ACI Certification

CRAFTSMAN WORKBOOK

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Decorative Concrete Flatwork Finisher and Associate



American Concrete Institute Always advancing



CRAFTSMAN WORKBOOK

For ACI Certification Program: Decorative Concrete Flatwork Finisher and Associate

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Check the **Decorative Concrete Flatwork Finisher and Associate Program page** for the most current version (see below) of this publication.

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First Edition Third Printing, February 2022 Copyright © 2018 American Concrete Institute 38800 Country Club Drive Farmington Hills, Michigan 48331 Phone (248) 848-3700 • FAX (248) 848-3701

PREFACE

Since 1990, ACI has successfully maintained a program to certify concrete flatwork finishers. This program is recognized throughout the industry and regularly called out in project specifications. However, that program does not address decorative concrete and the specialized finishing skills and techniques required when using decorative concrete products. Due to the growth of the decorative concrete industry a certification program was developed to verify the knowledge, skills and abilities of individuals who perform the techniques required for this type of construction.

The ACI Decorative Concrete Flatwork Finisher program will complement the ACI Concrete Flatwork Finisher program by certifying that an individual has knowledge of the materials, equipment, and techniques required to successfully install and/or manage decorative flatwork concrete installations. These installations typically include the use of dry shake hardeners, integral colors, release agents, stamped concrete, use of retarders, sand/ exposed aggregate finishes, decorative treatment of stair treads and risers, and cleaning/sealing of basic concrete and decorative concrete practices. Chemical stains, decorative overlays, architectural cast-in-place walls, and other topical finishes are not included in this certification.

This Workbook (CP-12) describes the operation of the ACI Certification Program and provides technical materials and directions necessary to prepare for the certification examinations.

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PROGRAM INFORMATION

Overview of the ACI Program

Achieving ACI Certification as a Decorative Concrete Flatwork Finisher requires current certification as a Concrete Flatwork Finisher/Technician, successfully completing the ACI written examination, and fulfilling the required work experience (see Figure 1).

Achieving ACI Certification as a Decorative Concrete Flatwork Associate requires current certification as a Concrete Flatwork Technician and successfully completing the ACI written examination (see Figure 1).

Administration

ACI, through its Certification Programs Committee, administers the certification program. This includes the development and maintenance of all program policies and procedures, instructional materials, and examinations.

The ACI certification program is conducted by a sponsoring group, such as an ACI chapter, a state or local concrete industry association, a college or university, or other organization committed to upgrading the quality of concrete. This group is responsible for scheduling and conducting all sessions; arrangement of facilities, material, equipment, and personnel; payment of all bills; and establishment and collection of all registration fees.

The ACI Certification Department assists the sponsoring groups in setting up the program and manages the daily operation of the program. This includes the publication and dissemination of all instructional materials and examinations, grading examinations, maintenance of certification records, and issuance of certification to successful candidates.

Definitions

ACI—The American Concrete Institute (38800 Country Club Drive, Farmington Hills, MI 48331), which developed and published instructional materials and examinations used in this program, and which certifies individuals who satisfy all requirements of this program.

ACI Certification—A formal recognition, valid for a specified period of time, which shows that a person has satisfactorily completed the certification requirements.

ACI Certification Department—The department within ACI that manages the certification programs.

ACI Decorative Concrete Flatwork Finisher—

A craftsman who has demonstrated knowledge about and the ability to place, finish, cure, and protect decorative concrete flatwork.

ACI Decorative Concrete Flatwork Associate—A person who is knowledgeable about proper procedures to place, finish, cure, and protect decorative concrete flatwork, but who lacks sufficient work experience to qualify as a Decorative Concrete Flatwork Finisher.

ACI Advanced Concrete Flatwork Finisher— An individual who has demonstrated proficiency in and an understanding of proper procedures and techniques for placing, finishing, jointing, curing, and protecting concrete flatwork by passing the ACI written examination and by meeting the performance evaluation and work experience requirements.

ACI Concrete Flatwork Associate—An individual who has an understanding of proper procedures and techniques for placing, finishing, jointing, curing, and protecting concrete flatwork by passing the ACI written examination.

Examiner—A currently certified Decorative Concrete Flatwork Finisher who is approved as a Flatwork Finisher Examiner.

JTA—Job Task Analysis; a detailed list of items of knowledge and skills that can be used as a study guide for the examination.

Recertification—A process, undertaken every five years after original certification, by which a certified individual renews certification by successfully completing the then-current recertification requirements.

Respondent—A person, usually a present or former employer, who verifies submitted work experience from an individual seeking certification.

Sponsoring Group—The local organization (such as an ACI chapter, trade association, public agency, private testing laboratory, or other organization) which takes responsibility for conducting the certification examination in its locality and, as a recommended option, for conducting a review course.

Resource Materials

This craftsman workbook contains resource material you need to prepare for the Decorative Concrete Flatwork Finisher and Associate certifications.

