

ACI Concrete Field Testing Technician - Grade I Practice Exam (Sample)

Study Guide



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SAMPLE

Questions

- 1. During concrete sampling from a revolving drum truck mixer, what is the minimum number of sampling intervals required?**
 - A. 1**
 - B. 2**
 - C. 3**
 - D. 4**
- 2. What is the approximate depth of concrete after placing the first layer of the slump test?**
 - A. 2 in. [50 mm]**
 - B. 2 5/8 in. [70 mm]**
 - C. 3 in. [75 mm]**
 - D. 4 in. [100 mm]**
- 3. What must be done to a concrete sample containing aggregate larger than permitted before conducting a test?**
 - A. Sent to a lab for analysis**
 - B. Dry sieved**
 - C. Wet sieved**
 - D. Crushed into finer aggregates**
- 4. What must be used when pouring the initial quantity of water and alcohol into the air meter?**
 - A. The funnel**
 - B. A measuring cup**
 - C. Directly from the bottle**
 - D. A spatula**
- 5. The sample of concrete used for temperature determination must be rodded 25 times. True or False?**
 - A. True**
 - B. False**
 - C. It varies by test type**
 - D. Only for large batches**

- 6. Which ASTM Standard governs the sampling of concrete for the slump test?**
- A. C150, Standard Specification for Portland Cement**
 - B. C172, Standard Practice for Sampling Freshly Mixed Concrete**
 - C. C31, Standard Practice for Making and Curing Concrete Test Specimens**
 - D. C39, Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens**
- 7. Sampling is required when tests are to be made to determine _____ with specification requirements.**
- A. Compliance**
 - B. Strength**
 - C. Durability**
 - D. Workability**
- 8. Is a composite sample of concrete needed if the only purpose is to determine temperature?**
- A. True**
 - B. False**
 - C. Only in large volumes**
 - D. Only if specified by the engineer**
- 9. Which of the following materials can be used as a container for sampling concrete?**
- A. Wooden box**
 - B. Plastic lining**
 - C. Glass container**
 - D. Metal pan**
- 10. What is the standard size of concrete cylinders used for strength testing?**
- A. 2 inches by 4 inches**
 - B. 6 inches by 12 inches**
 - C. 3 inches by 6 inches**
 - D. 5 inches by 10 inches**

Answers

SAMPLE

- 1. B**
- 2. B**
- 3. C**
- 4. A**
- 5. B**
- 6. B**
- 7. A**
- 8. B**
- 9. D**
- 10. B**

SAMPLE

Explanations

SAMPLE

1. During concrete sampling from a revolving drum truck mixer, what is the minimum number of sampling intervals required?

- A. 1
- B. 2**
- C. 3
- D. 4

When sampling concrete from a revolving drum truck mixer, it is crucial to obtain a representative sample that accurately reflects the entire load of concrete. The minimum number of sampling intervals required is two. This is because taking just one sample would not provide sufficient assurance that the sample accurately represents the variability of the concrete mix throughout the entire batch. By taking samples at two different intervals during the discharge process (and ideally at evenly spaced intervals), you can better ensure that the properties of the concrete, such as consistency and aggregate distribution, are adequately represented. This practice helps account for any potential inconsistencies in the mix that may arise due to segregation or varied mixing. Sampling too infrequently can lead to a misrepresentation of the concrete's quality and performance characteristics, which is why two intervals are considered the minimum standard in the industry.

2. What is the approximate depth of concrete after placing the first layer of the slump test?

- A. 2 in. [50 mm]
- B. 2 5/8 in. [70 mm]**
- C. 3 in. [75 mm]
- D. 4 in. [100 mm]

The depth of concrete after placing the first layer of the slump test is approximately 2 5/8 inches (70 mm). This depth is critical because the slump test involves filling a slump cone in three equal layers, with each layer being tamped down a specific number of times (usually 25 taps for the first two layers and 10 taps for the final layer) to achieve proper compaction. The first layer is filled to the correct depth of 2 5/8 inches, which ensures that the volume of concrete being tested is consistent and that the results of the slump test accurately reflect the workability of the concrete mix. This specific measurement aligns with the guidelines outlined in ASTM C143, which governs the procedures for conducting the slump test. By starting with this precise depth, technicians ensure uniformity in testing, leading to reliable and comparable results.

