Influence of atmospheric steam curing by solar energy on the compressive and flexural strength of concretes

Authors: B. BENAMMAR, B. MEZGHICHE and S. GUETTALA.

Abstract

In this paper, influence of atmospheric steam curing by solar energy on the compressive and flexural strength of concretes for precast elements was investigated. An experimental program was carried out to studying in parallel the effect of water/cement ratio (0.4, 0.5 and 0.6), the influence of cement type and the influence of curing methods (four methods of curing were used: water curing, air curing, steam curing at 29 C and steam curing at 45 C) on the compressive and flexural strength of concretes. Six formulations of similar workability made from ordinary Portland cement (CEM I 42.5) and a composite cement (CEM II/B 42.5) three of each type are studied. The results allow us to highlight the beneficial effect of a steam curing procedure to achieve high compressive and flexural strength, especially in the earlier ages of curing. However, after 28 days of steam curing, a strength reduction was observed in all samples. The technique of steam curing by solar energy is an effective technique for accelerated hardening of concretes, for a good strength and high electrical energy saving for precast concretes production. We can say that the increased compressive strength during the progress of the reaction of hydration is accompanied by an increase in flexural strength. Through the results obtained a gain of time and shorter manufacturing lead times to reach the compressive strength at 28 days in the free air after a one day steam curing and 3 days of hardening in the free air for the two types cement and the different w/c ratios.

Link http://www.scopus.com/record/display.url?eid=2-s2.0-84884784585&origin=inward&txGid=9C2E176579725CED300CC8012A162686.ZmAySxCHIBxxTXbnsoe5w%3a1