

ACI Concrete Strength Testing Technician Practice Test (Sample)

Study Guide



Everything you need from our exam experts!

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SAMPLE

Questions

- 1. Is it true or false that specimens with a diameter discrepancy of less than 2% can still be tested?**
 - A. True**
 - B. False**
 - C. Only under certain conditions**
 - D. Only if approved by a supervisor**
- 2. Why is it necessary to remove air bubbles from concrete mixes?**
 - A. To improve aesthetics**
 - B. To ensure uniformity and strength**
 - C. To reduce mass**
 - D. To control temperature**
- 3. What is the maximum allowable deviation for the axis of the cylinder not exceeding before checking its vertical alignment?**
 - A. 0.2 degrees**
 - B. 0.5 degrees**
 - C. 1.0 degrees**
 - D. 1.5 degrees**
- 4. What is one common reason for variations in concrete strength results?**
 - A. Consistent mixing and curing**
 - B. Using high-strength aggregates only**
 - C. Inconsistent mixing or improper curing conditions**
 - D. Testing without supervision**
- 5. What might happen if a compressive strength test is conducted too early?**
 - A. The concrete might not achieve its maximum strength**
 - B. It will cost more to perform the test**
 - C. The testing machine may break**
 - D. The specimens will require more time to prepare**

- 6. What role do admixtures play in concrete?**
- A. They reduce the cost of concrete production**
 - B. They enhance certain properties of concrete, like setting time**
 - C. They have no significant effect on concrete**
 - D. They are only used in decorative concrete**
- 7. What compressive strength must sulfur mortars and high-strength gypsum cement cubes demonstrate?**
- A. 30 MPa (4350 psi)**
 - B. 40 MPa (5800 psi)**
 - C. 35 MPa (5000 psi) or the cylinder strength, whichever is greater**
 - D. 25 MPa (3625 psi)**
- 8. At what age is concrete typically tested for its compressive strength?**
- A. 1 day**
 - B. 7 days**
 - C. 14 days**
 - D. 28 days**
- 9. What is the purpose of the air content test in concrete?**
- A. To measure the cement content**
 - B. To assess moisture levels**
 - C. To determine the amount of air voids affecting durability**
 - D. To evaluate the temperature during mixing**
- 10. What is the maximum allowed percentage of error for loads in a testing machine according to ASTM C39?**
- A. $\pm 0.5\%$**
 - B. $\pm 1.0\%$**
 - C. $\pm 2.0\%$**
 - D. $\pm 5.0\%$**

Answers

SAMPLE

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

SAMPLE

Explanations

SAMPLE

1. Is it true or false that specimens with a diameter discrepancy of less than 2% can still be tested?

A. True

B. False

C. Only under certain conditions

D. Only if approved by a supervisor

The statement is true. When conducting concrete strength testing, it is generally acceptable to test specimens that exhibit a diameter discrepancy of less than 2%. This allowance is based on the idea that such minor differences in diameter are unlikely to significantly affect the results of the strength test. Standards and procedures, like those from the American Concrete Institute (ACI), focus on ensuring that the results are representative and reliable, and minor discrepancies fall within acceptable tolerances. In practice, this means that as long as the diameter discrepancy is within this 2% threshold, the test should provide a reliable measurement of the concrete's strength properties. More significant discrepancies could lead to inconsistent results, so those thresholds are established to maintain the integrity of the testing process. This understanding is crucial for technicians who need to ensure compliance with testing standards while also being efficient in their operations.

2. Why is it necessary to remove air bubbles from concrete mixes?

A. To improve aesthetics

B. To ensure uniformity and strength

C. To reduce mass

D. To control temperature

Removing air bubbles from concrete mixes is essential primarily to ensure uniformity and strength. Air bubbles can create voids within the concrete, leading to a reduction in density and integrity. When air is entrained in the mix, it can weaken the overall structure by diminishing the concrete's ability to bear loads and resist stresses. This may result in a concrete that is more prone to cracking, less durable, and weaker than intended. The uniformity of the mix is crucial, as consistent distribution of materials including aggregates, water, and cement is needed to achieve the desired strength and performance characteristics. A homogenous mix with minimized air voids can also enhance the bonding between aggregates and the cement paste, further contributing to the concrete's compressive strength. In contrast, while aesthetics, mass reduction, and temperature control have their importance in specific contexts of concrete use, they are not the primary reasons for the removal of air bubbles from concrete mixes.

