



CP-50  
3<sup>rd</sup> Ed.

## Tilt-Up Supervisor and Technician



American Concrete Institute







# TECHNICIAN WORKBOOK

**ACI Certification Program for  
Tilt-Up Supervisor and Technician**

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Check the [Tilt-Up Program page](#) for the most current version (see below) of this publication.

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# PREFACE

Site-cast tilt-up concrete is a rapidly growing segment of the construction industry: it is becoming a common construction method in regions where historically there has been little activity; in an increasing number of areas it is the construction method of choice; and as the technology continues to develop, it is being used in a wider variety of projects. In concept, tilt-up construction is simple, but behind this simplicity is a complex matrix of knowledge that intertwines basic construction principals, project-specific requirements, and a commitment on the part of the constructors to adhere to standards of quality that are essential for the continued growth of the industry. The tilt-up supervisor is a key individual to the success of the project, the tilt-up contractor, and to the industry as a whole. The growth of the industry has driven demand for knowledgeable and experienced individuals capable of supervising tilt-up projects, and this has made an independent national program of training and certification highly desirable.

To address this need, the American Concrete Institute (ACI) and the Tilt-Up Concrete Association (TCA) have developed the Tilt-Up Supervisor Certification Program. ACI provides leadership by administering the program. ACI's position as an established and independent group of concrete

experts enables it to effectively administer impartial certification programs that are international in scope. TCA, working through ACI, provides the panel of tilt-up industry experts required to evaluate new knowledge and technology as they emerge and continually maintain and update the program.

The certification program is designed to assess the knowledge and skills of experienced field supervisors in the tilt-up industry as well as provide a career path for individuals entering the industry who do not possess the experience necessary for full supervisor certification. It is important to remember that the certification process is a tool used to assess the knowledge and skills of the participants, and that it does not replace training and experience as a vehicle to convey the knowledge and skills. Related study materials and educational seminars provide an integral role in this process. It is expected that the certification program will establish a core of individuals who have demonstrated understanding and experience in the tilt-up construction, and that this will stimulate the growth and expansion of tilt-up construction into new areas.

This Tilt-Up Supervisor Technician Workbook (CP-50) describes the operation of the certification program and provides the information necessary to prepare for the ACI certification examination.

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# PROGRAM INFORMATION

## Overview of the ACI Program

Achieving ACI Certification as a Tilt-Up Supervisor requires successful completion of the ACI written examination and fulfillment of the required work experience. Tilt-Up Technician certification is granted to examinees who pass the written examination but have not satisfied the necessary work experience to be granted Supervisor certification.

## 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 Tilt-Up Supervisor**—A person who demonstrates proficiency in and an understanding of overall on-site administrative and technical management for producing tilt-up projects by passing the ACI written examination and meeting work ex-

perience requirements.

**ACI Tilt-Up Technician**—A person who demonstrates proficiency in and an understanding of overall on-site administrative and technical management for producing tilt-up projects by passing the ACI written examination.

**Examiner**—A registered professional engineer approved by ACI and authorized to administer the examination sessions locally.

**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 information concerning work experience submitted by 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.

**TCA**—The Tilt-Up Concrete Association (PO Box 204, Mount Vernon, IA, 52314), which provides technical material used in this program, assisted in the program's development, and continues to assist in its maintenance and delivery.

