CCO

CANDIDATE HANDBOOK

- **TOWER CRANE OPERATOR**

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Certification Policies
TOWER CRANE OPERATOR

ELIGIBILITY

To be eligible for certification, candidates must:

- Be at least 18 years of age
- Comply with CCO's Substance Abuse Policy
- Comply with CCO's Code of Ethics
- Pass a written examination
- Pass a practical examination

EXAMINATION FEES

For all exam and related fees, visit www.nccco.org/fees.

CCO CERTIFICATION TIME FRAMES

Candidates have 12 months from the time they pass their first exam in which to pass the corresponding exam. Any tests passed within a 12-month period count towards certification. For example, a candidate who fails the Tower Crane Operator Written Exam in December 2024 but passes the Tower Crane Operator Practical Exam in January 2025 has until the end of January 2026 to retake (and pass) the Tower Crane Operator Written Exam.

RECERTIFICATION REQUIREMENTS

CCO Tower Crane Operator certification is valid for five years. ***Recertification candidates must complete all of their recertification requirements during the 12 months prior to their certification's expiration date.*** Regardless of the date of the exams within that one-year period, the new five-year certification period begins from the date of expiration of the candidate's initial certification.

Recertificants must:

- Pass the Tower Crane Operator written examination(s)
- Comply with CCO's Substance Abuse Policy
- Comply with CCO's Code of Ethics

Candidates who can attest to at least 1,000 hours crane-related experience during their period of certification do not need to take the practical exam to recertify. *Crane-related experience* is defined as: operating, maintaining, inspecting, or training on cranes.

Recertification candidates who do need to take the practical exam for any reason, however, must do so before their certification expires. ***There is no grace period after their certification's expiration date.*** Candidates whose certification has lapsed must take the full written and practical examinations over to be certified again.

NOTE: Candidates who recertify more than 12 months prior to their expiration date will have their new certification period begin immediately, not from the end of their current certification period.

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Written Examination Outline

TOWER CRANE OPERATOR

55 QUESTIONS/60 MINUTES (CALCULATOR NOT PERMITTED)

The Tower Crane Written Examination tests the following knowledge areas relating to the operation of tower cranes.

Domain 1: Site
- Approximately 10% of test

Domain 2: Erection, Climbing, and Dismantling
- Approximately 25% of test

Domain 3: Operations
- Approximately 50% of test

Domain 4: Technical Knowledge
- Approximately 15% of test

DOMAIN 1: SITE

Approximately 10% of test

1. Know how to assess suitability of the supporting surface.*
2. Know how to determine if there is adequate room for outriggers and tail swing.*
3. Know how to locate and identify site hazards and restrictions such as electric power lines, air-rights, or other hazardous systems and public access areas.
4. Be familiar with basic requirements for power sources, fusing, disconnects, lightning protection, and grounding.
5. Be familiar with the necessity to protect the crane's foundation.

** 1 and 2 refer to self-erecting tower cranes only*

DOMAIN 2: ERECTION, CLIMBING, AND DISMANTLING

Approximately 25% of test

1. Know proper erection, climbing, and dismantling procedures specified by the manufacturer in the operator's manual.
2. Know general notes and warnings to be applied during climbing procedures.
3. Know the maximum allowable wind speeds during erection, climbing, dismantling, and operation.
4. Understand the proper procedures for bolting and/or pinning connections.
5. Understand the maximum freestanding height allowed.
6. Understand the proper counterweight configurations and/or central ballast requirements.
7. Understand the proper crane configuration.
8. Be familiar with standard minimum and maximum tie-in spacing and maximum tower height above tie-ins.
9. Be familiar with proper installation of internal climbing collars, support beams, wedges, and climbing apparatus.
10. Be familiar with proper installation of top climbing units and tie-in collars, struts, and lower braces.
11. Know proper position of top climbing unit after climbing procedures in accordance with manufacturer's specifications.
12. Be familiar with proper travel rail installation and maintenance.

