

CASTinTACT®

Concrete Tactile Warning Panels

Coefficient of Linear Thermal Expansion of Concrete

CRD-C 39 Test Method for Coefficient of Linear Thermal Expansion of Concrete

This test method covers the determination of the coefficient of linear thermal expansion of concrete test specimens by determinations of length change due to temperature changes. Because the thermal coefficient of concrete varies with moisture condition, being a minimum when saturated or oven dry and a maximum at about 70 percent saturated, it is important to select the relevant moisture condition for the test to be made.

CASTinTACT® specimens were cut from full size detectable warning panels and the measuring pins were epoxied into holes that were drilled into the ends of the specimens.

CASTinTACT® Thermal Expansion	
50% RH	
	in/in per °F
Sample A	6.8 x 10 ⁻⁶
Sample B	6.7 x 10 ⁻⁶
Sample C	6.8 x 10 ⁻⁶
Sample D	6.5 x 10 ⁻⁶
Sample E	6.5 x 10 ⁻⁶
Average	6.7 x 10⁻⁶
95% RH	
	in/in per °F
Sample A	8.2 x 10 ⁻⁶
Sample B	8.1 x 10 ⁻⁶
Sample C	8.0 x 10 ⁻⁶
Sample D	7.9 x 10 ⁻⁶
Sample E	8.1 x 10 ⁻⁶
Average	8.1 x 10⁻⁶

Calculation

The coefficient of linear thermal expansion shall be calculated from the measurements by the use of the following formula:

$$C = \frac{(R_h - R_c)}{G \Delta T}$$

Where:

C = coefficient of linear thermal expansion of the concrete 10⁻⁶/deg F (deg C)

R_h = length reading at higher temperature, in. or mm

R_c = length reading at lower temperature, in. or mm

G = gage length between inserts, in. or mm

ΔT = difference in temperature of specimen between the two length readings, deg F or deg C

Other Materials Thermal Expansion	
Product	in/in per °F
Brick Masonry	3.1 x 10 ⁻⁶
Cast Iron Gray	6.0 x 10 ⁻⁶
Steel	7.3 x 10 ⁻⁶
Concrete	8.0 x 10 ⁻⁶
Epoxy Resins	31.0 x 10 ⁻⁶
Polyester Resins	69.0 x 10 ⁻⁶