3. What is the maximum allowable deviation for the axis of the cylinder not exceeding before checking its vertical alignment?

A. 0.2 degrees

B. 0.5 degrees

C. 1.0 degrees

D. 1.5 degrees

The maximum allowable deviation for the axis of the cylinder before checking its vertical alignment is important because it ensures that the applied load is distributed evenly across the sample during testing. A deviation that exceeds this limit could lead to inaccurate test results or the failure of the sample in a way that does not accurately reflect its true strength properties. In this case, a deviation of 0.5 degrees is considered acceptable as it is small enough to minimize the risk of uneven stress distribution while allowing for practical handling and setup of the test samples. If the alignment exceeds this threshold, it is necessary to correct the position to ensure the integrity of the test and the validity of the results. This standard is crucial for maintaining the quality and consistency of concrete strength testing protocols.

4. What is one common reason for variations in concrete strength results?

A. Consistent mixing and curing

B. Using high-strength aggregates only

C. Inconsistent mixing or improper curing conditions

D. Testing without supervision

Variations in concrete strength results are often attributed to inconsistent mixing or improper curing conditions. When concrete is mixed, the uniformity of the mixture is essential; inconsistencies can lead to variations in the distribution of materials like cement, aggregates, and water, which are crucial for achieving the desired strength. If the mixing process is not thorough or if the proportions of materials are not accurately measured, the concrete may not reach its intended strength. Additionally, the curing process plays a vital role in the development of concrete strength. Proper curing ensures that the concrete remains moist for an adequate period, which is critical for the hydration of cement. If the concrete is exposed to extreme conditions such as rapid drying or freezing, or if it is not adequately covered to maintain moisture, it can lead to weaker concrete. Therefore, variations stemming from inconsistent mixing practices or poor curing conditions can significantly impact the final strength of the concrete, making this the most relevant answer to the question.

5. What might happen if a compressive strength test is conducted too early?

- A. The concrete might not achieve its maximum strength**
- B. It will cost more to perform the test**
- C. The testing machine may break**
- D. The specimens will require more time to prepare**

Conducting a compressive strength test too early can lead to inaccurate results, as concrete requires proper curing time to achieve its intended strength. Concrete typically continues to cure and gain strength over time due to the hydration reaction of the cement. If a test is performed before the concrete has reached an adequate strength level, the results will likely indicate a lower compressive strength than what the concrete can ultimately achieve. This not only can lead to erroneous conclusions about the quality and performance of the concrete but also may impact project decisions regarding structural safety and material modifications. Therefore, ensuring that the concrete has cured sufficiently before testing is essential for obtaining reliable and accurate strength measurements.

6. What role do admixtures play in concrete?

- A. They reduce the cost of concrete production**
- B. They enhance certain properties of concrete, like setting time**
- C. They have no significant effect on concrete**
- D. They are only used in decorative concrete**

Admixtures are specifically formulated materials added to concrete to enhance its properties and performance. Their primary role is to modify the characteristics of the concrete mix to meet specific requirements for a project. For instance, certain admixtures can change the setting time, allowing for faster or slower curing as needed. This feature can be crucial in managing workability during different environmental conditions or for scheduling the construction process. Additionally, there are various types of admixtures, such as water reducers, accelerators, retarders, and air-entraining agents, each aimed at improving properties like workability, durability, strength, or resistance to freeze-thaw cycles. By using admixtures appropriately, engineers and contractors can tailor concrete mixes for a wide range of applications, ensuring optimal performance and longevity. The other options do not accurately reflect the primary purpose of admixtures. While admixtures can occasionally help reduce production costs indirectly, that is not their main function. It's also incorrect to state that they have no significant effect on concrete or that they are strictly limited to decorative use, as their applications extend far beyond aesthetics into core structural capabilities.

