cttp
Center for Training Transportation Professionals

Concrete Field Testing Technician Study Guide

ASTM C 172 – SAMPLING FRESH CONCRETE

1. The maximum allowable time between obtaining the first and final portions of a composite sample is _____minutes. (Section 4.1)

2. The sample shall be _____ _____ when the concrete contains aggregate larger than that appropriate for the molds or equipment. (Section 6.1)

3. When wet sieving, mortar adhering to the sides of the sieves shall be scraped back into the batch used for testing. True or False (Section 6.4.1)

4. After wet-sieving, the composite sample must be _____ with a shovel to ensure uniformity prior to testing. (Section 6.4.1)

5. After all concrete samples have been transported to the place where tests are to be performed; the samples must be _____ and _____with a _____ to ensure uniformity. (Section 4.1.1)

6. Tests for temperature, slump, and air content, shall be started within _____ minutes after obtaining the final portion of the composite sample. (Section 4.1.2)

7. The molding of strength specimens shall begin within _____ minutes after fabricating the composite sample. (Section 4.1.2)

8. After obtaining the concrete sample, it must be protected from _____, _____, and other sources of _____ _____and from _____. (Section 4.1.2)

9. The size of a sample to be used for strength testing should be a minimum of _____ ft^3. (Section 5.1)

10. When sampling from a stationary mixer, collect _____ or more portions taken at _____ spaced intervals from the _____ portion of the batch. Combine portions into one _____ sample before testing. (Section 5.2.1)

11. Concrete samples from a truck mixer must be obtained before any water or admixtures are added to the mixer at the job site. True or False (Section 5.2.3)

12. Collection of a sample of concrete from a revolving drum truck mixer includes obtaining at least _____ portions taken at regularly spaced _____ during discharge of the middle portion of the batch. (Section 5.2.3)

13. Two methods for obtaining a sample of concrete from a revolving drum mixer are to repeatedly pass a receptacle through the entire _____ stream or to completely _____ the discharge stream into a sample container. (Section 5.2.3)

14. If needed, the rate of discharge may be regulated by adjusting the rate of _____ of the _____. (Section 5.2.3)

15. When sampling from a continuous mixer, concrete samples should not be obtained until all _____ have been made and only after _____ cubic feet or more of concrete has been discharged. (Section 5.2.4)

16. After combining sample portions from a continuous mixer into a composite sample, wait a minimum of _____ minutes and a maximum of _____ minutes before beginning tests. (Section 5.2.4)

17. When sampling from a paving mixer, _____ the contents of the paving mixer and obtain samples from at least _____ different portions of the pile. (Section 5.2.2)

18. Samples from open-top truck mixers should be obtained by the most applicable method which will produce a representative sample. True or False (Section 5.2.5)

ASTM C 1064 – TEMPERATURE

19. ASTM C 1064 may be used to verify _____ with specifications. (Section 4.1)

20. Concrete containing aggregate with a nominal maximum aggregate size greater than 3 inches may require up to _____ minutes before the temperature stabilizes after mixing. (Section 4.2)

21. The temperature measuring device shall be capable of measuring the temperature of fresh concrete to ± _____ °F and throughout the range of _____ °F to _____ °F. (Section 5.2)

22. The temperature measuring device shall be verified _____, or whenever there is a question of _____. (Section 6.1)

23. Reference thermometers must be accurate and readable to ± _____ ° F. (Section 5.4)

24. The accuracy of TMD's must be verified at _____ temperatures at least _____ apart. (Section 6.1)

25. The temperature of fresh concrete may be measured in the transporting equipment or forms providing there is at least 3" of cover. True or False (Section 7.1)

26. If transport equipment or forms are not used as the container, prior to sampling, you must _____ the sample container used for obtaining the temperature of fresh concrete. (Section 7.2.1)

27. A composite sample of concrete is required even if the only purpose for obtaining the sample is to determine temperature. True or False (Section 7.2.2)

28. The thermometer sensor should be immersed a minimum of _____ inches into the concrete and have at least _____ inches of concrete cover in all directions. (Section 7.1 and Section 8.1)

29. After inserting the thermometer, the concrete must be pressed around the temperature measuring device to prevent the _____ _____ temperature from affecting the reading. (Section 8.1)

30. Leave the temperature measuring device in the concrete for at least _____ minutes, but not more than _____ minutes before reading. (Section 8.2)