## Resource Materials

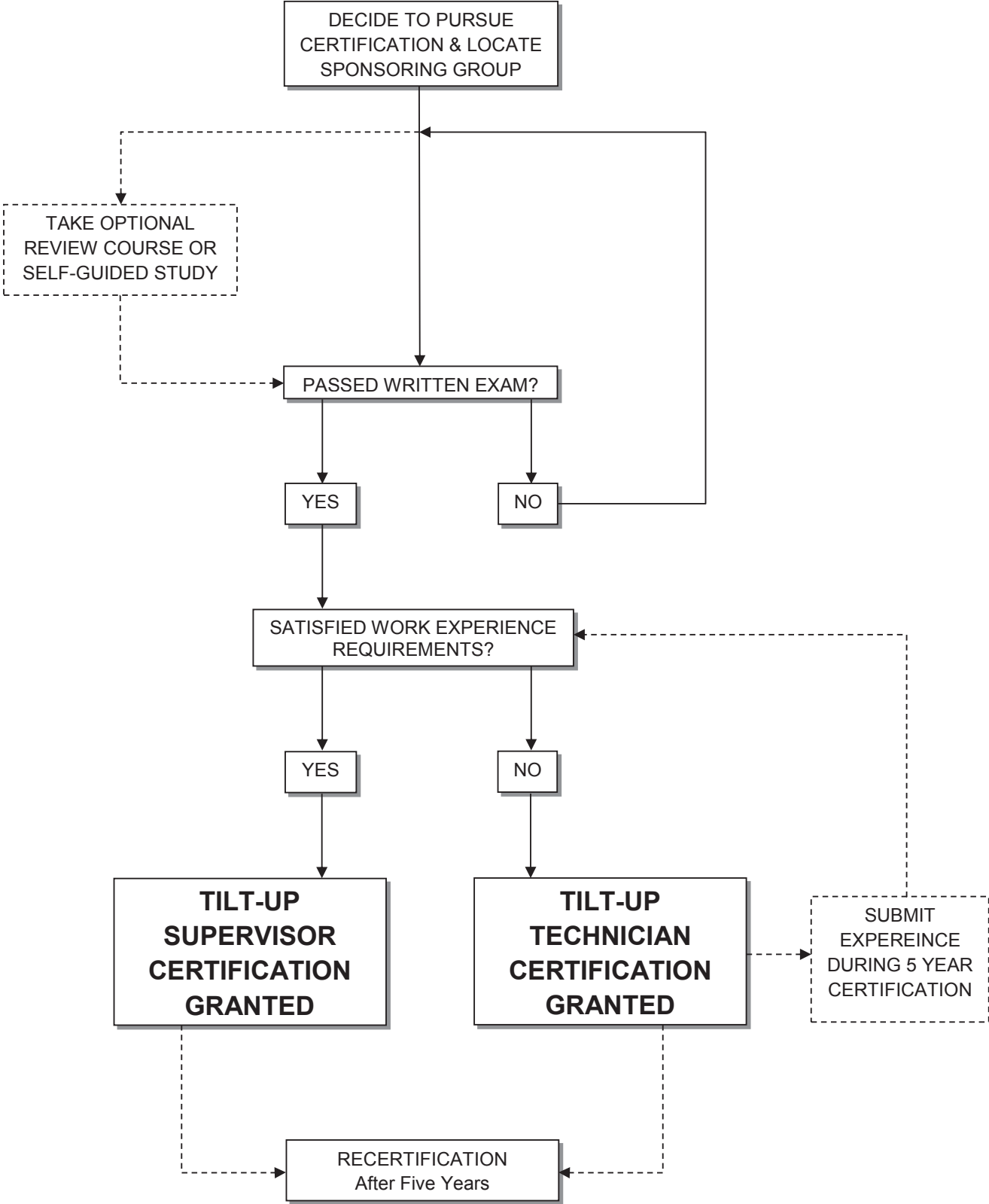
This document is included with your purchase of the TCA publication *The Construction of Tilt-Up*, which is the primary resource for Tilt-Up Supervisor and Technician certification, and contains the essential resource materials you need to prepare for the examination.

This document is designed to orient you to the certification program and direct you in preparing for the written examination. Sample written exam questions and answers are included in the **Study Materials** section.

Please be advised that the written examination is based on the current edition of *The Construction of Tilt-Up*. If you are unsure you possess the correct edition, please contact TCA or the ACI Certification Department.

**ACI TILT-UP SUPERVISOR  
AND TECHNICIAN  
CERTIFICATION PROCESS**

Figure 1





## 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 Tilt-Up Supervisor and Technician 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 Tilt-Up Supervisor or Technician 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 Tilt-Up Supervisor and Technician certification, a written examination must be passed. You may be required to show photo identification to gain admittance to the examination.

The Tilt-Up Supervisor and Technician written examination covers content from *The Construction of Tilt-Up*. 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 80 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., 56 correct out of 80 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 *The Construction of Tilt-Up*; 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 Tilt-Up Constructor Certification 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 under the criteria stated will require re-examination on the entire written exam. It is your responsibility to request re-examination. 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 C650—Tilt-Up Constructor Certification
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 C650.*

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.