The Program Information section contains general information about this ACI certification program and describes all policies, procedures, and



requirements in detail.

The Study Materials section contains the Job Task Analysis, Study Questions, and Answers to Study Questions to aid your individual study.

This workbook does not contain ACI CCS-5: *Placing and Finishing Decorative Concrete Flatwork,* covered by this program. You will need to obtain a copy on your own.

Job Task Analysis (JTA)

The JTA is a detailed list of fundamental job elements, including the items of knowledge and skills required to successfully perform a job's functions. These elements are further distinguished in the JTA between general knowledge (understanding concepts) and working knowledge (knowing facts or values).

The written examination for Decorative Concrete Flatwork Finisher and Associate is designed to assess these fundamental job elements. Therefore, the JTA may also serve as a guide when studying/ preparing for certification; it outlines the expected knowledge and skill base of a Decorative Concrete Flatwork Finisher and Associate and governs the areas of competency assessed by the written examination for this program.

The JTA for this certification program can be found in the Study Materials section.

Preparation for the Examination

ACI recommends that you attend a review course prior to the examination if one is offered by the sponsoring group. Sponsoring groups typically have access to resources (laboratory equipment and time, video training materials, etc.) that an individual does not. Course content and instructional time varies between sponsoring groups depending upon local needs.

Examinees are not required to participate in a review course, but preparing for the examination without the benefit of the review course is not recommended. If a review course is not offered, or if you choose not to enroll in the course when offered, you should prepare a course of self-study.

Remember that your individual study, with or without a review course, can be the difference between passing and failing the examination.

Written Examination

To achieve Decorative Concrete Flatwork Finisher or Associate certification, a written examination must be passed. You may be required to show photo identification to gain admittance to the examination.

The Decorative Concrete Flatwork Finisher and Associate written examination covers ACI CCS-5. Questions are derived directly from the text as well as special applications which you may or may not encounter on a construction project. There are no questions on general concrete technology on the examination.

The examination is closed-book; access to technical materials or notes during the examination is not allowed.

The examination consists of approximately 50 multiple-choice questions. A maximum of 2 hours (120 minutes) is allowed to complete the entire examination.

To pass the examination, at least 70% of all questions on the examination must be answered correctly (e.g., 35 correct out of 50 equals 70%).

Calculations may be required for some questions; therefore, you may bring a simple-function pocket calculator to the examination. You may not share a calculator with another examinee during the examination.

ACI uses an optical reader to scan all personal data and written examination answer sheets. Therefore, bring two No. 2 pencils and a clean eraser to the written examination session.

This examination may be conducted verbally if requested; please make arrangements with the sponsoring group prior to the examination date.

Challenges

If you encounter a test question that appears to be unclear, incorrect, or unfair, please describe your complaint on the Question Challenge Form included with your examination.

You must mark a response on your answer sheet that best answers the question. All questions have been formulated from CCS-5; any challenge based on a reference from an outside document will not be considered unless the reference agrees with the relevant document. If your explanation is found to be valid, scores will be adjusted accordingly.

All questions for the written examination are developed by the Decorative Concrete Finisher Committee and maintained at ACI Headquarters by the ACI Certification Department. Neither the examiner nor the sponsoring group have any jurisdiction over the content or the scoring of the written examination.

Re-Examination

Failure of the written examination will require

re-examination on the entire written examination.

A re-examination on the exam may be taken at any time. It is your responsibility to request reexamination. To do so, contact the examiner and/ or sponsoring group to arrange a convenient time, location, and appropriate fee. If you require further assistance, contact the ACI Certification Department.

Appeals

All ACI certification policies, procedures, requirements, and examination materials have been developed through the voluntary consensus process and carefully reviewed for accuracy and fairness. However, an appeal process is available in the event that you feel that some aspect of the examination administration is unclear, incorrect, or unfair (see Challenges for examination content disputes). If a complaint is found to be valid, ACI will adjust grades accordingly.

The first level of appeal rests with the examiner. This person is a registered professional engineer, approved by ACI as their local representative for this program.

If the examiner cannot satisfy your complaint, appeals are handled in order by the following people or groups:

- 1. Sponsoring Group
- 2. Director of Certification
- 3. Certification Appeals Committee
- 4. Committee C641—Decorative Concrete Finisher
- 5. Certification Programs Committee

Note: Members of the Certification Appeals Committee include the Director of Certification, the Chair of the Certification Programs Committee, and the Chair of Committee C641.

Appeals submitted directly to ACI must be received, in writing, within 60 days of the receipt of the examination at ACI Headquarters. Appeals that are not made during the examination session will not be considered.

Requirements

For Decorative Concrete Flatwork Finisher certification, you are responsible for:

Obtaining certification as an ACI Advanced

Concrete Flatwork Finisher.

