

UTILIZATION OF LIMESTONE AS MINERAL ADMIXTURE IN CEMENT AND CONCRETE

Yue Li and X.L. Du and D. Huo

The architecture and civil engineering college, Beijing University of Technology, Beijing, 100022, China, liyue@bjut.edu.cn

The limestone can be used as mineral admixture in cement and concrete. When the limestone admixture amount is proper ($\leq 10\%$ cement weight), the early strength of the blended Portland cement will be enhanced [1-3]. Limestone powder can also be used as mineral admixture in concrete for enhancing the early strength of concrete. When the fineness of limestone powder is $13000\text{cm}^2/\text{g}$ and the addition amount is 10% of the total binder, the early compressive strength of concrete was remarkably increased [4]. However, all test results show that, when the limestone admixture amount is higher than 10% of cement, the mechanic performance of cement and the concrete obviously reduces, which asking for a good technical solution method.

In this paper, the author introduced a kind of limestone compound active agent (LCAA), which can react with limestone powder and form early strength hydrated product in the cement hydration process, simultaneously can adjust the particles distribution of clinker and limestone powder. The test results show that LCAA will greatly increase the compressive and bending strength of blended limestone cement. For example, when cement clinker is 61MPa , and the cement finesse is $4100 \pm 100\text{cm}^2/\text{g}$, and the limestone addition amount is 30% of cement, the compressive and bending strength of blended limestone cement separately is 46.1MPa and 7.1MPa , which is 38.4% and 14.5% more than that of the limestone Portland cement without LCAA. In addition, the other physical properties of limestone Portland cement are completely normal. This article similarly studied the properties of concrete with limestone powder admixture, the test results show that proper addition of limestone powder will remarkably enhance the early strength and slump of the concrete, and reduce the slump loss depending on time. LCAA also have good effects on the strength increment of limestone powder concrete. Employing XRD and SEM studied the limestone Portland cement hydration and hardening mechanism. The result indicates, $\text{C}_3\text{A} \cdot \text{CaCO}_3 \cdot 11\text{H}_2\text{O}$ is the stable hydration product between limestone and C_3A , and the limestone Portland cement paste has the dense microscopic structure.

References

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