

Investigations on water penetration and autogenous healing of cracked concrete

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the conditions examined when they were below 0.15 mm, consistent with current standard provisions for water retaining structures. Cracks in some concretes containing certain permeability-reducing admixtures were found to heal at widths of up to 0.3 mm.

On many construction projects in Australia and in other parts of the world, structural elements are designed where limits on design crack width are specified. In many cases, the need for watertightness in the element and the structure is highlighted, resulting in tighter specifications of design crack width. In practice, the reasons for crack propagation in concrete are complex and cracks themselves form and orient themselves in a myriad of ways. In this paper, results from studies on the relationships between water penetration, concrete properties and cracking is presented. Controlled cracks with predefined widths of 0.1 mm to 0.4 mm were induced in concrete specimens through the application of feedback-controlled splitting-tensile loads. Cracked and uncracked specimens were placed into a permeability apparatus where water at a significant head was applied to determine water penetration rates. The permeability characteristics of cracked concrete specimens was determined and compared with that reflective of comparable uncracked concrete specimens. Crack healing was also investigated over time in conventional concretes and with those containing specialty admixtures. Relationships were developed between crack width and water penetration. As expected, larger crack widths resulted in increased water penetration. Cracks in all concretes were found to heal under