- Successfully completing the Decorative Concrete Flatwork Finisher and Associate written examination.
- Obtaining a minimum of one year [1500 hours] of verified work experience in finishing decorative concrete flatwork, including a minimum of:
 - » 250 hours coloring
 - » 250 hours stamping
 - » 250 hours exposed finishes
 - » 250 hours stairs
 - » 40 hours cleaning/sealing concrete surfaces

For Decorative Concrete Flatwork Associate certification, you are responsible for:

- Obtaining certification as an ACI Concrete Flatwork Associate.
- Successfully completing the Decorative Concrete Flatwork Finisher and Associate written examination.

A certified Decorative Concrete Flatwork Associate can upgrade to a certified Decorative Concrete Flatwork Finisher at any time during their certification if they fulfill the necessary requirements. Certification will be valid for the remainder of the original certification period.

Completing Work Experience Forms

When seeking Decorative Concrete Flatwork Finisher certification, you must use a Work Experience Form to provide verification that the work experience requirements have been met.

Completion of this form requires obtaining the cooperation of respondents, present and/or past employers, in verifying the work experience described. Respondents must be either a project superintendent, job foreman, and/or owner of a company.

It is possible that more than one respondent will be necessary to verify overall work experience. Each time period corresponding to a particular job or work situation must be identified on a separate Work Experience Form.

If you are self-employed, three letters of refer-

ence from clients over at least a one year period will serve as an alternate method of verification.

Recertification

Your ACI certification as a Decorative Concrete Flatwork Finisher or Associate expires five years from the date that you complete the certification requirements. Your original certification and subsequent recertification periods run concurrently, not consecutively.

Recertification is granted to a Decorative Concrete Flatwork Finisher or Associate who successfully completes the then-current written examination.

Americans with Disabilities Act (ADA)

If you have a disability and require special accommodations, please contact ACI Headquarters for further information on how to proceed. All requests for special accommodations under ADA are handled on a case-by-case basis and must be made allowing enough time for evaluation and appropriate action by ACI.

STUDY MATERIALS

This section consists of:

- Job Task Analysis
- Study Questions
- Answers to Study Questions

JOB TASK ANALYSIS

How to Use this JTA:

On the written examination, the Candidate must:

- Understand the following general concepts, which may not have specified values, procedures, or measurements; and
- **Know** the following specific procedures or values; performance of these items may also be assessed on the performance examination.

RESOURCES:

ACI CCS-5 Concrete Craftsman Series: Placing and Finishing Decorative Concrete Flatwork

Chapter 1: Safety

- Know the minimum safety equipment required when working with wet concrete.
- Know the SDS requirements for hazardous materials.
- Understand the ventilation requirements related to solvent-based materials.
- Understand when an approved respirator should be worn.
- Understand the need to barricade the work area and maintain cleanliness.
- Know the safety recommendations for working with electric tools.

Chapter 2: Layout Considerations - Americans with Disabilities Act Guidelines

- Understand the acronym ADA.
- Know the minimum width for an Accessible Route.
- Know the Cross Slope for Walks and Ramps.
- Understand the purpose of the ADA.
- Understand the ramifications of noncompliance with the ADA.

Chapter 3: Soils, Subgrade, and Base Requirements

- Understand the purpose and terminology of a soils report.
- Understand requirements that may be affected by the soils report.
- Know how the subgrade is prepared.
- Understand how to handle conflicting requirements from the soils report.

Chapter 4: Forming, Reinforcement, and Dowels

- Know the purpose of forming.
- Understand the need to identify problems or conflicts before concrete is placed.
- Know the recommended placing strategy for decorative concrete.
- Understand the typical reinforcement for decorative concrete paving.
- Understand the disadvantages of welded wire reinforcement.
- Understand the importance of reinforcement position.
- Know the proper method to place welded wire reinforcement and steel reinforcement.
- Know the purposes for dowels.
- Understand the purpose of microfibers.
- Know the effects of microfibers on concrete aesthetics.
- Understand the various names for isolation joints.
- Understand the various names for contraction joints.

JOB TASK ANALYSIS

- Know where isolation joints are placed.
- Know where contraction joints are placed.
- Know proper contraction joint spacing.
- Understand the relationship between water-cementitious materials ratio and shrinkage cracking.
- Understand the effect of subgrade on shrinkage cracking.
- Understand how isolation joints function.
- Understand how contraction joints function.
- Understand how contraction joints are constructed.
- Know when joints should be cut with saws.
- Know how to select the proper form size and stakes.
- Know welded-wire reinforcement designations.
- Know the dosage rate of microfibers.
- Understand the purpose of a contraction joint.
- Understand the purpose of saw cutting construction joints.
- Understand how the subgrade affects a concrete slab.
- Understand how isolation joints are decoratively treated.
- Understand slope recommendations for paving.

