

CALIFORNIA COUNCIL OF TESTING & INSPECTION AGENCIES

Laboratory Internal Auditing ASTM C496-04

Standard Test Method for Splitting Tensile Strength of Cylindrical Concrete Specimens

Company Name	Company Address
Telephone No.	
Completed By:	Signature

- This test method covers the determination of the splitting tensile strength of cylindrical concrete specimens, such as molded cylinders and drilled cores.
- The text of this standard references notes that provide explanatory material. These notes shall not be considered as requirements of the standard.
- This test method consists of applying a diametral compressive force along the length of a cylindrical concrete specimen at a rate that is within a prescribed range until failure occurs. This loading induces tensile stresses on the plane containing the applied load and relatively high compressive stresses in the area immediately around the applied load.
- Tensile failure occurs rather than compressive failure because the areas of load application are in a state of triaxial compression, thereby allowing them to withstand much higher compressive stresses than would be indicated by a uniaxial compressive strength test result.
- Splitting tensile strength is generally greater than direct tensile strength and lower than flexural strength (modulus of rupture).
- Splitting tensile strength is used in the design of structural lightweight concrete members to evaluate the shear resistance provided by concrete and to determine the development length of reinforcement

1.00 Apparatus	Ref	Yes	No	N/A	Comments
1.1 Does the testing machine conform to the requirements of C39?					
1.2 Can the testing machine provide a constant rate of loading of 100 to 200 psi/min of splitting tensile stress until failure?					
1.3 Has the technician calculated the rate from above?					
1.4 If the diameter or largest dimension of the upper bearing face or the lower bearing block is less than the length of the cylinder is a supplemental bearing bar being employed?					
1.5 Has the supplemental bearing bar been machined to within ± 0.001 in. of planeness?					
1.6 Is the load being applied to the specimen through 1/8 in thick plywood strips?					
1.7 Are the plywood strips approximately 1 in wide and of a length equal to or slightly longer than the specimen?					
1.8 When a supplemental bearing bar is used has a plywood-bearing strip been placed between it and the specimen?					
1.9 Has the plywood bearing strips been reused?					

2.00 Test Specimens	Ref	Yes	No	N/A	Comments
2.1 Does the test specimens conform to the size, molding, and curing requirements set forth in either Practice C 31/ C 31M (field specimens) or Practice C 192/C 192M (laboratory specimens).?					
2.2 When testing drilled cores do they conform to the size and moisture-conditioning requirements set forth in Test Method C 42/C 42M?					
2.3 Are moist cured specimens tested in a moist condition as soon as practicable and kept moist during the period between their removal from the curing environment and testing?					
2.4 Are light-weight concrete: specimens tested at 28 days in a air-dry condition after 7 days moist curing followed by 21 days drying at $73.5 \pm 3.5^{\circ}\text{F}$ [$23.0 \pm 2.0^{\circ}\text{C}$] and $50 \pm 5\%$ relative humidity?					

3.00 Procedure	Ref	Yes	No	N/A	Comments
3.1 Has diametral lines been marked on each end of the specimen with a suitable device that will ensure that they are in the same axial plane?					
3.2 Has the diameter of the test specimen been determined to the nearest 0.01 in. [0.25 mm] by averaging three diameters measured near the ends and the middle of the specimen and lying in the plane containing the lines marked on the two ends?					
3.3 Has the length of the specimen been determined to the nearest 0.1 in. [2 mm] by averaging at least two length measurements taken in the plane containing the lines marked on the two ends?					
3.4 Has the lower plywood bearing strip been centered along the center of the lower bearing block?					
3.5 Has the specimen been placed on the plywood strip and aligned so that the lines marked on the ends of the specimen are vertical and centered over the plywood strip?					
3.6 Has the second plywood strip been placed lengthwise on the cylinder, centered on the lines marked on the ends of the cylinder?					
3.7 Does the projection of the plane of the two lines marked on the ends of the specimen intersects the center of the upper bearing plate?					
3.8 Has the load been applied continuously and without shock, at a constant rate within the range 100 to 200 psi/min [0.7 to 1.4 MPa/min] splitting tensile stress until failure of the specimen (Note 1)?					
3.9 Has the maximum applied load indicated by the testing machine at failure been recorded?					
3.10 Has the type of failure and the appearance of the concrete been noted?					
NOTE 1—The required loading range in splitting tensile stress corresponds to applied total load in the range of 11 300 to 22 600 lbf [50 to 100 kN]/min for 6 by 12-in. [150 by 300-mm] cylinders.					

4.00 Calculation	Ref	Yes	No	N/A	Comments
4.1 Has the splitting tensile strength of each specimen been calculated using the computed cross-section based on the average diameter of the specimen?					

5.00 Report	Ref	Yes	No	N/A	Comments
5.1 Does the report have the following information?					
a) Identification number,					
b) Diameter and length,					
c) Maximum load,					
d) Splitting tensile strength (to nearest 5 psi)					
e) Estimated proportion of course aggregate fractured during test,					
f) Age of specimen,					
g) Curing history,					
h) Defects in specimens,					
i) Type of fracture,					
j) Type of specimen.					

6.00 Precision & Bias	Ref	Yes	No	N/A	Comments
An interlaboratory study of this test method has not been performed. Available research data, ³ however, suggests that the within batch coefficient of variation is 5 % (see Note 4) for 6 X 12-in. [150 X 300-mm] cylindrical specimens with an average splitting tensile strength of 405 psi [2.8 MPa].					
The test method has no bias because the splitting tensile strength can be defined only in terms of this test method.					

.00	Ref	Yes	No	N/A	Comments

Prepared by Terry L. Egland with *Testing Engineers, Inc.* San Leandro, California, November 19, 2004
terry@testing-engineers.com