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## Examination for Standard Practice for Shotcrete

### CHAPTER 1 - INTRODUCTION

1. Equipment for pneumatically applying a fine aggregate cement mixture was first introduced when?
  - a) 1901
  - b) 1910
  - c) 1911
  - d) 1921
2. What document provides a basis for preparation of a specification for Shotcrete?
  - a) EM 1110-2-2000
  - b) ACI 506R-90
  - c) CW 03361

### CHAPTER 2 – TYPES OF SHOTCRETE AND APPLICATIONS

3. What causes compaction of the shotcrete paste matrix into surface irregularities?
  - a) The force of impact
  - b) The bonding properties
  - c) The mixing proportions
  - d) The application method used
4. Which of the following is not listed as a marine structure repair using shotcrete?
  - a) Bridge deck
  - b) Dam
  - c) Dry dock
  - d) Discharge tunnel
5. Why is the application of shotcrete to the surface of landfills beneficial?
  - a) To provide surface compaction
  - b) To permanently cover slopes that may erode
  - c) To prevent excessive uplift pressure
  - d) To prevent surface water infiltration

6. In dry-mix shotcrete, air is added at the nozzle to increase the nozzle discharge velocity?
- a) True
  - b) False
  - c) Not enough information for a specific answer
  - d) Too many variables for a specific answer
7. The formation of an air-void system in wet-mix shotcrete is not possible?
- a) True
  - b) False
  - c) Not enough information for a specific answer
  - d) Too many variables for a specific answer
8. According to table 2-1, which of the following is a true statement?
- a) The dry-mix process is best suited for continuous application
  - b) Wet-mix has higher rebound
  - c) Wet-mix equipment maintenance costs tend to be higher
  - d) Dry-mix has lower bond strengths
9. Which of the following fibers is not commonly used in shotcrete?
- a) Synthetic fibers
  - b) Natural fibers
  - c) Glass fibers
  - d) Steel fibers
10. In the wet-mix process, accelerators are added when?
- a) At the nozzle
  - b) Batched with other materials
  - c) After application
  - d) At the plant

### **CHAPTER 3 – MATERIALS, PROPORTIONING AND PROPERTIES**

11. Slurried silica fume is produced how?
- a) By breaking down and dissolving silica fume pellets
  - b) Through significant mixing action
  - c) By mixing nearly equal weights of silica fume and water
  - d) By adding powdered water-reducing admixtures
12. What type of aggregate is most practical for the dry-mix process?
- a) Fine aggregate
  - b) Lightweight aggregate
  - c) Coarse aggregate

13. Water retarding admixtures are seldom used in shotcrete, except for?
- Surfaces where finishing is required
  - Sloped surfaces where finishing is required
  - Near vertical surfaces where finishing is required
  - Near horizontal surfaces where finishing is required
14. Except where “flash set” is needed, calcium chloride should never be used in an amount greater than?
- 0.6 percent by mass of the aggregate
  - 2 percent by mass of the cement
  - 2.6 percent by mass of the aggregate
  - 10 percent by mass of the cement
15. In general, what is the recommended bar spacing for shotcrete reinforcement?
- Less than 3 inches
  - 3 to 6 inches
  - 6 to 12 inches
  - Greater than 12 inches
16. What is the effect of steel fibers on compressive strength?
- No effect
  - Little effect
  - Modest effect
  - Significant effect
17. What should be done to minimize rebound for placement of thin layers on hard surfaces?
- Coarse aggregate should be minimized or eliminated
  - Fine aggregate should be maximized
  - Fine aggregate should be minimized or eliminated
  - Coarse aggregate should be maximized
18. What is the typical batched cement content for wet-mix proportioning?
- Less than 300 pounds per cubic yard
  - From 300 to 500 pounds per cubic yard
  - From 500 to 700 pounds per cubic yard
  - More than 700 pound per cubic yard
19. The batched water-cement ratio for coarse aggregate dry-mix shotcrete typically varies between what?
- 0.10 to 0.30
  - 0.30 to 0.40
  - 0.40 to 0.50
  - 0.50 to 0.70

## CHAPTER 4 – EQUIPMENT AND CREW

20. When was the continuous feed dry-mix gun introduced?
- a) Early 1900's
  - b) 1910
  - c) 1941
  - d) Around 1960
21. Positive displacement wet-mix delivery equipment requires a wetter mixture than pneumatic-feed equipment?
- a) True
  - b) False
  - c) Not enough information for a specific answer
  - d) Too many variables for a specific answer
22. In wet-mix applications, what is the only admixture type that can be added at the nozzle's air supply?
- a) Dry admixture
  - b) Liquid admixture
23. How much greater than the operating air pressure should the constant water pressure be?
- a) 5 psi
  - b) 5 to 10 psi
  - c) 10 to 15 psi
  - d) 15 to 30 psi
24. True/False: Special equipment is necessary for batching and mixing silica-fume shotcrete?
- a) True
  - b) False
25. Who is the most important member of a shotcrete crew?
- a) The foreman
  - b) The nozzleman
  - c) The equipment operator
  - d) The helper



Answer Sheet for Standard Practice for Shotcrete  
 TPDH-00008

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