Chapter 5: Basic Decorative Concrete Components

- Understand the effect of aggregate size on water requirement.
- Understand the effect of high water content on cracking.
- Know the effect of aggregate size on cracking potential.
- Understand the effect of fly ash on color.
- Understand the effect of fly ash and slag cement on setting time.
- Know the mix design criteria for areas that experience cycles of freezing and thawing.
- Know when air entrainment is and is not needed for decorative concrete.
- Understand the problems encountered when finishing concrete with entrained air.
- Know how to minimize the problems encountered when finishing concrete with entrained air.
- Understand why calcium chloride should not be used.
- Know the disadvantages of carbon black.
- Understand release agents.
- Know release agent removal requirements.
- Know the levels of exposure for top-surface retarders.
- Know how to calculate how many stamping mats are needed.
- Understand the use of flexible stamping mats.
- Understand the use for tampers.
- Understand why hand rollers are used after the stamping mats are removed.
- Know the benefits, disadvantages, and dosage rate of integral color.
- Know the composition, benefits, and disadvantages of color hardeners.
- Understand the effects of supplementary cementitious materials on concrete color.
- Know and be able to use basic tools for decorative flatwork.

Chapter 6: Concrete Surface Retarders

- Know when a top surface retarder is applied.
- Understand why top surface retarders are used for decorative concrete.

JOB TASK ANALYSIS

- Know the different aggregate exposure levels.
- Understand how top surface retarders are applied.
- Know the guidelines for use of surface retarders.

Chapter 7: Stamped Concrete

- Know the appropriate aggregate sizes for stamped concrete.
- Know the alignment requirements with regards to a specific stamping tool.
- Know when curing should be applied to decorative concrete.
- Know which curing methods are appropriate for decorative concrete.
- Understand the need for curing the mock-up panel.
- Understand the cleaning requirements with release agent prior to sealer application.
- Know the application of release agent.
- Know and be able to perform application of color hardener.

Chapter 8: Seeding Special Aggregates

- Know the requirements of ASTM C33 for seeded aggregate.
- Know what sizes of aggregate are used and at what rate.
- Know how and be able to construct exposed aggregate concrete using the seeded aggregate method.
- Know what should be included in a mock up and when to create it.
- Understand the basic concept of alkali-silica reaction.
- Understand the effect of aggregate color on albedo.
- Understand the benefits of dark colors for vehicular paving.

Chapter 9: Decorative Treatment of Stairs

- Understand the dimension requirements for stairs.
- Know the requirements for the radius of curvature at the leading edge of the tread on stairs.
- Know the projection requirements for stair nosings.
- Know the slope requirement for stair treads.
- Know the appropriate slump for stairs.
- Understand the direction of concrete placement for stairs.
- Understand the direction of concrete finishing for stairs.
- Understand when a mock-up should be constructed.
- Understand timing of stair construction.
- Understand application of color hardener to stairs.

Chapter 10: Sealing Decorative Concrete

- Know the difference between curing compounds, sealers, and cure and seal products.
- Know the different types of sealers.
- Understand compliance with VOC regulations.
- Know the major causes of problems when applying sealers to decorative concrete.
- Know the potential surface contaminants
- Know the requirements for surface cleanliness prior to sealer application.
- Know how sealers are applied.

Chapter 1: Safety

- 1. Not every contracting company needs a written safety policy. *True* or *False*?
 - A. True
 - B. False
- 2. When working with wet concrete, boots and gloves should be:
 - A. Cotton
 - B. Leather
 - C. Impervious
 - D. Optional
- 3. Fresh concrete can cause chemical burns. *True* or *False*?
 - A. True
 - B. False
- 4. Safety glasses and face shields should be worn when using:
 - A. Saws
 - B. Chipping hammers
 - C. Grinders
 - D. All of the above

5. Approved respirators should be worn when handling _____ producing products.

- A. Dust
- B. Mist
- C. Fume
- D. All of the above
- 6. Hearing protection should be worn when operations or equipment create noise levels that prevent normal conversation at a distance of 3 ft (1 m). *True* or *False*?
 - A. True
 - B. False
- 7. Portable electric tools should be of the _____ type.
 - A. Insulated
 - B. Double insulated
 - C. Exposed
 - D. None of the above

- 8. Extension cords should be kept away from:
 - A. Pedestrian traffic
 - B. Vehicular traffic
 - C. Sharp objects
 - D. All of the above
- 9. Solvent-based sealers are not flammable. *True* or *False*?
 - A. True
 - B. False
- 10. _____ is responsible for keeping the jobsite clean.
 - A. General contractor
 - B. Crew foreman
 - C. Janitors
 - D. Everyone

