

## CONCRETE COEFFICIENT OF THERMAL EXPANSION (AASHTO T 336)

The coefficient of thermal expansion (CTE) is a parameter that quantifies the extent to which a material changes length in response to changes in temperature. CTE has a large impact on the performance of concrete pavements because a uniform temperature change will affect the opening/closing of joints and a temperature gradient through the thickness of the slab will produce curling of the slab. Accurate measurements of CTE will allow for better estimates of slab movement and stress development due to temperature changes.

The AASHTO's Pavement ME Design software is believed to be one of the first design approaches that incorporate the CTE of concrete as an input parameter in the design of rigid pavements. Numerous studies in the past ten years have indicated that CTE is one of the most sensitive inputs for pavement design and has a significant impact on the design pavement thickness. Due to the sensitive nature of the CTE input, it is important that CTE be accurately measured to optimize pavement designs (i.e., prevent over- or under-designing concrete pavements). The resulting longer lasting and smoother pavements save agencies enormous amount of money.

Some states are also considering the use of CTE as an acceptance and/or contractor quality control test on concrete paving projects.

The importance of the CTE as a pavement design input has significantly increased interest in CTE testing. Many state highway agencies and universities are currently characterizing their states' materials as part of the Pavement ME Design implementation activities. Over the years, FHWA has performed considerable work in developing and refining the test method. Currently there is an AASHTO Test Method (T336) for conducting this test. CALTRANS is currently using this test for quality assurance. CALTRANS specifications require the contractor to test CTE of concrete from production on a daily basis for both continuously reinforced and jointed plain concrete pavements.

With the advent of AASHTO-ME for pavement design, it is very important to accurately measure CTE of concrete rather than rely on default CTE values (based on the type of aggregate used in the concrete) from literature, which may or may not be accurate.



CTE Equipment



CTE Frame

**Vendors:**

Gilson Company, Inc  
PO Box 200  
Lewis Center, OH 43035  
Phone: (800) 444 1508  
[www.globalgilson.com](http://www.globalgilson.com)  
Price: \$25,472

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101 Industrial Drive  
Grove City, PA 16127  
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[www.pineinst.com](http://www.pineinst.com)  
Price: \$10,600

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