DOMAIN 3: OPERATIONS

Approximately 50% of test

1. Know how to inspect the crane for proper condition and complete required records.
2. Know how and when to communicate with management, crew, and signalperson.
3. Know standard method hand signals as specified by OSHA.
4. Know how to shut down and secure the crane properly when leaving it unattended.
5. Know the manufacturer's recommendations for operating in various weather conditions.
6. Know how to verify the weight of the load and the rigging.
7. Understand basic load rigging procedures.
8. Know how to perform basic maintenance.
9. Know the crane operator responsibilities contained in ASME B30.3 and specified by OSHA.
10. Know how to use operator aids and limiting devices.
11. Know the proper procedures for operating safely under special conditions—e.g., traveling with suspended loads; approaching two blocking; operating near electric power lines; lifting loads from beneath the surface of the water; handling loads out of the operator's vision ("in the blind"); and using suspended personnel platforms.
12. Know the proper procedures for load control during the use of handheld tag lines.

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13. Know emergency response procedures—e.g., fire control, electric power line contact, and control malfunction.
14. Understand federal, state, and local regulations and ASME B30.3 regulations pertaining to the operation of the crane.
15. Know how to review planned crane operations and requirements with site supervision.
16. Understand tower crane load charts.

DOMAIN 4: TECHNICAL KNOWLEDGE

Approximately 15% of test

1. Understand the function, limitations, and characteristics of the crane.
2. Know the basic maintenance, inspection, and replacement criteria for tower crane wire ropes.
3. Know basic tower crane nomenclature.
4. Understand basic machine power flow systems—e.g., mechanical, electrical, hydraulic, combination.
5. Understand boom, jib, counter jib, and counterweight configurations.
6. Know the out-of-plumb tolerance for the tower crane
7. Have a basic understanding of metric units and U.S. customary units.
8. Understand basic safety procedures—e.g., lock out, tag out, fall protection.

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Practical Examination
TOWER CRANE OPERATOR

SKILLS TESTED

The CCO Tower Crane Operator Practical Exam can be taken on any one of the following types:

- Hammerhead
- Luffing jib
- Self-erecting

The practical exam comprises three main tasks that increase progressively in the skill level tested. Skills tested are: trolley travel, hoisting, swinging, and combination (multifunction) operations. Crane operation with load and without load is required.

The following is an outline of the practical testing procedure, as provided to candidates at the time of testing.

CANDIDATE INFORMATION AND INSTRUCTIONS

The following sections describe the specific tasks that you will be performing when taking the practical examination. It is important that you understand these instructions. If there is anything you do not understand, please request clarification from the Practical Exam Proctor.

TASKS

The Tower Crane Operator Practical Exam tasks are:

- ***Task 1: Pre-Operational (Shift) Inspection***
- ***Task 2: Place Load Hook and Chain in Stop Circle***
- ***Task 3: Place Test Weight in Load Circle***
- ***Task 4: Negotiate Zigzag Corridor with Load***
- ***Task 5: Safe Securing Procedures***

There is also a Pre-Test Briefing, a Pre-Test Familiarization Period, and a Pre-Task Familiarization Period (prior to the Load Circle task) with a load. You will be required to complete all phases of the test in sequence.

During the practical examination, you are under the direction of the Proctor and must follow the Proctor's directions at all times.

Once you have completed all of the tests you are taking, you must leave the testing area. Only personnel involved in the administration of the test are allowed in the test area.

OPTIMUM TIMES

For some tasks ***optimum time limits*** have been set. If the task is completed within this time period, you receive no time penalty. Other tasks are untimed, as noted below.

Once you exceed this time limit, however, you will lose points on a gradual basis. The optimum time for each task is stated as part of the task descriptions. At one-and-a-half times the optimum time the Proctor may end the task and move on to the next task.

PRE-TEST BRIEFING

While you are waiting to take your test, you will have sufficient time to read this description of the tasks to be performed and review the operator's manual and load chart for the crane you will operate. In addition, you will be informed of the make and model of the crane, the load hook height, jib length, and the weight of the test load. You will also watch a short video showing all the tasks you will be required to perform during the examination.

Note that:

- The crane's LMI system (if the crane is so equipped) has been correctly programmed and will not interfere with the proper operation of the crane.
- The crane has been set up and leveled.
- None of the target points have been placed at a radius that exceeds the crane's rated capacity.

CIRCUMVENTING THE COURSE

Circumventing the course on CCO Tower Crane Operator Practical Exams is defined as when:

1. Chain leaves the corridor while on or off the ground and passes more than one pole left still standing on the original string line before re-entering the corridor; you ***must*** enter the circles from inside the corridor to avoid this being marked as a deficiency
2. Chain leapfrogs from one leg of corridor to another with the chain off the ground, outside the corridor
3. Chain passes four or more poles consecutively with the chain off the ground, inside the corridor

UNSAFE ACT

If, at any time during the Pre-Test Familiarization Period or during the test, you commit an unsafe act, you will be disqualified from continuing with the test. An "unsafe act" is defined as an action by a candidate that is uncontrolled or reckless, and is sufficient to cause safety concern for persons or property damage.

