

Concrete Strength Testing Study Guide

ASTM C 617 – CAPPING CYLINDRICAL CONCRETE SPECIMENS

- Neat cement caps and high-strength gypsum-plaster shall be formed against a glass plate at least ______ in. thick, a machined metal plate at least ______ in. thick, or a polished plate of granite or diabase at least ______ in. thick.
- 2. Plates used for sulfur capping have a recessed area to hold sulfur that cannot be more than ______ in. deep.
- In all cases, plates shall be at least ______ in. greater in diameter than the test specimen and the working surfaces shall not depart from a plane by more than ______ in ______ inches.
- 4. Alignment devices ensure that the resulting caps are perpendicular to the axis of the cylinder to within ______°.
- 5. A pot with ______ is required for melting and heating sulfur mortar.
- 6. Never heat the melting pot over an ______. The sulfur pot must be located under a ______ to exhaust the fumes.
- 7. Capping materials used on cylinders with an expected strength of 500 to 7000 psi must have a minimum strength of _____ psi or the cylinder strength, whichever is greater.
- To qualify sulfur mortar or gypsum used to test concretes with strengths greater than ______ psi, that has a strength less than the cylinder strength, the average strength of the cylinders capped with the capping material must be at least ______ % of the average strength of the companion cylinders.
- 9. All capping materials are tested for compressive strength using _____ in. cubes.
- 10. The strength of capping material are tested on receipt of a new lot and at intervals at least every _____ months.
- 12. For gypsum cement paste, a lower water-cement ratio will yield _________ strength results, but the resulting mixture will be _______ workable.



- 13. Use only ______ to cap freshly molded cylinders.
- 14. Use a carpenter square across the top and down the side of the cylinder to check that the difference between the highest point and lowest point across the ______ of the cylinder is not more than ______ in.
- 15. When capping with high strength gypsum, place a conical mound of paste on top of the _______ on top of the paste and apply downward pressure until the plate contacts the top of the cylinder.
- 16. Prepare sulfur mortar for use in capping by heating to a temperature between _____and ______°F.
- 17. Sulfur can be reused if the cylinders previously tested had strengths less than ______ psi. The oldest material in the pot shall not be used more than ______ times.
- 18. Check the temperature at approximately_____ intervals during capping.
- 19. The capping plate or device shall be warmed before use. This will cause the sulfur to ______ and the resulting cap will be ______.
- 20. In preparing the cylinder for sulfur capping, make sure that the ends are dry enough to avoid ______ or foam pockets larger than _____ in.
- 21. Sulfur mortar must be allowed to harden a minimum of ______ hours before testing concrete strengths of ______ psi or greater.
- 22. During each day's capping operation, check the ______ on at least ______ specimens prior to compression testing by using a ______ and a ______ in. feeler gauge.
- 23. During each day of compression testing, check the ______ of caps on at least ______ specimens.
- 24. To check cap thickness, after completing the compression test, recover at least ______ pieces of the capping material from the selected specimen and measure and record the thickness to the nearest ______ in.
- 25. Do not test capped cylinders before the caps have had enough time to develop



ASTM C 1231 – USE OF UNBONDED CAPS IN DETERMINATION OF COMPRESSIVE STRENGTH OF HARDENED CONCRETE SPECIMENS

- 26. Use of unbonded caps below ______ psi or above ______ psi is not permitted.
- 27. Pads shall be ______ in. thick and the diameter shall not be more than ______ in. smaller than the inside diameter of the ring.
- 28. _____ pads are disposable and should only be used the number of times specified in the Table unless qualification tests are done.
- 29. For an anticipated cylinder strength of 3500 psi, the correct pad durometer used could be ______ or _____.
- 30. The maximum number of reuses allowed on a neoprene pad that will be testing concrete in the range of 1500 to 7000 psi is ______. For concrete in the range of 7000 to 12000 psi, the maximum number of reuses is ______.
- 32. The height of the retaining ring shall be ______ in.
- 33. The inside diameter of the retaining ring shall not be less than ______% or greater than ______% of the diameter of the cylinder.
- 34. The bearing surfaces of the retaining rings must be plane to ______ in.
- 35. A straight edge and a round wire gauge with a diameter of up to ______ in are required for checking the ends of cylinders prior to using unbonded caps.
- 36. The remainder of the testing is done according to ASTM Test Method ______.
- 37. When tests are to be made to establish a permissible number of *reuses* exceeding those in Table 1, only those reuses which are within ______ psi of the ______ strength level to be qualified will be included in reuse count.
- 38. When testing for qualification or pad reuse, a minimum of ______ of cylinders shall be made at the ______ and ______ strength levels desired or anticipated. Average strength of cylinders tested must not be less than _____ % of the average strength of the companion capped/ground cylinders.



