



Effect of Moisture Content on Thermal Coefficient of Expansion of Concrete

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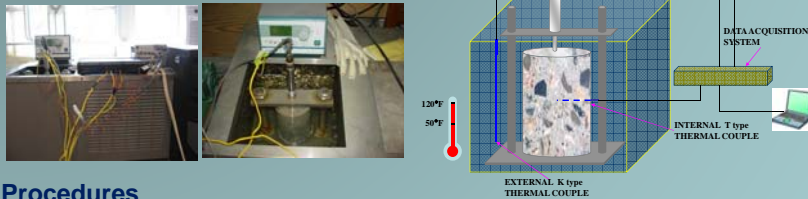


AASHTO TP60-00 Coefficient of Thermal Expansion

Scope

Most materials, including concrete, expand when they are heated and contract when they are cooled. The amount of expansion or contraction in response to a given temperature change depends on its coefficient of thermal expansion (CTE). A concrete with a large CTE will expand more in response to a given temperature rise than a concrete with a small CTE. Due to the impacts in concrete CTE allows for the assessment of the potential for temperature related length/volume change of concrete, such as the pavement joint opening and slab curling. They are a key inputs in the new Mechanistic- Empirical Pavement Design Guide.

Test Setup



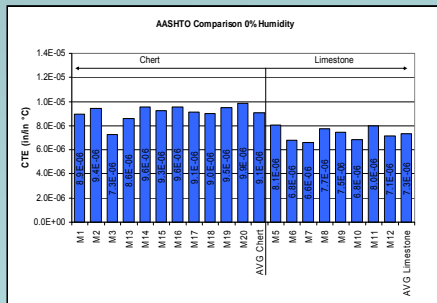
Procedures

- 1) Keep the specimen in saturated limewater at 23±20°C (73±4°F) for at least 48 hours before testing.
- 2) Cut half an inch from top and bottom of 4x 8 inch cylinders to obtain a 4x7 inch test specimen.
- 3) Set the temperature of the water bath from 50±2°F. Allow the bath to remain at this temperature for at least 60 minutes, then increase the temperature to 122±2°F; Remain for at least 60 minutes, once again to 50±2°F, and remain for at least 60 minutes.
- 4) Place the measuring apparatus (Invar frame) with LVDT attached in the water bath
- 5) Measure the initial length of the specimen at room temperature. Place the specimen in the measuring apparatus, making sure that the lower end of the specimen is firmly seated against the three support balls and that the LVDT tip is seated against the upper end of the test specimen.
- 6) Start the water bath and data acquisition system simultaneously.

CTE Calculation

- $CTE = (\Delta L_a / L_0) / \Delta T$
- $\Delta L_a = \Delta L_m + \Delta L_f$
- $\Delta L_f = C_f * L_0$
 L_0 -original length of specimen
 C_f -correction factor of the frame
 ΔL_f -length change of frame
 ΔL_m -measured length change (LVDT reading)
 ΔL_a -actual length change

Results



DANISH STANDARD TI-B Coefficient of Thermal Expansion

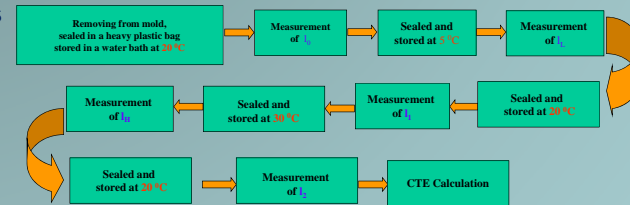
Scope

This TI-B method describes a method for the determination of the thermal expansion coefficient of concrete in the temperature range of 5°C to 30°C on sealed test specimens.

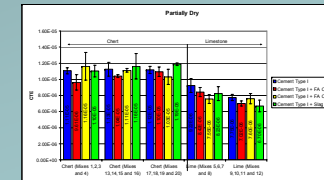
Test Setup



Procedures



Results



STRAIN GAGE MEASUREMENT Coefficient of Thermal Expansion

Test Setup



Test specimens with embedded humidity sensor SHT75

Results

