

**FIELD MEASUREMENTS OF EARLY AGE
TEMPERATURE RISE AND SEASONAL TEMPERATURE
VARIATION IN CONCRETE**

**Thesis submitted to the Department of Civil Engineering of
University of Moratuwa in partial fulfillment of the
requirements for the degree of
Master of Engineering in Structural Engineering Design**

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DECLARATION

I herewith declare that the work included in this thesis in part or whole has not been submitted for any other academic qualification at any institution.

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Abstract

BS8007 provides a method to prevent early thermal cracking in concrete water retaining structures based on the temperature fall between hydration peak and ambient temperature (T_1) and the temperature variation due to seasonal variation (T_2). Though Sri Lankan designers use the T_1 values given in Table A.2 of BS8007 in this methodology, these are not relevant to Sri Lankan climatic conditions and other concreting practices. Experimental investigation on T_1 value for wall panels with 12mm plywood formwork and concrete mix with cement content of 400Kg/m^3 has been completed recently. This study presents the field investigations carried out at 19 water retaining structures at 11 sites. Thickness of concrete section, cement content, W/C ratio, type of cement, type of formwork, thickness of the formwork, concrete grade, quantity of ice were variables considered in this investigation. T_1 values were measured at every 10 minutes interval for 3 days at these sites. It was found that T_1 values observed in actual Sri Lankan field conditions were less than the corresponding value given in BS8007 and fairly close to the values proposed in the experimental investigation carried out at University of Moratuwa. It is also noted that use of ice to reduce the temperature of fresh concrete is not much helpful to reduce the maximum temperature rise due to heat of hydration. Measurement of temperature variation inside the concrete sections due to seasonal variation was carried out 10 and 40 days after concreting to understand the effect of seasonal temperature variation on internal temperature variation of concrete sections. Recommendation has been made on T_2 values based on analysis of monthly temperature data of 14 cities for last 17 years.

Keywords: Heat of hydration, Field investigations, Water retaining structures
Temperature variation due to seasonal variation

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Eng. S.K.H. Perera

December 2004

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