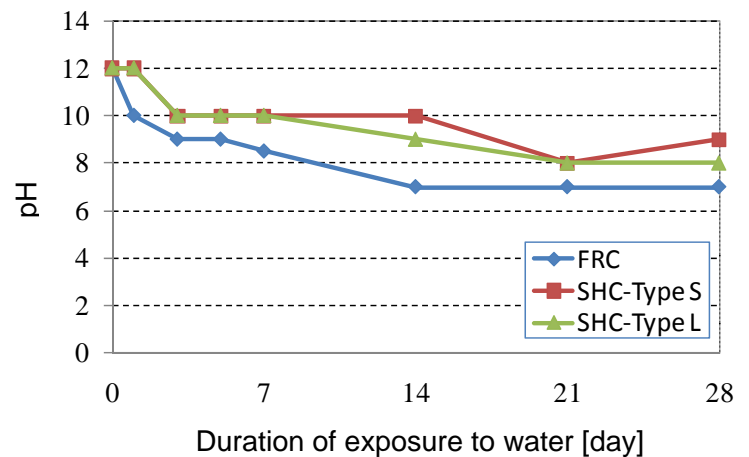


Figure 5. pH values of passing water

[CONCLUSIONS]

1. With regardless to the types of concretes, it is observed that water leakage is reduced over time, especially in the first week. However, depending on the types of concretes used, the decreasing rate of water leakage was different.
2. By looking at the pH values of water passing through the crack, further hydration of SH products can be understood.
3. Under specific experimental conditions, proposed self healing concretes showed a promising improvement in water tightness compared to fiber reinforced concrete.