31. The temperature measuring device may be removed from the concrete for reading. True or False (Section 8.2)

32. After reading, record the temperature to the nearest _____ °F. (Section 8.2)

ASTM C 143 – SLUMP OF HYDRAULIC CEMENT CONCRETE

33. The slump test is applicable to concretes with a maximum aggregate size of_____ inches. If the concrete contains aggregate larger than _____ inches, wet sieve over the _____ inch sieve. (Section 4.2)

34. The rigid surface or base must be large enough to contain all of the slumped concrete. True or False (Section 5.1 and Section 7.1)

35. The tamping rod used in the slump test is a smooth steel rod of_____ inches in diameter and has at least one _____ tip. (Section 5.2)

36. The height of the slump cone is _____ inches with a base opening of _____ inches and a top opening of _____ inches. (Section 5.1)

37. Slump molds should be verified before first use and at least _____ thereafter. (Section 5.1.1)

38. Slump molds may be made of metal or plastic. True or False (Section 5.1)

39. The measuring device used to determine slump must have _____ inch divisions or smaller. (Section 5.3)

40. Before filling, _____ the mold and _____. Place the slump cone on a rigid, _____, level, non-absorbent, surface free of _____. (Section 7.1)

41. The slump mold is filled in three layers of equal _____. (Section 7.1)

42. Rod each layer _____ times using the _____ end of the tamping rod. (Section 7.2)

43. During rodding, the rod must be _____ to allow consolidation of the concrete near the perimeter of the mold. (Section7.2)

44. When rodding a second or third layer, the rod must penetrate approximately _____ inch into the previous layer. (Section 7.2)

45. If the concrete drops below the top of the slump mold during rodding of the final layer, rodding must be discontinued until _____ concrete has been added to raise the level above the rim, then resumed until 25 roddings have been completed. (Section 7.3)

46. The _____ _____ should be used to strike off the top surface of the concrete using a rolling and _____ motion. (Section 7.3)

47. After strike-off, _____ the concrete from around the base of the mold to prevent interference with the slumping of the concrete. (Section 7.3)

48. Raise the mold vertically without lateral or torsional movement, a distance of _____ inches, in _____ ± _____ seconds. (Section 7.3)

49. Complete the slump test from filling to removal of mold in a time of _____ minutes. (Section 7.3)

50. Determine the slump by measuring the vertical distance between the top of the mold and the _____ original center of the concrete surface. (Section 7.4)

51. If a decided shearing away occurs, _____ the test and make a new test on another portion of the sample. (Section 7.4)

52. Report slump to the nearest _____ inch. (Section 8.1)

ASTM C 31 MAKING AND CURING CONCRETE TEST SPECIMENS

53. The concrete used to make the molded specimens shall be sampled after all on-site _____ have been made to the mixture proportions. (Section 1.2)

54. When strength specimens are to be made, _____, _____, and _____ _____ tests must also be conducted. (Sections 8.1, 8.2, and 8.3)

55. For a 6 x 12 cylinder, the tamping rod must be a round, straight steel rod with a diameter of _____ inches, but if using a 4 x 8 inch mold, the _____ inch diameter rod must be used. (Table 1)

56. The minimum frequency of an internal vibrator used in this procedure is _____ vibrations per minute. The diameter of the vibrator should be no more than _____ the diameter of the cylinder mold or width of the beam mold. (Section 5.5)

57. The required weight of mallet used in this procedure is _____ lbs. (Section 5.6)

58. When placing concrete in a beam mold, either a scoop or shovel is permitted. True or False (Section 5.7)

59. For acceptance testing for specified compressive strength, cylinders shall be _____ x _____ in. or _____ x _____ in. (Section 6.1)

60. For a cylinder, if the nominal maximum aggregate size of the coarse aggregate exceeds _____ inches, the concrete must be _____ _____ over the 2 inch sieve prior to placement in the mold. (Section 6.1)

61. Consolidation of concrete having a slump of less than one inch must be accomplished by using _____ when making cylinders or beams. (Table 3)

62. When molding 6 x 12 cylinders by rodding, the concrete is placed into the cylinders in _____ equal layers and each layer is rodded _____ times. (Table 4)

63. When using an internal vibrator to consolidate a 6 x 12 compressive strength test specimen, the mold is filled in _____ layers and the vibrator must be inserted at _____ different points for each layer. (Table 5)

64. When rodding the upper layer(s) of a cylinder, the tamping rod should penetrate the underlying layer by about _____ inch. (Section 9.4.1)

65. When molding 4 x 8 cylinders by rodding or vibration, the concrete is placed into the cylinders in _____ equal layers. (Table 4 and Table 5)

66. For cylinder molds which may be dented or permanently distorted by using a mallet; after consolidation of each layer you must tap the outside of the mold 10 to 15 times using an _____ _____. (Section 9.4.1)