## Work Experience Requirements

To qualify for Tilt-Up Supervisor certification, you must complete the following:

- A minimum of 5 years (7500 hours) of verifiable construction experience, of which:
  - » at least 3 years (4500 hours) is tilt-up related experience, of which:
    - ◇ a minimum of 2000 hours is tilt-up supervisory experience and training, of which:
      - a minimum of 75% of supervisory hours are field experience.

Supervisory experience and training, in the number of hours indicated, is required in the following areas:

- Safety Communications and Procedures (100)
- Planning and Scheduling (200)
- Structural Systems (100)
- Site Preparation and Foundations (100)
- Slabs on Grade (160)
- Forming and Layout (240)
- Concrete Properties and Placement (440)
- Erection and Bracing (440)
- Panel Finishes and Finishing Buildings (220)

Time in the classroom while as an apprentice or other formal training program shall not be included in meeting the required work experience.

Applicants who have passed the written examination but do not meet all of the work experience requirements will be granted Tilt-Up Technician certification.

You must submit a Work Experience Form to provide verification that the work experience requirements have been met.

Satisfying the work experience requirements for ACI certification involves obtaining the cooperation of present and/or past employers in verifying the work experience described on your form. The persons best suited to be respondents are present and former employers, but coworkers, such as supervisors, who have direct knowledge of your work history during the time period in question, are also acceptable.

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.

Certified Technicians can submit the required work experience to upgrade to Supervisors during their current certification period.

## Recertification

Your ACI certification as a Tilt-Up Supervisor or Technician expires five years from the date that you complete the certification requirements. A Technician who is upgraded to Supervisor at any time during the five-year certification period will be recognized as a Supervisor for the remainder of that certification period. Your original certification and subsequent recertification periods run concurrently,

not consecutively.

Recertification can be obtained by one of the following methods:

- A **Tilt-Up Supervisor** or **Technician** who successfully completes the then-current written examination. If your certification is expired by two years or more, you must recertify by this method.
- A Tilt-Up Technician who submits 10 hours of verifiable continuing education during the previous 5 year period. Courses shall be from listings pre-approved by the C650 committee and TCA from offerings at conventions, exhibitions, or similar venues.
- A Supervisor Technician who submits verifiable work experience and continuing education for the previous 5 year period, following the criteria listed:

- » Participation in at least 10 hours of approved continuing education. Courses shall be from listings pre-approved by the C650 committee and TCA from offerings at conventions, exhibitions, or similar venues.
- » Tilt-up supervisory experience on a minimum of 3 tilt-up projects, or a project(s) with a minimum of 100 panels.

## **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**
- **Sample Written Exam Questions**
- **Answers to Sample Exam Questions**

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# JOB TASK ANALYSIS

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## 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.

## RESOURCES:

*The Construction of Tilt-Up* by the Tilt-Up Concrete Association, 2nd Edition, 2016

## AREAS OF COMPETENCY:

Safety Communications and Procedures  
Planning and Scheduling  
Structural Systems  
Site Preparation and Foundations  
Slabs on Grade  
Layout and Forming  
Concrete Properties and Placement  
Erection and Bracing  
Panel Finishes and Building Finishing

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### Safety Communications and Procedures

- Know when safety meetings are to be held
- Know who should attend and what is to be covered in a safety meeting
- Know where non-participants to the lift should be
- Know how to identify site hazards
- Understand communications with crane operator
- Know when to check brace attachments after lifting and bracing
- Know where to locate the correct rigging configuration for panels
- Understand where to locate information regarding overhead obstructions

### Planning and Scheduling

- Know what information is in Panel Books and Panel Drawings
- Understand concepts that make tilt-up construction sustainable
- Know when alternative casting methods might be required
- Know factors to consider during pre-construction planning
- Understand factors to determine whether to lift from inside or outside the building
- Know the factors used to schedule casting and lifting sequences
- Understand the requirements for crane selection
- Understand what elements are important when “panelizing” an elevation
- Know common surfaces for casting panels
- Understand simple procedures for estimating panel weight
- Understand methods for insulating tilt-up walls
- Understand what types of buildings are most prevalent and economical to build
- Know who should be involved in determining panel layout and scheduling
- Know what items are to be considered in a pre-pour checklist
- Know the means for assessing benchmarks for quality control