3. What must be done to a concrete sample containing aggregate larger than permitted before conducting a test?

- A. Sent to a lab for analysis**
- B. Dry sieved**
- C. Wet sieved**
- D. Crushed into finer aggregates**

To ensure accurate testing results, when a concrete sample contains aggregate larger than the specified limits, wet sieving is the appropriate method to prepare the sample before conducting tests. Wet sieving involves passing the sample through a series of sieves with water, which helps to separate the larger aggregates from the smaller particles effectively and minimizes the chance of clumping. This method is particularly useful as it also helps to wash off any excess cement paste that may adhere to the surface of the aggregates, allowing for a more precise assessment of the concrete's properties. In contrast, other methods such as dry sieving could lead to issues where dust or fine particles may not be adequately separated due to the lack of water, and sending the sample to a lab could delay results without addressing the immediate need for testing preparation. Crushing the aggregates into finer pieces alters the sample's characteristics, which is not suitable for the purpose of accurate field testing of the original concrete mix. Thus, wet sieving is the correct and best practice for handling oversized aggregates in field tests.

4. What must be used when pouring the initial quantity of water and alcohol into the air meter?

- A. The funnel**
- B. A measuring cup**
- C. Directly from the bottle**
- D. A spatula**

The correct option is the funnel because it provides a controlled and precise way to pour liquids into the air meter without splashing or overfilling. Using a funnel helps to ensure that the initial quantities of water and alcohol are measured accurately, which is crucial for obtaining reliable results in air content tests. It minimizes the risk of spills and allows for a clearer view of the liquid levels entering the meter, ensuring that the process adheres to proper testing protocols. Options such as a measuring cup might not provide the same level of precision when pouring, especially if the goal is to avoid any mess or loss of material. Pouring directly from the bottle can lead to inaccuracies and potential spillage, compromising the integrity of the test. A spatula is not suitable for liquid measurement as it is designed for solid materials, thus being ineffective for this particular task.

5. The sample of concrete used for temperature determination must be rodded 25 times. True or False?

A. True

B. False

C. It varies by test type

D. Only for large batches

The statement that the sample of concrete used for temperature determination must be rodded 25 times is false. Temperature measurement does not require rodding to be performed, as it involves assessing the thermal state of the concrete mix at the time of testing. The focus for temperature determination is on the accuracy of the temperature probe and the placement of the thermometer in the concrete, ensuring it is adequately submerged to get a true reading. Rodding is typically associated with tests that involve the compaction of concrete, such as the slump test, where a specified number of roddings is undertaken to ensure the mix is properly consolidated in the container or mold before measuring its properties. Therefore, it is important to recognize that temperature measurement is distinct from other tests, and no rodding is required for this specific determination.

6. Which ASTM Standard governs the sampling of concrete for the slump test?

A. C150, Standard Specification for Portland Cement

B. C172, Standard Practice for Sampling Freshly Mixed Concrete

C. C31, Standard Practice for Making and Curing Concrete Test Specimens

D. C39, Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens

The correct answer is governed by ASTM C172, which is the Standard Practice for Sampling Freshly Mixed Concrete. This standard specifically outlines the procedures and precautions necessary for sampling concrete to ensure that the sample is representative of the batch. Sampling is a critical step before conducting tests such as the slump test because it directly affects the reliability and accuracy of the test results. The standard includes important guidelines on how to collect and handle samples, including the quantity of concrete needed, methods to prevent contamination, and the timing of the sample collection in relation to the placement of concrete. Understanding ASTM C172 is essential for any technician performing field tests on concrete, as it ensures adherence to best practices and compliance with industry standards. The other options, while related to concrete testing and specifications, focus on different aspects: C150 pertains to cement specifications, C31 deals with making and curing specimens for strength tests, and C39 describes the testing of the compressive strength of concrete cylinders. Therefore, none of those standards provide the specific guidance on sampling needed for conducting a slump test.

