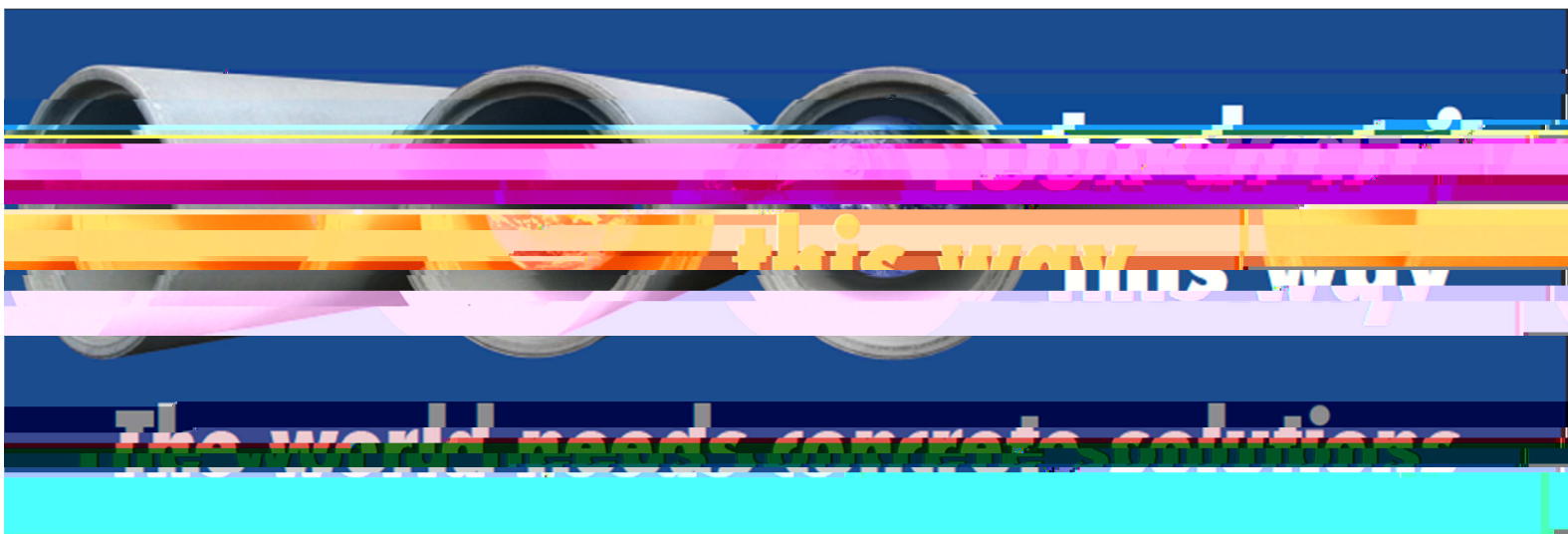


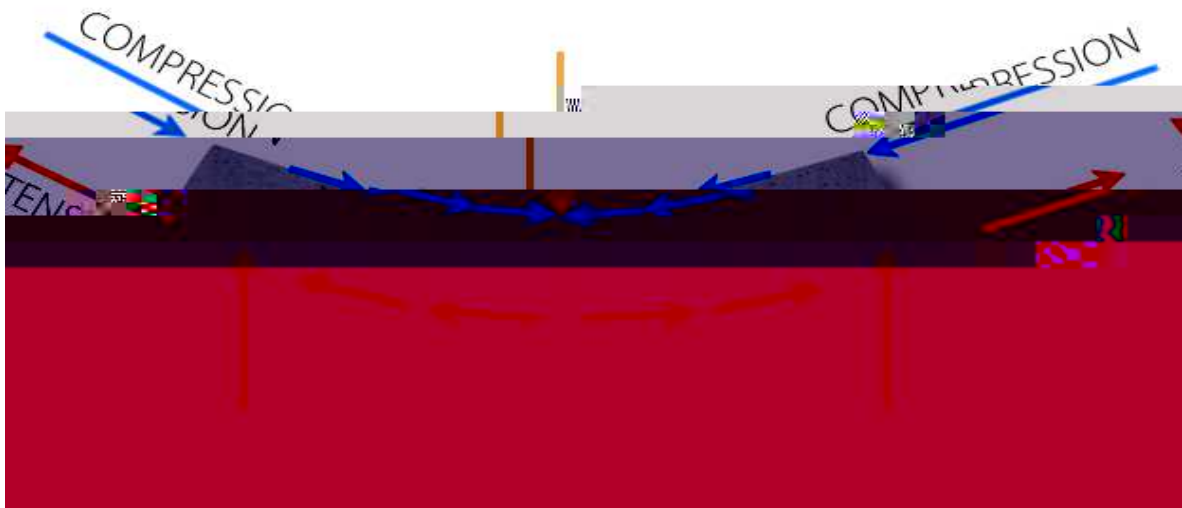


Cracks & Autogenous Healing

What is an Acceptable Crack Width in Concrete Pipe?

Written by: Tyson Dyck, EIT





Autogenous healing of concrete occurs when the continuity between two sides of a crack is restored without repair work. According to the Concrete Society, based in the UK, *“Autogenous healing is the natural process of crack repair that can occur in the presence of moisture and the absence of tensile stress”* [2]. The formation of calcium carbonate crystals. CaCO_3 is the primary cause for the self-healing of cracks.



Figure 3: Calcium carbonate crystals have completely formed over an existing crack in this concrete pipe.

Calcium carbonate crystals are formed in two phases: The first phase involves water reacting with calcium ions, Ca^{2+} , on the surface of the crack; this process occurs much more rapidly than the second phase [3]. After these surface ions are consumed, Ca^{2+} diffusion will develop due to the concentration gradient and continue to form CaCO_3 crystals at a slower rate. Through laboratory testing, it was found that autogenous healing is influenced by the crack width and the prevailing water pressure. Furthermore, the type of cement used and the type of water have no influence in forming CaCO_3 . The formation of CaCO_3 crystals can be accelerated by:

- a rising water temperature
- a rising pH of the water
- a falling CO_2 partial pressure in the water

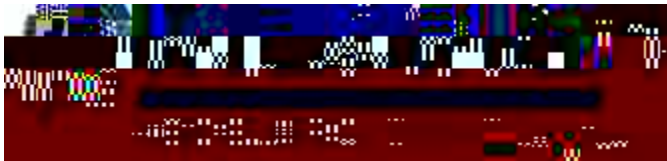
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