Chapter 2: Layout Considerations - Americans with Disabilities Act Guidelines

- 1. Decorative concrete work does not need to comply with ADA Guidelines. *True* or *False*?
 - A. True
 - B. False
- 2. A walking surface that has a running slope of 1:15 is a:
 - A. Detectable warning
 - B. Ramp
 - C. Vehicular way
 - D. Walk
- 3. Interior accessible routes include:
 - A. Ramps
 - B. Elevators
 - C. Corridors
 - D. All of the above
- 4. Exterior accessible routes include:
 - A. Curb ramps
 - B. Crosswalks
 - C. Lifts
 - D. All of the above
- 5. Built-up curb ramps project into vehicular traffic lanes. *True* or *False*?
 - A. True
 - B. False
- 6. Outdoor ramps and their approaches are required to be designed so that _____ will not accumulate.
 - A. Water
 - B. Pedestrians
 - C. Landscaping debris
 - D. Bird droppings
- 7. A landing is required to be at least as wide as the widest ramp run leading to it. *True* or *False*?
 - A. True
 - B. False

- 8. Detectable warnings are required to seamlessly blend visually with adjoining surfaces. *True* or *False*?
 - A. True
 - B. False
- 9. An accessible route is _____ with new construction.
 - A. Typical
 - B. Uncommon
 - C. Rare
 - D. Never found
- 10. Contractors should consider tolerances when constructing ramps. *True* or *False*?
 - A. True
 - B. False

Chapter 3: Soils, Subgrade, and Base Requirements

- 1. The soils report is also known as the geotechnical investigation report. *True* or *False*?
 - A. True
 - B. False
- 2. The purpose of the soils report is to:
 - A. Evaluate geotechnical conditions at the site
 - B. Identify significant geotechnical or geologic issues that would impact site development
 - C. Provide geotechnical recommendations for design and construction
 - D. All of the above
- 3. Excavated soil can be used as compacted structural fill without testing. *True* or *False*?
 - A. True
 - B. False
- 4. Other contractors may trench through a prepared, compacted subgrade to place:
 - A. Electrical conduit
 - B. Plumbing
 - C. Irrigation work
 - D. All of the above
- 5. The concrete contractor should exclude subgrade preparation from their proposal. *True* or *False*?
 - A. True
 - B. False
- 6. The geotechnical engineer will determine the required:
 - A. Cement type
 - B. Aggregate type
 - C. Water source
 - D. None of the above
- 7. The geotechnical firm will evaluate the soils to determine what steps need to be taken to ensure slabs-on-ground are not subject to ______ attack.
 - A. Snack
 - B. Shark
 - C. Chemical
 - D. Bear

- 8. The soils report may recommend joint spacing. *True* or *False*?
 - A. True
 - B. False
- 9. Slabs-on-ground should be placed on ______ as described within the soils report.
 - A. Compacted subgrade
 - B. A moisture barrier
 - C. Welded wire mesh reinforcement
 - D. None of the above
- 10. It is recommended to adhere to the most lenient design when comparing the soils report recommendations to the project drawings and specifications. *True* or *False*?
 - A. True
 - B. False

Chapter 4: Forming, Reinforcement, and Dowels

- 1. Forming:
 - A. Creates the desired layout
 - B. Sets the elevation for paving
 - C. Determines the placement sequence
 - D. All of the above
- 2. Issues with the plans and specifications should be addressed after the concrete has been placed. *True* or *False*?
 - A. True
 - B. False
- 3. Concrete lane width is dependent on:
 - A. The type of finish
 - B. Contraction joint requirements
 - C. Decorative joint requirements
 - D. All of the above
- 4. Heavier gauge welded wire reinforcement mats are easier to support during placement of concrete. *True* or *False*?
 - A. True
 - B. False
- 5. The size and spacing of reinforcing steel may be found in the:
 - A. Drawings
 - B. Soils report
 - C. Specifications
 - D. All of the above
- 6. Dowels are a means to allow for load transfer across ______ joints.
 - A. Construction
 - B. Isolation
 - C. Contraction
 - D. All of the above
- 7. Microfibers and macrofibers are primary reinforcement. *True* or *False*?
 - A. True
 - B. False

- 8. Isolation joints are typically placed against:
 - A. Structures
 - B. Walls
 - C. Vertical restraints
 - D. All of the above
- 9. A typical isolation joint material is:
 - A. Asphalt-impregnated fiber
 - B. Lumber
 - C. Foam with a perforated top
 - D. None of the above
- 10. Contraction joints are used to reduce the occurrence of random cracks. *True* or *False*?
 - A. True
 - B. False

Chapter 5: Basic Decorative Concrete Components

- 1. It is recommended that you specify some performance properties and some materials and proportions when ordering concrete. *True* or *False*?
 - A. True
 - B. False
- 2. Common supplementary cementitious materials include:
 - A. Metakaolin
 - B. Calcined lime
 - C. Crystalline silica
 - D. Fly ash
- 3. Entrained air is generally needed only in concrete that will be exposed to sulfates from the soil. *True* or *False*?
 - A. True
 - B. False
- 4. Integral color extends through ______ of the slab.
 - A. Only the top surface
 - B. About one-quarter the depth
 - C. Half the depth
 - D. The full depth
- 5. Dry-shake hardeners contain:
 - A. Portland cement
 - B. Silica sand
 - C. Wetting agents
 - D. All of the above
- 6. Acid washing and sandblasting are environmentally friendly alternatives to top-surface retarders. *True* or *False*?
 - A. True
 - B. False
- 7. Finishers can use hand floats to achieve final finish for:
 - A. Sidewalks
 - B. Patios
 - C. Driveways
 - D. All of the above

