YOTCHAI JUPRAPATTASRI : A STUDY ON ADIABATIC TEMPERATURE RISE IN MASS CONCRETE. THESIS ADVISOR : PROF.EKASIT LIMSUWAN, Ph.D., 133 PP.

Heat generation in mass concrete causes unbalanced stresses due to expansion and contraction in structures so that cracks would be induced and lead to sturctural damages. To solve such problem, heat generation and dissipation in mass concrete should be studied. For heat generation, adiabatic temperature rising tests were conducted on the basis of several variables such as cement type, cement content, water cement ratio and concrete placing temperature. For heat dissipation, the Finite Element Method was employed to analyze heat in concrete structures effected from heat conduction, convection and radiation, on surface and in the mass, considering solar absorption, surface evaporation, pipe cooling system and time constraint from construction sequence.

The adiabatic temperature rising tests in this program used concrete 50 litre for each specimen ,they were cast and covered with poly-styrene foam, then kept in the oven so that surrounding temperature could be automatically adjusted to the one in the specimen. Such method was applied to simulate mass concrete condition so that heat generation has varied with time and rate of hydration . The maximum temperature would be reached within 42-65 hr. after mix.

The results of adiabatic temperature rising test have shown less influence from water to cement ratio and placing temperature but the adiabatic temperture rise was much affected from cement content and cement type .The temperature rise have found to be 1 $^{\circ}C$ increase for every 10 $Kg./m.^{3}$ increase in cement content. The maximum temperature rises for cement type I, III and V were found to be at ratio of 1.0, 1.1 and 0.9, respectively. Heat generating equations were fitted to analyze temperature in mass concrete structures. The results were compared to the calculation from heat of hydration and to the measurement from actual structures. The results indicated that the adiabatic temperature rise as heat generating equation in this study produced less temperature than the measurement and by means of numerical solution, the factor of 1.7 should be applied to the adiabatic test results to obtain reliable temperatures in the mass concrete structure.