The Proctor has the authority to stop the test at any time for reasons of safety. Please ask the Proctor if you have any questions. If you are disqualified due to an unsafe act,

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you will not be permitted to take any additional practical exams that day.

WEATHER CONDITIONS/EQUIPMENT PROBLEMS

The Proctor will use an anemometer to check the wind speed and then will record the weather conditions on the score sheet.

The Proctor has the responsibility to determine if weather conditions or equipment problems are such that a test needs to be suspended. If the test is interrupted due to weather conditions or equipment problems, the procedure for restarting is as follows:

- You will resume the test at the beginning of the task you were performing at the time of the interruption, except for Task 3, when you will go back to the beginning of either Task 3a or 3b, as appropriate.
- You will be entitled to a Pre-Test or Pre-Task Familiarization Period before resuming the test.
- If testing resumes on a different machine, you must start the test over from the beginning. The first score sheet will be marked as "VOID" with an explanation and returned to CCO.
- If the testing is delayed to a different day, the test must be restarted from the beginning.

CRANE WALK AROUND

- Before you begin operations, you are allowed a couple of minutes to walk around the crane to ensure proper setup.

TASK 1: PRE-OPERATIONAL (SHIFT) INSPECTION

- The Proctor will identify five items regarding the crane that are part of the pre-operational inspection. One at a time, you will describe how you would conduct the inspection and what deficiencies you would look for.
- You have approximately one minute per item.

PRE-TEST FAMILIARIZATION PERIOD

- You will be allowed 15 minutes to familiarize yourself with the crane and to examine anything on the crane that you feel is necessary to operate it comfortably.
- You will be allowed to get the feel of the controls and run the crane through its functions. The jib length has been preset. The brakes and other devices have been set according to the crane manufacturer's recommendations.
- You may not interfere with the test course, lift the test weight, or shadow the Zigzag Corridor and Load Circle.
- You must finish the Pre-test Familiarization Period with the load hook under control in the Start Circle within the 15-minute period.
- The Proctor will notify you when there are ten, five, and one minute(s) remaining.
- If you are ready in less than 15 minutes, you may indicate this to the Proctor.
- If, at the end of the Pre-Test Familiarization Period, you feel you are not ready to take the examination, you should notify the Proctor. You will have, in effect, disqualified yourself from taking the examination at this time, and you will be required to sign to that effect on the Candidate Score Sheet.

TASK 2: PLACE LOAD HOOK AND CHAIN IN STOP CIRCLE

Optimum time: 1:30

- At the Proctor's indication to start, at which point timing begins, raise the load hook and chain at least 10 ft. off the ground to clear all obstacles and personnel.
- Bring it from its starting position in the Start Circle to the Stop Circle.
- Once the load hook and chain reaches the Stop Circle, place it there such that the chain suspended from the hook makes contact with the ground inside the circle and remains there.
- Once the chain makes contact with the ground inside the circle, you are not permitted to lift the chain off the ground.
- The Proctor will give you a *stop* signal once the load hook and chain are under control.
- If your time exceeds one-and-a-half times the optimum time, the Proctor may stop you and move on to the next task.
- Points will be deducted for the following:
  a. Dragging or contact of chain outside of the circle
  b. Load hook touching ground either inside or outside of the circle
  c. Load hook or chain contacting any part of the course (e.g., poles)
  d. Lifting the chain off the ground after it has made contact with the ground inside the circle
  e. Exceeding the optimum time

PRE-TASK FAMILIARIZATION PERIOD (WITH TEST WEIGHT)

This part of the test is not scored.

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- At the Proctor's indication, bring the load hook over the test weight located in the Test Weight Circle.
- The load will be attached to the crane's load hook by the Proctor or Assistant Proctor.
- You are allowed to bring the test weight to the designated area where you can get the feel of the load, test the brake, etc., before beginning the Load Circle task.
- You may not swing the load outside of the designated area or shadow the Zigzag course.
- You will be allowed a maximum of five minutes for this Pre-Task Familiarization, by the end of which period you must have placed the test weight on the ground in the Test Weight Circle with the rigging taut.
- The Proctor will notify you when there is one minute remaining.