ASTM C 39 – COMPRESSIVE STRENGTH OF CYLINDRICAL CONCRETE SPECIMENS

- This test method is limited to concretes with a unit weight in excess of _______
 lb/ft³.
- 40. The compressive strength values obtained using this test method are dependent on several variables including the ______ and shape of the specimen being tested, batching, mixing procedures, age, temperature and ______
- 41. Testing machines must be verified as follows:
 - Within _____ months of last calibration,
 - On original ______ or immediately after relocation,
 - Immediately after making _____ or _____
 - Whenever there is a reason to suspect the ______ of the indicated loads.
- 42. The compression machine must be accurate to ______ of the indicated load.
- 43. The upper bearing block is a ______ and _____, commonly referred to as the spherical head.
- 44. All bearing blocks must be at least ______ % larger than the nominal diameter of the cylinder being broken with them.
- 45. Except for the concentric circles, the bearing faces of the testing machine shall not depart from a plane by more than ______ in. in 6 in.
- 46. The lower bearing block shall be at least _____in. thick when new, and ______in. after any resurfacing.
- 47. The ball and socket portions of the spherical head should be taken apart and cleaned thoroughly at least every _____ months. The pieces should be _____ with a petroleum-type oil.
- 48. The maximum diameter of the bearing face of the suspended spherically seated block shall not exceed ______ inches for a 6 inch diameter test specimen.
- 49. For a specimen that is ______ inches in diameter, the maximum diameter of the bearing face of the suspended spherically seated block shall not exceed 6.5 inches.



- 50. Prior to testing, neither end of the test specimen shall depart from perpendicularity to the axis by more than ______°.
- 51. Any end of a test specimen that is not plane to within ______ in. needs to be ______, ground or ______.
- 52. The diameter used for calculating the cross-sectional area of the specimen, shall be determined to the nearest ______ in. by averaging two diameters measured at ______ to each other at about the midheight of the specimen.
- 53. Specimens shall not be tested if any individual diameter of a cylinder differs from any other diameter of the same cylinder by more than ______ %.
- 54. The number of individual cylinders measured to be used for determining average diameter is not prohibited from being reduced to one for each ______ or _____ per day, whichever is greater, provided they are from a single lot of molds and consistently produce average diameters within a range of 0.02 in.
- 55. If a density measurement is required, the length of the specimen is measured to the nearest _______in. at ______ locations spaced evenly around the specimen.
- 56. Test specimens shall be tested in a _____ condition.
- 57. The allowable testing time tolerance for a 28 day old cylinder is ______ hours.
- 58. Wipe clean the ______ of the upper and lower bearing blocks, spacers if used, and of the specimen.
- 59. Align the center of the cylinder with the ______ of the _____ bearing block. ______ the ______ bearing block so that the bearing face is ______ to the top of the cylinder.
- 60. Prior to testing, verify that the load indicator is set to ______.
- 61. If using unbonded caps, apply up to _____% of the anticipated specimen strength and verify that the axis of the cylinder does not depart from vertical by more than ______°.
- 62. Apply the load continuously and without shock at a rate of ______psi/s.
- 63. During application of the first half of the anticipated loading phase, a ______ rate of loading shall be permitted.



- 64. The compressive strength results must be multiplied by a correction factor if the length to diameter ratio is ______ or less.
- 65. When specimen has a length to diameter ratio of 1.50, a correction factor of ______ will be multiplied by the compressive strength results.
- 66. Report the ______ number, average measured ______, and maximum ______. Report the compressive strength to the nearest ______ psi and note the type of ______. Report the ______ of specimen at time of testing.

ASTM C 78 – FLEXURAL STRENGTH OF CONCRETE (USING SIMPLE BEAM WITH THIRD-POINT LOADING)

67. This test uses ______ - ____ loading to determine the flexural strength of concrete.

68. A beam with a depth of 6 in. would have a span length of ______ in.

69. A beam with a span length of 12 in. would have a depth of ______ in.

- 70. The load applying and support blocks should not be more than ______ in. high, measured from the center of the axis or pivot.
- 71. The test specimen shall have a test span within _____% of being three times the depth as tested.
- 72. In a typical test setup, the bottom of the beam is referred to as the ______ face.
- 73. Surface drying of the specimen before testing will result in a ______ of the measured flexural strength.
- 74. When testing molded specimens, turn the specimen on its ______ with respect to its position as molded.
- 75. Apply between _____ and _____ % of the estimated load before checking the specimen for gaps with the feeler gages.
- 76. If no gaps are present using the 0.004 in. feeler gauge _____ is required.
- 77. If there is a gap greater than _____ in. over a length of _____ inch but less than _____ in. over a length of one inch, then the specimen may be _____, ___, or _____.



- 78. If there is a gap that is greater than the _____ in. feeler gage over an inch, the only acceptable methods to eliminate the gap is by _____ or ____.
- 79. If leather shims are to be used to eliminate gaps, they must be a uniform ______ in. thickness and shall extend across the ______ width of the specimen.
- 80. The load shall be applied at a constant rate to increase the maximum stress on the tension face between _____ and _____ psi/min.
- 81. The specimen shall be loaded ______ and ______.
- 82. To determine the dimensions of the specimen after completion of testing, take ______ measurements across the width and depth to the nearest ______ in. and average.
- 83. If the fracture occurs on a capped section of the beam, the ______ must be included in the measurement.
- 84. Use an alternative calculation when the beam fracture occurs outside the middle third of the tension face but is within ______%.
- 85. The test results should be ______ if the beam fracture occurs outside the middle third of the tension face by more than ______ %.