

## **A New Approach To Building More Durable Structures.**

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Concrete is widely used in construction for various reasons, including its durability, but remains vulnerable to many deterioration mechanisms that impact its durability. The porous nature of concrete can be one of the primary sources of its proneness to degradation. Leaving concrete exposed to deterioration mechanisms negatively affects the structure's durability; therefore, having suitable protection is vital. Concrete protection is classified into surface-applied and integral systems; here, we thoroughly cover the effects of novel integral admixtures on concrete durability. The first part of this paper presents various studies on the impact of Krystol Waterproofing Admixtures (WA). The test results indicate WA enhances concrete resistance to water penetration, reduces cracking, improves self-sealing, and overall protects concrete against various deterioration mechanisms. Compared with the reference mix, WA-treated concrete had a lower corrosion potential using Linear Polarization Resistance (LPR) method. In addition to laboratory testing, a long-term field study proves the positive effects of WA on corrosion control. Adding WA improved the concrete Durability Factor from 60% to more than 80% after 300 freeze-thaw cycles with no evidence of failure. Besides, adding WA to concrete prevented ASR development, delayed the development of interior damage, and significantly reduced compressive strength loss. The second part will cover a less often considered deterioration mechanism, abrasion, and the effects of Integral Hardening Admixtures (IHA). The results of the various test methods, including an innovative method, show that adding IHA improves concrete abrasion and erosion resistance and, thus, structure service life.