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# JOB TASK ANALYSIS

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## Structural Systems

- Understand components and importance of the roof diaphragm
- Know basic requirements for reinforcement cover and spacing
- Know orientation, tolerance, and placement of imbeds
- Know the purpose and type of connection between the panels, roof, and floor
- Understand the impact of reveals on structural performance
- Understand when a panel crack is of concern
- Know when the engineer should be contacted if designs are modified
- Know the impact of lifting loads on reinforcement amount and location

## Site Preparation and Foundations

- Understand the types of foundations used in tilt-up construction
- Know the impact of panel weight on the footing
- Know the important site factors impacting the crane
- Know the typical distance between the bottom of panel and footing
- Understand soil characteristics and their impact on foundations
- Know when the grout should be packed beneath the panels
- Understand the importance of a good sub-base and compaction

## Slabs on Grade

- Know the importance and methods of slab finishing and evaluating flatness
- Know timing application of curing compounds and bond breakers
- Understand the role of the slab thickness in bracing panels
- Know how to properly apply bond breakers
- Understand the factors influencing slab quality
- Know the reasons and methods for curing floor slabs
- Know the alternatives and parameters to alternate casting locations
- Understand the reasons for slab curing
- Understand the impact of floor joints on panel appearance
- Understand what a closure strip is and why it is used
- Understand types of floor joints and their purposes

## Layout and Forming

- Know factors affecting layout and sequencing processes
- Know when alternative casting methods are economical
- Know importance of reveal locations and how to ensure they are accurate
- Know what items to check prior to casting
- Know the different types of hardware cast into panels and their purpose
- Know how panels are typically cast
- Know materials and systems for forming panels
- Understand interaction between bond breaker and reinforcement
- Understand the purpose and use of chamfer strips
- Know tolerances, orientation, and installation methods of embeds and inserts
- Understand the proper method of bond breaker application
- Know the design, materials, and methods for use of reveals
- Know where to find information regarding inserts, strongbacks, and lifting strength

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# JOB TASK ANALYSIS

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## Concrete Properties and Placement

- Know the difference between the lifting and design strength of concrete
- Understand the material standard setting entities and what they govern
- Understand how cylinder, beam, and slump tests are taken and what they measure
- Understand what constitutes supplementary cementitious materials and their impact
- Know about water-cement ratio and impact of water on concrete mixes
- Understand how and when to use water reducing admixtures
- Understand the definition and procedures for cold weather concreting
- Understand procedures for hot weather concreting
- Know the reason and proper methods for vibrating concrete
- Know how to use curing compounds and methods
- Understand cement types and uses
- Know the materials, general proportions, and properties of concrete
- Understand the concept for mix proportioning/design
- Know the properties of aggregate and their impact on concrete
- Know the methods and techniques for placement and finishing concrete
- Know the types and uses of admixtures
- Know the reasons and impact of air entrainment in concrete
- Know inherent safety dangers with fresh concrete
- Understand the important checks recommended before casting
- Know methods and systems for supporting steel reinforcement
- Know the sustainability attributes of the manufacturing of cement and concrete
- Understand the fire rating of concrete
- Know the factors and process by which concrete cures

## Erection and Bracing

- Know critical planning considerations and procedures for lifting and bracing
- Understand who generally analyzes lifting and bracing insert designs
- Know personnel location and responsibilities during erection
- Know rigging components and configurations
- Know when panel braces should be attached and adjusted
- Know when panel braces can be removed
- Understand the factors that impact lifting capacity of the crane
- Understand how to minimize floor damage when lifting panels
- Know how proper booming affects lifting
- Know what to do if components do not match up
- Know procedures to prevent and loosen sticking panels
- Know the definition and uses of tandem picks and suitcase picks
- Know procedures for walking panels and walk-out panels
- Know how to safely conduct a blind pick
- Understand the correct use and application of strongbacks
- Understand safety factors for inserts and braces
- Know the minimum number of braces for a panel
- Know procedures if a panel cannot be placed after erection
- Understand how to brace to locations other than floor slab
- Understand brace configuration, location, and tolerances
- Know lifting and design strength of concrete
- Know the timing, materials, and purpose for shimming and foot grouting



