



The cement can be any brand complying with the requirements of Section 90 of the Caltrans Standard Specifications for Type II Modified Cement. All concrete and mortar mixes made for the purposes of satisfying the requirements of this method must be made using cement from the same cement mill.

#### **E. TESTING**

1. Determine the sand equivalent and cleanness value of the aggregates by California Test 217 and California Test 227.
2. For relative mortar strength, follow the test procedure of California Test 515, except use the referee sand in place of Ottawa sand. The grading requirements of Section G.2. will not apply. Use the sand in the "as received" grading and the amount of water required for a flow of 75 to 85. Determine the compressive strength after seven days curing.
3. For comparing the drying shrinkage of mortar, follow the procedures outlined in California Test 527, except use the same test mortars as prepared for determining the cube strength. Follow the procedure of California Test 527 for fabrication, curing, drying and measuring contraction.
4. For comparing compressive strength of concrete, prepare concrete test cylinders using concrete with grading, cement content and consistency similar to that proposed for the work. Following applicable procedures in California Test 521, test at least six 6 in. dia × 12 in. cylinders made from each test aggregate. Determine the compressive strength after 28 days of moist curing.
5. For comparing the drying shrinkage of concrete, prepare specimens from the same concrete mix prepared for the compressive strength tests. Follow the applicable provisions of California Test 530, except for a 1 in. maximum sized aggregate, either 3 in. × 3 in. × 11¼ in. or 4 in. × 4 in. × 11¼ in. bars may be used. For larger sized aggregate, up to 1½ in. maximum, 4 in. × 4 in. × 11¼ in. or 4 in. × 5 in. × 18 in. bars must be used. The same size bars must be used for both the "referee" and the plant test sample.

Determine the drying shrinkage of the concrete after 14 days drying for concrete made in the 3 in. × 3 in. × 11¼ in. molds, and after 21 days of drying for concrete made in the 4 in. × 4 in. × 11¼ in. or 4 in. × 5 in. × 18 in. molds.

#### **F. REPORT**

The report shall include the sand equivalent and cleanness value of the aggregates used for the test, mix proportions used for the concrete tests, and the measured values of strength and shrinkage of the mortar and concrete as determined by the tests. Compute and report the "relative strength" and "relative shrinkage" as follows:

##### Relative Strength:

Divide the average compressive strength of the mortar or concrete made with the batch plant sample by the corresponding compressive strength of the "referee" sample, and multiply by 100. The resulting value will be the relative compressive strength expressed as a percent.

Relative Shrinkage:

Divide the measured shrinkage of the test mortar or concrete made with the batch plant sample by the measured shrinkage of the corresponding "referee" mortar or concrete and multiply by 100. The resulting value will be the relative shrinkage expressed as a percent.

**G. HEALTH AND SAFETY**

It is the responsibility of the user of this test method to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use. Prior to handling, testing or disposing of any materials, testers must be knowledgeable about safe laboratory practices, hazards and exposure, chemical procurement and storage, and personal protective apparel and equipment.

Caltrans Laboratory Safety Manual is available at:

[http://www.dot.ca.gov/hq/esc/ctms/pdf/lab\\_safety\\_manual.pdf](http://www.dot.ca.gov/hq/esc/ctms/pdf/lab_safety_manual.pdf)

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**(California Test 549 contains 3 pages)**