- 8. Margin trowels are used to move coarse aggregate particles from a joint location before grooving. *True* or *False*?
 - A. True
 - B. False

9. Some stampers lay out more than one row at a time for _____ patterns.

- A. Ashlar
- B. Irregular notched
- C. Herringbone
- D. None of the above
- 10. Metal dirt tampers work well for flex mats and texturing skins. *True* or *False*?
 - A. True
 - B. False

Chapter 6: Concrete Surface Retarders

- 1. A surface retarder is:
 - A. An admixture mixed into the concrete with the batch water
 - B. A dry-shake powder applied immediately after strike-off
 - C. A liquid solution sprayed on during the initial plastic state
 - D. None of the above
- 2. Top-surface retarders must be protected by:
 - A. Plastic covering
 - B. Wetted burlap
 - C. Insulating blankets
 - D. None of the above
- 3. Surface retarders inhibit cement hydration for 4 to 24 hours. *True* or *False*?
 - A. True
 - B. False

4. Seeded aggregates less than _____ diameter are not recommended with surface retarders.

- A. 1/4 in. (8 mm)
- B. 3/8 in. (10 mm)
- C. 1/2 in. (13 mm)
- D. 1 in. (25 mm)
- 5. When producing micro-sand finishes, the use of an internal vibrator is most effective in developing a uniform mortar content. *True* or *False*?
 - A. True
 - B. False
- 6. A surface retarder is applied after:
 - A. Initial set
 - B. Bleed water dissipates
 - C. Final set
 - D. None of the above
- 7. It may be necessary to remove the surface retarder the same day, if the weather is hot. *True* or *False*?
 - A. True
 - B. False

- 8. When the treated area has cured, ______ is the most effective means of removing the retarded material.
 - A. High-pressure washing
 - B. Brooming
 - C. Power floating
 - D. None of the above
- 9. Sealing the finished surface is recommended when salt damage from inclement weather is a concern. *True* or *False*?
 - A. True
 - B. False
- 10. Surface retarders create a concrete surface that requires:
 - A. No maintenance
 - B. Limited maintenance
 - C. High maintenance
 - D. None of the above

Chapter 7: Stamped Concrete

- 1. Stamped concrete can resemble:
 - A. Cut stone
 - B. Slate
 - C. Tile
 - D. All of the above
- 2. Well-drained, compacted fill allows the concrete to cure with a more consistent color. *True* or *False*?
 - A. True
 - B. False
- 3. _____ can make stamping more difficult.
 - A. Sloppy forming
 - B. Smaller aggregate
 - C. Integral color
 - D. All of the above
- 4. The surface should be steel troweled during the first application of color hardener. *True* or *False*?
 - A. True
 - B. False
- 5. Release agent should be applied:
 - A. Before application of color hardener
 - B. Directly to the stamping mats
 - C. Right before the texturing process begins
 - D. All of the above
- 6. Stamping too early may cause:
 - A. Birdbaths
 - B. Little or no texture to develop
 - C. Delamination
 - D. All of the above
- 7. Sliding or dragging a patterned texturing tool may cause defects. *True* or *False*?
 - A. True
 - B. False

- 8. It is recommended to avoid placing decorative concrete in ______ weather.
 - A. Sunny
 - B. Windy
 - C. Cold
 - D. All of the above
- 9. Timing for release agent wash down depends on the:
 - A. Ambient temperature
 - B. Concrete mixture
 - C. Curing method
 - D. All of the above
- 10. Sealing is the same as curing. *True* or *False*?
 - A. True
 - B. False

Chapter 8: Seeding Special Aggregates

- 1. Seeded aggregate works better for pedestrian paving than for vehicular paving. *True* or *False*?
 - A. True
 - B. False
- 2. Darker aggregates with darker integral color may:
 - A. Contribute to LEED points by increasing the albedo
 - B. Hide oil and tire marks
 - C. Produce a soft, less durable surface
 - D. All of the above
- 3. Some aggregates may cause an expansive silica gel to form. *True* or *False*?
 - A. True
 - B. False
- 4. Reactive aggregates include:
 - A. Shells
 - B. Pyrite
 - C. Flint
 - D. All of the above
- 5. Reactive aggregate cracking can occur as early as days after placement. *True* or *False*?
 - A. True
 - B. False
- 6. Aggregates that contain ______ should be avoided.
 - A. Feldspar
 - B. Silica carbide
 - C. Organic impurities
 - D. None of the above
- 7. Seeded aggregates are broadcast onto the surface after the concrete achieves initial set. *True* or *False*?
 - A. True
 - B. False