7. Sampling is required when tests are to be made to determine ____ with specification requirements.

A. Compliance

B. Strength

C. Durability

D. Workability

Sampling is a crucial step in the testing process because it ensures that the materials used in concrete production meet the established specifications. The term "compliance" refers specifically to the adherence to the specified criteria laid out in relevant standards or building codes. In the context of concrete, compliance testing verifies that the properties of the concrete mix, such as strength, workability, and durability, are within the limits prescribed by the specifications. When sampling is performed for compliance testing, it typically involves collecting a representative portion of the material—such as fresh concrete—so that various tests can be conducted to assess quality attributes. The results of these tests confirm whether the concrete mix conforms to the required specifications, thereby ensuring that it is suitable for the intended structural application. The other choices—strength, durability, and workability—are all important properties of concrete, and while they relate to compliance, they represent specific aspects rather than the overarching requirement of meeting specifications. Thus, the focus on compliance as the correct answer highlights the broader obligation to ensure that the concrete adheres to all specified standards rather than just individual characteristics.

8. Is a composite sample of concrete needed if the only purpose is to determine temperature?

A. True

B. False

C. Only in large volumes

D. Only if specified by the engineer

The determination of the temperature of concrete does not necessitate the collection of a composite sample. A single temperature reading can adequately reflect the concrete's state at the time of testing, rendering the need for a composite sample unnecessary. Temperature is typically measured using a thermometer inserted into the fresh concrete, allowing for an immediate and accurate reading without the need to aggregate samples from various sections of the pour, as would be done for other tests like slump or compressive strength. In situations where the main focus is solely on temperature, composite sampling—where samples are taken from different locations and mixed together—is not relevant. This is because temperature fluctuations can be measured directly and do not require the averaging effect of multiple samples, as is necessary for more comprehensive assessments of the concrete's properties.

9. Which of the following materials can be used as a container for sampling concrete?

- A. Wooden box**
- B. Plastic lining**
- C. Glass container**
- D. Metal pan**

A metal pan is a suitable container for sampling concrete because it is durable, non-porous, and easy to clean, which helps ensure that the material does not absorb any moisture or contaminants that could affect the concrete sample's integrity. Metal pans can also withstand the weight and consistency of fresh concrete without deforming or breaking, making them ideal for transportation and storage of the sample until testing can be conducted. While other materials such as wooden boxes, plastic linings, and glass containers may be used in some contexts, they have limitations. Wooden boxes can absorb moisture and may introduce contaminants. Plastic linings may not be suitable for all types of concrete mixtures or weights. Glass containers can break easily, posing a safety risk and complicating the sampling process. Hence, a metal pan is a preferential choice for ensuring the reliability and consistency of the concrete sample.

10. What is the standard size of concrete cylinders used for strength testing?

- A. 2 inches by 4 inches**
- B. 6 inches by 12 inches**
- C. 3 inches by 6 inches**
- D. 5 inches by 10 inches**

The standard size of concrete cylinders used for strength testing is 6 inches by 12 inches. This size is commonly used in the construction industry as it provides an adequate volume of concrete for compressive strength testing while being large enough to minimize variability in test results. The dimensions allow for a practical balance between workability during casting and the strength needed for accurate assessment. The use of 6-inch by 12-inch cylinders is also consistent with ASTM C39, the standard test method for compressive strength of cylindrical concrete specimens, which specifies this dimension for standard testing. The larger size provides a greater surface area for applying the load evenly, leading to more reliable results when the specimen is subjected to compression. Other sizes like 2 inches by 4 inches, 3 inches by 6 inches, and 5 inches by 10 inches may be used in specialized situations or for specific tests, but they are not the standard for strength testing as outlined by ASTM standards. Using the standard size helps ensure consistency across tests and facilitates comparison of results across different projects and conditions.