Effect of Temperature on Load Carrying Capacity of a Plain Concrete Beam

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ABSTRACT

Fire requires a little source to be ignited but takes much more effort and cost to be controlled. In our country, Ethiopia, there were so many fire accidents which damage many structures and part of structures. Our knowledge on the properties of concrete under extreme temperature is limited and not well documented and makes it difficult to take into account fire resistance in the design of structures. This paper focused on studying the effect of temperature on the performance of plain concrete beam. Performance here indicates the response of plain concrete beam subjected to higher temperature; it includes variation of vertical displacement and variation of load carrying capacity with the reference of load-displacement curve for different temperature and temperature exposure duration. In this study; concrete grade, temperature and duration of temperature exposure are taken as factor to be considered for concrete strength. Experimental investigation was carried out on a plain concrete beam for four different concrete grades to compare the load carrying capacity after it has been exposed to a desired temperature. And it has been found that C-15 and C-25 plain concrete beam significantly affected by exposed temperature magnitude and C-30 and C-40 plain concrete beam significantly affected by exposed temperature duration. It has shown that higher concrete grade shows better resistance for fire. The rate at which the plain concrete beam lost strength for each concrete grade is also investigated.

Keywords: *Load carrying capacity, Plain concrete beam, Concrete grade, Temperature, Displacement*