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# JOB TASK ANALYSIS

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## **Panel Finishes and Building Finishing**

- Understand the different types of architectural treatments and finishes for tilt-up panels
- Know the parameters for painting tilt-up panels
- Know the parameters for cleaning
- Understand the types and purpose of panel connections
- Know the materials and methods for troubleshooting and repair of panels
- Know what materials are used for caulking joints
- Know how to prepare joints for caulk and the common causes of joint failure
- Understand the limitations and considerations for exposing aggregate
- Understand the most economical and common finishes
- Understand the types and uses of interior insulation systems
- Know the benefits and methods of sandblasting panels

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# SAMPLE WRITTEN EXAM QUESTIONS

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The Sample Written Examination is intended as an example only. The questions included in this sample examination will NOT appear on the actual examination, but will help you become familiar with the types of questions that make up the written examination. Answers to the sample examination are directly following the exam, including the location of the correct answer. While the questions in the sample will not appear on the actual exam, the content may be similar.

1. Which one of the following is not addressed at the erection safety meeting?
  - A. The rigging foreman is the only one to give hand signals to the crane operator
  - B. Review of each worker's responsibilities
  - C. Demonstration of bracing installation procedures
  - D. Procedure for reporting accidents
  
2. Which one of the following should not be a concern during your site inspection before erection?
  - A. Terrain and levelness traveled by the crane
  - B. Footing and setting pads are ready
  - C. Building footprint
  - D. Lifting and bracing inserts are accessible and placed correctly
  
3. An accelerating admixture can be helpful during placement of concrete in:
  - A. Hot weather
  - B. Cold weather
  - C. Rainy weather
  - D. Hot, damp weather
  
4. Which one of the following is not indicated on a completed panel drawing provided by the lifting supplier?
  - A. Opening location
  - B. Size, thickness and dimensions of each panel
  - C. Sequence of erection
  - D. Embedments
  
5. Which one of the following persons is not typically involved in determining panel layout?
  - A. Rigging foreman
  - B. Crane operator
  - C. Site supervisor
  - D. Engineer of record
  
6. Properly applied bond breaker should:
  - A. Exhibit a slightly darkened uniform appearance on the slab
  - B. Be puddled where possible to attain maximum coverage
  - C. Be applied thicker where inserts are indicated
  - D. Be applied thinner where inserts are indicated

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# SAMPLE WRITTEN EXAM QUESTIONS

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7. Which one of the following is not considered when determining panel casting and erection sequencing?
- A. Type and capacity of ready-mix truck
  - B. Panel sizes and weights
  - C. Crane lifting chart
  - D. Scale model of the site with building footprint
8. A shallow foundation system for a typical tilt-up building consists of each of the following except:
- A. Interior footing pads for column support
  - B. Thickened slabs for interior bearing wall support
  - C. Perimeter footings to support wall panels
  - D. Interior continuous footings to support bearing walls
9. Which one of the following is not a term used to describe the strength of the soil?
- A. Foundation modulus
  - B. K-value
  - C. Soil modulus
  - D. S-factor
10. When casting panels over floor joints, which one of the following should not be used to fill joints?
- A. Flowable asphalt
  - B. Caulk
  - C. Sand
  - D. Drywall compound
11. Each of the following are methods to minimize curling of a floor slab except:
- A. Use a thicker slab
  - B. Place control joints closer together
  - C. Control curing so the moisture gradient is more uniform
  - D. Utilize a vapor barrier under the floor slab
12. During the lift, the crane operator follows signals from the:
- A. Crew member closest to the crane
  - B. Building inspector
  - C. Rigging foreman
  - D. Job superintendent

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# SAMPLE WRITTEN EXAM QUESTIONS

