

Comparative study of properties of accelerated aged concrete and normally aged concrete

S. K. Ghosh^a and M. H. Hubler^{a*}

^a University of Colorado Boulder, CO, USA

* corresponding author: mija.hubler@colorado.edu

Abstract:

The procedure for accelerated aging of concrete is concerned with the stability of the concrete microstructure and aims to accelerate the autogenous processes that continue after the initial period of curing. The method involves heating concrete samples at a specified elevated temperature under sealed moisture conditions for a calculated period until the desired concrete age is reached. This procedure has been calibrated based on the Arrhenius equation to arrive at the compressive strength of aged samples within shorter testing times. Here we experimentally investigate the impact the procedure on other properties of concrete including the modulus of elasticity, tensile strength, and fracture energy to see if samples that have been aged can be used to represent other stress states, or would require adjusted aging rules. In this study three sets of concrete samples of the same batch were initially cured under the same conditions. One set was exposed to ambient laboratory aging conditions without creep loading. The second set was exposed to 95 degrees Celsius also without creep loading. The third set was exposed to 95 degrees Celsius with a constant load of 30% of its 28-day strength during the entire aging period. Once all the sets achieved the required age, a comparative analysis of accelerated aging samples and natural aging samples is made. By studying the added effect of creep loading on the elevated temperature we are also able to identify if creep and heat provide a more representative aging process.