- 7. What compressive strength must sulfur mortars and high-strength gypsum cement cubes demonstrate?**
- A. 30 MPa (4350 psi)**
 - B. 40 MPa (5800 psi)**
 - C. 35 MPa (5000 psi) or the cylinder strength, whichever is greater**
 - D. 25 MPa (3625 psi)**

The requirement for sulfur mortars and high-strength gypsum cement cubes to demonstrate a compressive strength of 35 MPa (5000 psi) or the cylinder strength, whichever is greater, is grounded in ensuring that the materials used in construction can withstand the demands placed on them. This standard is particularly relevant in construction applications where the use of sulfur and gypsum-based materials is common. Using this criterion, specifying a strength of 35 MPa or higher allows for flexibility in quality assurance, as it can adapt to varying cylinder strengths based on the actual mix and testing conditions. If the cylinder strength surpasses 35 MPa, that higher value then becomes the benchmark for minimum acceptable strength. This approach encourages better practices in mixing and curing while also providing a safeguard against subpar performance. Other potential values given in the choices do not align with the rigorous standards set for sulfur mortars and gypsum cement, putting them at a disadvantage in terms of strength reliability and structural integrity.

- 8. At what age is concrete typically tested for its compressive strength?**
- A. 1 day**
 - B. 7 days**
 - C. 14 days**
 - D. 28 days**

Concrete is typically tested for its compressive strength at 28 days because this time frame is when it generally reaches the majority of its strength potential. The curing process allows the hydration of cement particles to occur fully, contributing to the development of the concrete's durability and strength characteristics. Additionally, many construction specifications and building codes are based on the 28-day strength as the standard for assessing concrete quality. While concrete can be tested earlier, such as at 1, 7, or 14 days, these tests are often used for interim evaluations to predict the ultimate strength and ensure that the concrete is gaining strength adequately. However, these earlier tests do not provide a complete picture of the concrete's final compressive strength as established at the 28-day mark. Therefore, the choice of 28 days for strength testing is standard practice in the industry, ensuring that concrete structures meet the necessary performance and safety requirements.

9. What is the purpose of the air content test in concrete?

- A. To measure the cement content**
B. To assess moisture levels
C. To determine the amount of air voids affecting durability
D. To evaluate the temperature during mixing

The purpose of the air content test in concrete is to determine the amount of air voids present in the mix, which significantly impacts the durability of the concrete. The presence of air voids improves the resistance of concrete to freeze-thaw cycles and enhances its workability during the mixing and placement processes. When concrete contains the proper amount of air, it can effectively withstand environmental conditions without dilapidation. If there are too few or too many air voids, it could lead to serious issues, such as scaling or cracking, particularly in climates that experience freeze-thaw cycles. Thus, assessing air content is essential for ensuring the concrete can perform as intended over its lifespan, making it a critical test in concrete quality control. Measuring the cement content, assessing moisture levels, or evaluating temperature during mixing do not provide relevant information regarding the concrete's resilience to environmental stresses, which is why they do not reflect the primary objective of the air content test.

10. What is the maximum allowed percentage of error for loads in a testing machine according to ASTM C39?

- A. $\pm 0.5\%$**
B. $\pm 1.0\%$
C. $\pm 2.0\%$
D. $\pm 5.0\%$

The maximum allowed percentage of error for loads in a testing machine according to ASTM C39 is $\pm 1.0\%$. This standard outlines the requirements for testing the compressive strength of cylindrical concrete specimens, including the calibration of the testing machine. The tolerance of $\pm 1.0\%$ indicates that for the loads measured during the testing process, deviations from the actual load must not exceed this range, ensuring accuracy and reliability in the strength testing results. This level of precision is crucial as it helps maintain consistency and comparability in testing outcomes across different scenarios and testing equipment.