- 8. High density seeded aggregates can:
 - A. Sink too deeply to be exposed
 - B. Reduce the strength of the slab
 - C. Absorb excessive amounts of moisture from the surrounding mortar
 - D. All of the above

9. The concrete surface is washed _____ placement.

- A. The same day as or the day after
- B. 7 days after
- C. 28 days after
- D. None of the above
- 10. A mockup panel should always be completed prior to the commencement of work. *True* or *False*?
 - A. True
 - B. False

Chapter 9: Decorative Treatment of Stairs

- 1. The two components of stairs are:
 - A. Treads and risers
 - B. Runs and risers
 - C. Treads and runs
 - D. None of the above
- 2. The undersides of nosings are not allowed to be:
 - A. Grooved
 - B. Vertical
 - C. Abrupt
 - D. None of the above
- 3. Corrective action on stairs may create a cascading effect that will continue to the top or bottom of the flight. *True* or *False*?
 - A. True
 - B. False
- 4. Decorative stairs may have a(n) ______ finish.
 - A. Stamped
 - B. Broomed
 - C. Exposed aggregate
 - D. All of the above
- 5. The maximum slump for use in the placement of stairs should not exceed:
 - A. 2 in. (50 mm)
 - B. 4 in. (100 mm)
 - C. 6 in. (150 mm)
 - D. 8 in. (200 mm)
- 6. Concrete stairs are typically started at the:
 - А. Тор
 - B. Bottom
 - C. Middle
 - D. All of the above

- 7. The key to timing for placing stairs is working:
 - A. Cleanly
 - B. Carefully
 - C. Quickly
 - D. All of the above
- 8. Vertical faces will tend to appear lighter when using integral color. *True* or *False*?
 - A. True
 - B. False
- 9. With a sand finish, the typical coloring method is:
 - A. Integral color
 - B. Dry-shake color hardener
 - C. Painting
 - D. None of the above
- 10. Saw-cut contraction joints may be placed in stairs. *True* or *False*?
 - A. True
 - B. False

Chapter 10: Sealing Decorative Concrete

- 1. Sealers are one of the largest sources of frustration for decorative concrete. *True* or *False*?
 - A. True
 - B. False
- 2. _____ have a dry film thickness of 2 to 3 mil (50 to 75 μ m).
 - A. Curing compounds
 - B. Cure and seals
 - C. Sealers
 - D. Coatings
- 3. Sealers include:
 - A. Siloxanes
 - B. Acrylics
 - C. Polyurethanes
 - D. All of the above
- 4. Moisture is of minimal concern with decorative concrete sealers. *True* or *False*?
 - A. True
 - B. False
- 5. Sealers for decorative concrete often fail in areas:
 - A. That are power washed
 - B. Where deicing salts are applied
 - C. With fewer sunny days
 - D. None of the above
- 6. High temperatures stop film development and lead to a white powder on the surface. *True* or *False*?
 - A. True
 - B. False
- 7. Condensation on outdoor slabs is more common in:
 - A. Winter and summer
 - B. Winter and spring
 - C. Spring and fall
 - D. Summer and fall

- 8. A hand-troweled concrete surface is usually porous enough to accept a one-part sealer with a solids content lower than 30%. *True* or *False*?
 - A. True
 - B. False
- 9. The best way to apply any sealer is usually:
 - A. High-volume, low-pressure sprayer
 - B. Roller
 - C. Lamb's wool applicator
 - D. Microfiber applicator
- 10. A microfiber applicator is used for rough textured floors. *True* or *False*?
 - A. True
 - B. False

Chapter 1: Safety

| Question | Answer | Reference |
|----------|---------------------|-----------|
| 1. | B. False | p. 11 |
| 2. | C. Impervious | p. 11 |
| 3. | A. True | p. 11 |
| 4. | D. All of the above | p. 11 |
| 5. | D. All of the above | p. 11 |
| 6. | A. True | p. 11 |
| 7. | B. Double insulated | p. 11 |
| 8. | D. All of the above | p. 12 |
| 9. | B. False | p. 12 |
| 10. | D. Everyone | p. 12 |

Chapter 2: Layout Considerations - Americans with Disabilities Act Guidelines

| Question | Answer | Reference |
|----------|---------------------|-----------|
| 1. | B. False | p. 13 |
| 2. | B. Ramp | p. 13 |
| 3. | D. All of the above | p. 14 |
| 4. | D. All of the above | p. 14 |
| 5. | B. False | p. 15 |
| 6. | A. Water | p. 16 |
| 7. | A. True | p. 16 |
| 8. | B. False | p. 16 |
| 9. | A. Typical | p. 17 |
| 10. | A. True | p. 18 |