TASK 3: PLACE TEST WEIGHT IN LOAD CIRCLE

Optimum time: 3:30

- At the Proctor's indication to start, bring the test weight from the Test Weight Circle to the Load Circle.
- Swing, trolley, or hoist as necessary to place the test weight on the ground completely within the Load Circle.
- The Proctor will then give the *hoist* and *swing* signal, and this will indicate that you should then hoist and swing to place the test weight on the ground in the Start Circle.
- Do not let any part of the test weight make contact with the PVC barriers that surround the Load and Start Circles.
- Timing ends when you have placed the test weight on the ground in the Start Circle. The task is not complete until the load is placed completely within the outside perimeter of the circle and the Proctor has given you a *stop* signal. If the Proctor has not given you a *stop* signal, this indicates that the weight is not within the circle and the task continues to be timed.
- If your time exceeds one-and-a-half times the optimum time, the Proctor may stop you and move on to the next task.
- Points will be deducted for the following:
  a. Knocking ball off pole
  b. Knocking pole over
  c. Exceeding the optimum time
  d. Hitting any part of the course

TASK 4: NEGOTIATE ZIGZAG CORRIDOR WITH LOAD

Optimum time: 3:00 each direction

This task is divided into two tasks: 4A and 4B. Task 4A requires you to go through the corridor in a forward direction; Task 4B requires you to go through the corridor in a reverse direction.

- At the Proctor's direction to start, at which point timing begins, lift the test weight into the air and swing, trolley, or hoist up or down as you judge necessary to guide the load through the Zigzag Corridor without touching the ground with the test weight, raising the test weight so high that the chains leave the ground, or knocking over any part of the PVC barrier. Points will be deducted for the following:
  a. Knocking ball off pole
  b. Moving pole base off line
  c. Knocking pole over
  d. Chain leaving ground
  e. Passing poles with chain off ground
  f. Load touching ground
  g. Circumventing the task
  h. Exceeding the optimum time
- Timing stops when you have placed the test weight on the ground in the Stop Circle and the Proctor has given you a *stop* signal. The task is not complete until the load is placed completely within the outside perimeter of the circle and the Proctor has given you a *stop* signal. If the Proctor does not give you a *stop* signal, this indicates the weight is not within the circle, and the task continues to be timed.
- If your time exceeds one-and-a-half times the optimum time, the Proctor may stop you and move on to the next task.
- The Proctor will then detach the test weight from the load hook.
- At the Proctor's direction, swing the load hook to the Start Circle and allow the Proctor to attach the chain in readiness for the next candidate. Remain in the cab or at the operator's station until the Proctor gives you a clear indication that you may leave. Set the swing brake and lock before leaving.

TASK 5: SAFE SECURING PROCEDURES

- Describe the procedures you would follow to secure the crane at the end of the work day.

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Reference List
TOWER CRANE OPERATOR

The latest versions of the following reference materials are used by CCO's Tower Crane Exam Management Committee to verify the accuracy of CCO test questions.

Candidates are also strongly advised to become familiar with manufacturers' load charts in preparing for CCO certification examinations.

ASME, B30.3 TOWER CRANES

ASME, B30.29 SELF-ERECTING TOWER CRANES

www.asme.org

OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION, U.S. DEPARTMENT OF LABOR CODE OF FEDERAL REGULATIONS, PART 1926 SUBPART CC—CRANES AND DERRICKS IN CONSTRUCTION

OSHA SUBPART R—STEEL ERECTION

OSHA PART 1926.251—RIGGING EQUIPMENT

www.osha.gov

CCO TOWER CRANE REFERENCE MANUAL

www.nccco.org/store/

IPT'S CRANE AND RIGGING TRAINING MANUAL

www.iptbooks.com/

BOB'S RIGGING & CRANE HANDBOOK

www.donpellow.com/

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CCO Policies
TOWER CRANE OPERATOR

Code of Ethics

www.nccco.org/coe

Disciplinary Policy

www.nccco.org/discipline

Substance Abuse Policy

www.nccco.org/abuse

Testing Accommodations

www.nccco.org/accommodations

Test Security

www.nccco.org/security

Information Release Policy

www.nccco.org/inforelease

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