67. Underfilled molds shall be adjusted with representative concrete during _____ of the top layer. (Section 9.4.1)

68. Strike-off the concrete surface of cylinders using the _____ _____ or a handheld _____ or trowel to produce an even surface that has no depressions or projections larger than _____ inch. (Sections 9.5 and 9.5.1)

69. You may cap the top surface of freshly made cylinders with a thin layer of Portland cement paste which is then permitted to harden and cure with the specimen. True or False (Section 9.5.1)

70. After strike-off, verify that the mold has been _____ to identify the concrete it represents. (Section 9.6)

71. After strike-off, provide protection to prevent _____ loss, and move the specimen to an _____ _____ place for storage. (Sections 10.1.1 and 10.1.2)

72. The standard size beam is _____ inches wide by _____ inches deep and a minimum of _____ inches long. (Section 6.2 and Section 6.2.1)

73. For beams, if the NMAS is greater than 2 inches, wet sieving over the 2 inch sieve is required. True or False (Section 6.2.2)

74. A standard sized beam is filled in _____ lift(s) when rodding and _____ lift(s) when using a vibrator. (Table 4 and Table 5)

75. The number of roddings required per layer for a flexural strength specimen is one rodding for each _____ square inches of the top surface area of the beam. (Section 9.3)

76. After rodding and tapping each layer of a beam specimen, you must spade along the sides and ends with a trowel or other suitable device. True or False (Section 9.4.1)

77. When internal vibration is used to consolidate a standard flexural strength test specimen, the vibrator is inserted at intervals not exceeding _____ along the centerline of the beam. (Section 9.4.2.2)

78. When using a vibrator to consolidate a beam, you must tap the outside of the mold after vibration at least _____ times with a _____. (Section 9.4.2.2)

79. The supporting surface on which specimens are stored shall be level within _____ per _____. (Section 10.1.1)

80. *Standard Curing* is the method used when test specimens are to be used for _____testing, checking the _____ of mixture proportions, and _____ _____. (Section 4.2 – Section 4.2.3)

81. *Field Curing* is the test method used when test specimens are to be used for determining when a _____ may be put into use, comparison testing, the adequacy of _____ and _____ of the concrete in the structure, and _____ removal time requirements. (Section 4.3 – Section 4.3.4)

82. When *Standard Curing* concrete mixtures with a specified strength of less than 6000 psi, initial curing requires that the specimens be stored for a period up to _____ hours in a temperature range from _____ °F to _____ °F. (Section 10.1.2)

83. Concrete mixtures with specified strengths of 6000 psi or greater shall have an initial curing temperature between _____ °F and _____ °F. (Section 10.1.2)

84. Specimens shall not be transported until at least _____ hours after final set and the transportation time shall not exceed _____ hours. (Section 11.1)

85. During transportation, test specimens must be protected from damage due to _____, _____, and _____ _____. (Section 11.1)

86. Upon completion of initial curing, the test specimens may be left in their molds and sealed in plastic bags. True or False (Section 10.1.3.1)

87. Upon completion of initial curing and within _____ minutes of removing the mold, cure specimens by maintaining free _____ on all surfaces at a temperature of _____ ± _____ °F. (Section 10.1.3.1)

88. Beams must be cured by storing in water saturated with _____ _____ at 73.5 ± 3.5 °F at least _____ hours prior to testing. (Section 10.1.3.2)

89. Beam surfaces are allowed to dry prior to testing. True or False (Section 10.1.3.2)

90. When field curing cylinders, provide like _____ and _____ conditions as the structural work. (Section 10.2.1)

91. When reporting data for strength test specimens, it is important to report the location of placement, time of casting, and the curing method. True or False (Section 12)

ASTM C 138 – DENSITY (Unit Weight)

92. The balance used during the density test must be accurate to _____ lb or to within _____ % of the test load, whichever is greater. (Section 4.1)

93. The measure must be made of metal when determining the density of fresh concrete. True or False (Section 4.4)

94. The size of the measure required is based on the _____ size of the aggregate. Therefore, there is no wet-sieving required by this method. (Section 4.4)

95. Determine the volume of the measure using ASTM _____ yearly and report the volume of the measure to the nearest _____ ft^3. (Section 4.4 and Section 8.1.3)

96. The tamping rod length must be at least _____ inches greater than the depth of the mold being used but not greater than _____ inches. (Section 4.2)

97. The required frequency of the vibrator used in this test method is at least _____ vibrations per minute. (Section 4.3)