Chapter 3: Soils, Subgrade, and Base Requirements

| Question | Answer | Reference |
|----------|-----------------------|-----------|
| 1. | A. True | р. 19 |
| 2. | D. All of the above | р. 19 |
| 3. | B. False | p. 19 |
| 4. | D. All of the above | р. 19 |
| 5. | A. True | р. 19 |
| 6. | A. Cement type | p. 20 |
| 7. | C. Chemical | p. 20 |
| 8. | A. True | p. 20 |
| 9. | A. Compacted subgrade | p. 20 |
| 10. | B. False | p. 20 |
| | | |

Chapter 4: Forming, Reinforcement, and Dowels

| Question | Answer | Reference |
|----------|-----------------------------|-----------|
| 1. | D. All of the above | p. 21 |
| 2. | B. False | p. 22 |
| 3. | D. All of the above | p. 23 |
| 4. | A. True | p. 24 |
| 5. | D. All of the above | p. 25 |
| 6. | A. Construction | p. 26 |
| 7. | B. False | p. 27 |
| 8. | D. All of the above | p. 28 |
| 9. | C. Foam with perforated top | p. 31 |
| 10. | A. True | p. 32 |

Chapter 5: Basic Decorative Concrete Components

| Question | Answer | Reference |
|----------|--|-----------|
| 1. | B. False | p. 35 |
| 2. | D. Fly ash | p. 37 |
| 3. | B. False | p. 39 |
| 4. | D. The full depth | p. 41 |
| 5. | D. All of the above | p. 42 |
| 6. | B. False | p. 44 |
| 7. | D. All of the above | p. 47 |
| 8. | A. True | p. 48 |
| 9. | B. Irregular notched | p. 51 |
| 10. | B. False | p. 52 |
| | Chapter 6: Concrete Surface Retarders | |
| Question | Answer | Reference |
| 1. | C. A liquid solution sprayed on during the initial plastic state | p. 59 |
| 2. | A. Plastic covering | p. 60 |
| 3. | A. True | p. 60 |
| 4. | B. 3/8 in. (10 mm) | p. 61 |
| 5. | B. False | p. 62 |
| 6. | B. Bleed water dissipates | p. 63 |
| 7. | A. True | pp. 63-64 |

| 7. | A. Irue | pp. 63 |
|-----|--------------------------|--------|
| 8. | A. High-pressure washing | p. 64 |
| 9. | A. True | p. 65 |
| 10. | B. Limited maintenance | p. 66 |

Chapter 7: Stamped Concrete

| Question | Answer | Reference |
|---------------------------------------|--|-----------|
| 1. | D. All of the above | p. 67 |
| 2. | A. True | p. 68 |
| 3. | A. Sloppy forming | p. 69 |
| 4. | B. False | p. 70 |
| 5. | C. Right before the texturing process begins | p. 71 |
| 6. | A. Birdbaths | p. 72 |
| 7. | A. True | p. 73 |
| 8. | B. Windy | p. 74 |
| 9. | D. All of the above | p. 75 |
| 10. | B. False | p. 76 |
| Chapter 8: Seeding Special Aggregates | | |

| Question | Answer | Reference |
|----------|-------------------------------------|-----------|
| 1. | B. False | p. 77 |
| 2. | B. Hide oil and tire marks | p. 77 |
| 3. | A. True | p. 77 |
| 4. | D. All of the above | p. 77 |
| 5. | A. True | pp. 77-78 |
| 6. | C. Organic impurities | p. 78 |
| 7. | B. False | p. 78 |
| 8. | A. Sink too deeply to be exposed | p. 78 |
| 9. | A. The same day as or the day after | p. 78 |
| 10. | A. True | p. 79 |

Chapter 9: Decorative Treatment of Stairs

| Question | Answer | Reference |
|----------|----------------------|-----------|
| 1. | A. Treads and risers | p. 81 |
| 2. | C. Abrupt | p. 81 |
| 3. | A. True | p. 82 |
| 4. | D. All of the above | p. 83 |
| 5. | B. 4 in. (100 mm) | p. 84 |
| 6. | А. Тор | p. 85 |
| 7. | D. All of the above | p. 86 |
| 8. | B. False | p. 86 |
| 9. | A. Integral color | p. 87 |
| 10. | A. True | p. 88 |

Chapter 10: Sealing Decorative Concrete

| Question | Answer | Reference |
|----------|--------------------------------------|-----------|
| 1. | A. True | p. 91 |
| 2. | D. Coatings | p. 92 |
| 3. | D. All of the above | р. 93 |
| 4. | B. False | p. 94 |
| 5. | B. Where deicing salts are applied | p. 95 |
| 6. | B. False | p. 96 |
| 7. | C. Spring and fall | p. 97 |
| 8. | A. True | p. 98 |
| 9. | A. High-volume, low-pressure sprayer | pp. 98-99 |
| 10. | B. False | p. 100 |



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