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13. Factors affecting the layout and sequencing process include each of the following except:
- A. Casting slab size, location, and number.
  - B. Location of bracing inserts
  - C. Site access and crane circulation
  - D. Feasibility of using stacked panels
14. Which one of the following is not an acceptable method for curing tilt-up panels?
- A. Curing compound
  - B. Wet burlap
  - C. Layers of straw
  - D. Plastic film
15. The strength of the concrete at the time of lifting must be at least:
- A. 100% of the specified design strength.
  - B. 75% of the design strength.
  - C. The standard 28-day strength.
  - D. The specified minimum strength for erection
16. Which one of the following is not a type of tilt-up panel exterior finish?
- A. Thin brick
  - B. Exposed aggregate
  - C. Reveal patterns
  - D. Broom finish
17. Before casting a panel, the crew should check each of the following except:
- A. Reinforcement location
  - B. Form dimensions
  - C. Insert locations
  - D. Installation of strongbacks
18. To reduce the occurrence of “waffle” cracking over reinforcement bars it is best to:
- A. Cool the bars then by spraying with water just prior to concrete placement
  - B. Use a fog spray to keep the slab from drying too fast
  - C. Use a retarder to slow set time
  - D. Apply a curing compound as quickly as possible

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# SAMPLE WRITTEN EXAM QUESTIONS

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19. What should be done to free a panel that sticks to the floor slab?
- A. Instruct the crane operator to lengthen the boom, slacken the rigging, and jerk the panel
  - B. Instruct the crane operator to slide the panel laterally
  - C. Use wedges and pry bars between the panel and the floor slab
  - D. Blow forced air under the panels
20. Which one of the following conditions is not necessary for painting tilt-up panels?
- A. Ambient temperature has reached at least 50 °F (10 °C)
  - B. Concrete has cured for at least 90 days
  - C. Panel pH is between 7 and 10
  - D. All dirt and efflorescence has been removed
21. Which one of the following is not an important aggregate property affecting the quality of concrete?
- A. Color
  - B. Maximum size
  - C. Hardness
  - D. Shape
22. Concrete slump is a measure of:
- A. Amount of cement in the concrete
  - B. The flowability of the concrete
  - C. The water/cement ratio of the concrete
  - D. The stiffness of the concrete
23. Which one of the following is not a factor when determining the size of crane needed for a particular job?
- A. Reach or lift distance
  - B. Panel size
  - C. Panel openings
  - D. Panel weight
24. Which one of the following is the preferred support system for steel reinforcement?
- A. Concrete bricks
  - B. Steel chairs
  - C. Plastic chairs
  - D. Wood blocks



# ANSWERS TO SAMPLE EXAM QUESTIONS

QUESTION	ANSWER	REFERENCE
1.	D	Sec. 10, pp. 205-206, Safety Meeting
2.	C	Sec. 10, pp. 203-204, Planning #1-14
3.	B	Sec. 3, p. 5, Admixtures
4.	C	Sec. 4, p. 85, Panel Shop Drawings
5.	D	Sec. 4, p. 92, Panel Layout & Sequencing
6.	A	Sec. 7, p. 172, Application, par. 3
7.	A	Sec. 4, p. 101, Panel Layout Models, par. 1
8.	B	Sec. 6, p. 139, par. 4
9.	D	Sec. 5, p. 117, Slab Terminology #8
10.	A	Sec. 7, p. 162, Slab Joint Treatment, par. 2
11.	D	Sec. 11, p. 273, Slab Curling, par. 3
12.	C	Sec. 10, p. 205, par. 1
13.	B	Sec. 4, p. 93, Panel Layout, bullets
14.	C	Sec. 3, p. 72, Curing Methods, par. 2-3
15.	D	Sec. 10, p. 215, Strength of concrete
16.	D	Sec. 4, pp. 102-104, Surface Finishes 1-7
17.	D	Sec. 9, p. 192, Placing Operation
18.	A	Sec. 11, p. 276, Waffle cracking
19.	C	Sec. 10, p. 234, Sticking to Slab, par. 2
20.	B	Sec. 11, p. 265-267, Painting
21.	A	Sec. 3, p. 49, Aggregates, par. 1
22.	B	Sec. 3, p. 54, Concrete Slump, par. 1
23.	C	Sec. 4, p. 83, Pre-Construction #7
24.	C	Sec. 3, p. 63, Steel Bar Supports



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