98. A metal strike-off plate must be at least _____ inch thick and if made of glass or acrylic at least _____ inch thick. The length and width of a strike-off plate must be at least _____ inches greater than the diameter of the measure. (Section 4.5)

99. The specified weight of the mallet used on measures that are 0.5 ft^3 or smaller is _____ ± _____ lbs. (Section 4.6)

100. _____ must be used to consolidate concretes with a slump less than 1 inch, whereas _____ must be used to consolidate concretes with slumps greater than 3 inches. (Section 6.1)

101. If rodding is the method of consolidation, the measure must be filled in _____ layers of approximately equal volume. (Section 6.3)

102. For a measure of 0.5 ft^3 or smaller, _____ strokes of the tamping rod are required for consolidation of each layer. (Section 6.3)

103. After rodding each layer, tap the sides of the measure using the mallet _____ to _____ times to close the voids left by the tamping rod. (Section 6.3)

104. If vibration is the method of consolidation, the measure must be filled in _____ approximately equal layers. (Section 6.4)

105. When using an internal vibrator, the vibrator is not allowed to touch the sides or bottom of the measure. True or False (Section 6.4)

106. Prior to filling the measure, the measure must be _____ and then _____. (Section 6.2)

107. After filling and consolidation of the final layer, an excess of _____ inch of concrete above the rim of the mold is considered ideal. (Section 6.5)

108. Adjustments to the level of concrete is permitted after consolidation but must be made prior to _____ - _____. (Section 6.5)

109. Strike-off of the concrete surface must be made using the strike-off _____, with the final stokes accomplished by_____ the plate to produce a smooth surface. (Section 6.6)

110. After strike-off, all excess concrete must be removed from the exterior of the bowl before weighing. True or False (Section 6.7)

111. Report the density of concrete to the nearest _____ lb/ft^3. (Sections 8.1.4)

112. Yield is defined as the _____ of concrete produced from a known quantity of materials. (Section 1.1)

ASTM C 231 – AIR CONTENT BY THE PRESSURE METHOD

113. Air content by the pressure method determines the air content from an observation of the change in _____ of concrete with a change in _____. (Section 1.1)

114. This test method is intended for use with concretes that contain relatively _____ aggregates for which an aggregate correction factor can be determined. (Section 1.2)

115. Air content by the pressure method is not appropriate for concretes made with _____aggregates, air-cooled blast furnace slag, or aggregates of high _____. (Section 1.2)

116. The minimum capacity of the measuring bowl used in this test is _____ cubic feet with a typical volume of the type B meter bowl being _____ cubic feet. (Section 4.2 & Slideshow)

117. If a vibrator is used for consolidation it must conform to ASTM _____ and have a frequency of at least 9000 vibrations per minute. (Section 4.15)

118. The strike-off bar which may be used is a flat, metal bar at least _____ inch thick, _____ inches wide, and _____ inches long. (Section 4.11)

119. A check of the air pressure gauge dial readings is required every _____ months. (Section 5.1)

120. An aggregate correction factor is required by this method. True or False (Section 6.1)

121. If the concrete to be tested contains aggregate retained on the _____ inch sieve, the sample must be wet-sieved over the _____ inch sieve prior to testing. (Section 7.1)

122. Consolidate concrete in this method by: _____ concrete with a slump of greater than 3 inches; _____ or _____ concrete with a slump of 1 to 3 inches; _____ concrete with a slump of less than 1 inch. (Section 8.1.1)

123. Prior to filling the mold with concrete, the mold must be _____. (Section 8.1.1)

124. When consolidation is accomplished by rodding, place the concrete in the bowl in _____ equal layers and rod each layer _____ times. After rodding, tap the sides of the bowl with a mallet _____ to _____ times. (Section 8.1.2)

125. If the concrete sample is to be consolidated by vibration, the measure is filled in _____ layers of equal volume. Insert the vibrator _____ times per layer. (Section 8.1.3)

126. Never continue vibration long enough to cause the escape of _____ from the sample. Over vibration may cause _____ and loss of intentionally entrained air. (Section 8.1.3 and Note 6)

127. The strike-off _____ or the strike-off _____ may be used in this method to strike-off the top surface of the concrete after consolidation. (Section 8.1.4)

128. _____ the rim of the measuring bowl and cover assembly prior to attaching the cover assembly to the measuring bowl. (Section 8.3.1)

129. For a Type B meter, after clamping the cover to the bowl, _____ is injected into one petcock using a syringe until it emerges from the opposite petcock. Continue filling with water and _____ the meter, until all trapped air is expelled. (Section 8.3.1)

