Protective Performance of Waterproofing Membrane Against Carbonation of Concrete Substrate

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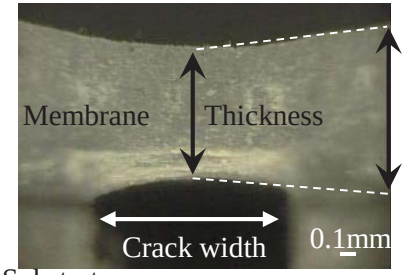
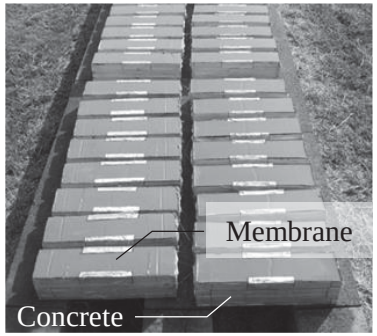
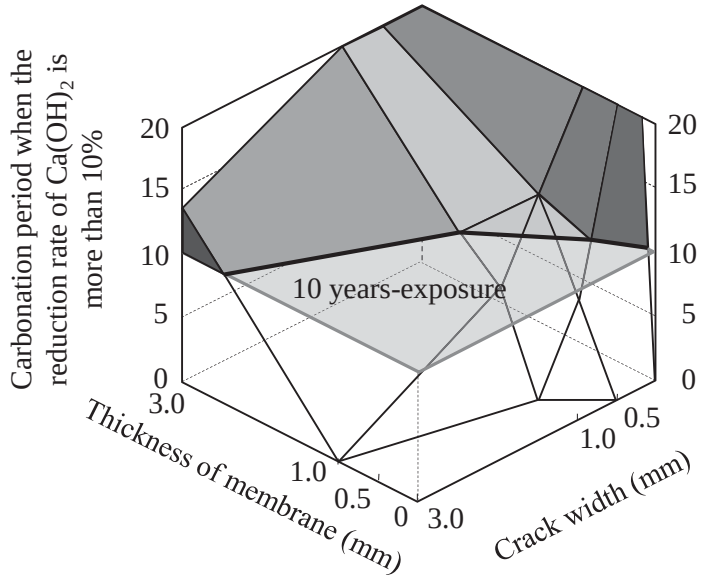


The behavior of membrane at crack area



Exposure test for specimens



Carbonation resistance of waterproofing membrane
(Threshold value of $Ca(OH)_2$ reduction rate: less than 10%)

Content:

Recently, deterioration of concrete structures has become a topic of a great interest because of the continuously increasing cost of repairs and maintenance. When a concrete is in use, deterioration is accelerated by various factors. A corrosion of reinforcing steel in particular has been cited as the primary factor that influences durability. Fundamentally, the interior of concrete is generally highly alkaline, which prevents reinforcing steel from corroding easily. However, carbon dioxide in air permeates into the concrete and carbonation occurs with calcium hydroxide present in the concrete.

Hence, preventing infiltration of carbon dioxide by coating the concrete surface with materials such as finishing materials has been explored. However, it is difficult to eliminate generation of cracks in concrete; consequently, deterioration progresses deep into the substrate cracks and durability decreases. Therefore, when finishing materials are used to improve concrete durability, it is necessary to clarify whether the protective performance against carbonation follows the movement of a substrate even if cracks occur in the substrate after applying the finishing material. Furthermore, since majority of waterproofing materials are organic materials, deterioration is bound to occur when they are subject to sunlight, heat, and rainwater during use. Protective effect on the substrate decreases because of deterioration of the waterproofing material.

Therefore, this study targets the cracked area of the concrete substrate, and using outdoor exposure and carbonation acceleration tests, evaluates the protective performance of waterproofing membranes that deteriorate with aging. Then, numerical simulation results demonstrate various conditions required for carbonation protective performance of waterproofing membrane under long term exposure to outdoor conditions.

Keywords : Waterproofing Membrane, Carbonation of Concrete

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