130. After filling a Type B meter with water, _____ the air bleeder valve, and pump air into the chamber until the hand on the dial gauge is on the initial pressure line. The petcocks are _____ during this operation. (Section 8.3.2)

131. After stabilizing the pressure on the initial pressure line, _____ both petcocks and _____ the main air valve while striking the sides of the measure with the _____ to remove trapped air. (Section 8.3.2)

132. While holding the main air valve open, lightly _____ the gauge with your hand and read the dial when stable. Then release the main air valve. (Section 8.3.2)

133. Release the pressure in the measure by _____ both petcocks. Remove cover before releasing the air in the air chamber. (Section 8.3.2)

134. If water enters the air chamber, it must be _____ from the chamber and blown out using the pump to prevent errors in the next measurement. (Section 8.3.2)

135. The aggregate correction factor is _____ from the dial reading to determine the final air content. (Section 9.1)

136. Report the % air to the nearest _____ % if the reading is from 0 – 8 %, and to the nearest _____ - _____ division if it exceeds 8 %. (Section 10.1.1)

ASTM C 173 – AIR CONTENT BY THE VOLUMETRIC METHOD

137. Air content by the volumetric method can be performed on concrete containing any type of aggregate. True or False (Section 1.1)

138. The bowl volume must be at least _____ ft^3. (Section 4.1.2)

139. The tamping rod for the volumetric air meter shall have a diameter of _____ inches and be at least _____ inches longer than the depth of the bowl, but not more than _____ inches in length. (Section 4.3)

140. The strike off bar made of steel shall have dimensions of at least _____ x _____ x _____ inches, and if made of plastic the require thickness increases to _____ inch. (Section 4.4)

141. The rubber or rawhide mallet required for this test should have a mass of approximately _____ lbs. (Section 4.11)

142. The calibrated cup is used only to add _____ when the air content exceeds 9 % and should be equal to _____ ± _____ % of the bowl volume. (Section 4.5)

143. The alcohol used in this test method must be_____ with a concentration of _____ % by volume. (Section 4.10)

144. Calibrate the meter and calibrated cup initially and _____ thereafter. (Section 5.1)

145. If the concrete for testing by the volumetric method contains aggregates that would be retained on an _____ inch sieve, wet-sieve a sufficient amount of the sample over a _____ inch sieve. (Section 6.1)

146. Prior to filling the bowl, _____ the inside of the bowl and remove any _____ water from the bottom. (Section 7.1)

147. The bowl of the meter will be filled with fresh concrete in _____ layers of approximately equal volume. (Section 7.1)

148. Rod each layer _____ times with the tamping rod. (Section 7.1)

149. After each rodding, tap the sides of the bowl _____ to _____ times with a mallet to close any voids left by the tamping rod. (Section 7.1)

150. Adjustment to the concrete level may be made after strike-off. True or False (Section 7.1)

151. Prior to attaching the top section, _____ the top section including the gasket. (Section 7.3)

152. After attaching the top section, insert the _____ and add at least _____ pint of water followed by the selected amount of alcohol. Then, continue to add water through the funnel until the water level is seen in the _____. Remove the funnel and fill the neck with water until the bottom of the _____ is level with the zero mark. (Section 7.3)

153. After securing the lid, invert the meter and shake to free the concrete from the _____. Do not keep the meter inverted for more than _____ seconds at a time to prevent lodging of aggregate in the neck. (Section 7.4.1)

154. Repeat the inversion and shaking procedure for a minimum of _____ seconds. (Section 7.4.1)

155. After freeing the concrete from the base, roll the meter for approximately _____ minute. (Section 7.4.2)

156. After rolling, set the meter upright and allow the liquid level to stabilize. The liquid is considered stable when it does not change by more than _____ % in a _____ minute time period. (Section 7.4.2.2)

157. When the liquid level is stable without excessive foam, read the bottom of the meniscus to the nearest _____ %. This is recorded as the _____ meter reading. (Section 7.4.2.4)

158. If there is more than _____ % foam after the initial rolling procedure, discard the test and start a new test using more _____. (Section 7.4.2.3)

159. During this test, the meter must be rolled at least _____ but no more than _____ times. (Section 7.4 – Section 7.5)

160. For this test to be completed, the maximum amount of change between the recorded initial and final meter readings is _____ %. (Section 7.5.2.1)

161. If there are portions of undisturbed, tightly packed concrete found in the bowl when emptying, the test is valid. True or False (Section 7.6)

162. If more than _____ pints of alcohol are used, a correction to the final meter reading is required. (Section 8.1)

163. The final air content is reported to the nearest _____ %. (Section 8.2.1)