

CHAPTER 6

PERSONNEL QUALIFICATION AND TRAINING

This chapter describes personnel qualification and training. Only qualified personnel shall operate the equipment covered in this standard.

6.1	GENERAL	6-1
6.2	QUALIFICATION	6-2
6.2.1	General	6-2
6.2.2	Operators of Cab-Operated and Pulpit-Operated Cranes	6-2
6.2.3	Operators of Mobile Cranes	6-2
6.2.4	Operators of Truck Mounted Cranes – Capacity 1 Ton or Less	6-4
6.2.5	Operators of Floor-Operated Cranes and Hoists	6-4
6.2.6	Operators of Remote Operated Cranes	6-4
6.2.7	Operators of Forklift Trucks	6-4
6.2.8	Riggers	6-4
6.2.9	Person-In-Charge (PIC)	6-4
6.2.10	Designated Leader	6-5
6.2.11	Inspectors	6-5
6.2.12	Instructors	6-5
6.2.13	First-Line Supervisors	6-5
6.2.14	Maintenance Personnel	6-5
6.3	TRAINING	6-7
6.3.1	General	6-7
6.3.2	Operators of Cab-Operated, Pulpit-Operated, and Floor-Operated Cranes	6-7
6.3.3	Mobile Crane Operators	6-8
6.3.4	Operators of Truck Mounted Cranes – Capacity 1 Ton or Less	6-8
6.3.5	Forklift Truck Operators	6-8
6.3.6	Riggers	6-10
6.3.7	Inspectors	6-10
6.3.8	Instructors	6-11
6.3.9	Maintenance Personnel	6-11
6.4	REQUALIFICATION	6-12
6.5	RECORDS	6-13

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6.1 GENERAL

- a. This chapter delineates the requirements for the qualification and training of operators, riggers, inspectors, maintenance personnel, trainers, person-in-charge (PIC), designated leaders, and first-line supervisors.
- b. Personnel who are designated to operate equipment or perform work covered by this standard shall be qualified and trained to the level of proficiency consistent with assigned tasks.

6.2.1 GENERAL

Only qualified personnel or trainees, under the direct supervision of qualified personnel, who meet the following requirements shall be allowed to rig, operate, inspect, or perform maintenance on cranes, hoists, or powered forklift trucks:

- a. Be at least 18 years old.
- b. Understand spoken and written English or a language generally in use at the work location.
- c. At the site's discretion, crane operator certification by the National Commission for the Certification of Crane Operators (NCCCO), an OSHA recognized certification body or a state licensing agency may be used to verify compliance with qualification requirements described hereunder for covered classes of equipment.

6.2.2 OPERATORS OF CAB-OPERATED AND PULPIT-OPERATED CRANES

- a. Operators and operator trainees shall meet the following physical qualifications.
 1. Have vision of at least 20/30 Snellen in one eye and 20/50 in the other, with or without corrective lenses. Operators whose jobs do not require binocular vision (operation of cranes with television cameras or periscope optics) shall have distant visual acuity of 20/30 in one eye and no specific visual requirement for the other eye.
 2. Be able to distinguish colors, regardless of position, if color differentiation is required for operation.
 3. Have adequate hearing, with or without a hearing aid, for specific operation.
 4. Have physical strength, coordination, and sufficient reaction speed to meet the demands of equipment operation.
 5. Show no evidence of physical defects or of emotional instability that could be a hazard to themselves or others, or

which, in the opinion of the examiner, could interfere with their safe performance; such evidence may be sufficient cause for disqualification. In these cases, medical judgments and tests may be required.

6. Show no evidence of being subject to seizures or to loss of physical control; such evidence shall be sufficient reason for disqualification. Medical examinations may be required to determine these conditions.
7. Have normal depth perception, field of vision, manual dexterity, coordination, and no tendencies to dizziness or similar potentially hazardous characteristics.
8. Have no detectable or known disease or physical restriction that would render them incapable of safely operating equipment or carrying out rigging duties. Where any deficiency of an upper or lower extremity exists, the acceptability of a candidate shall be the decision of the supervisor, after consulting with the designated physician.

- b. Operators shall be required by the employer to satisfactorily pass a written examination covering operational characteristics, controls, and emergency control skills.
- c. Operators shall be required by the employer to pass a practical operating skill evaluation. Qualification shall be limited to the type of equipment for which the operator is being evaluated. The actual or simulated operation shall enable trainees to demonstrate basic knowledge and skills at a level that ensures the safety of personnel and equipment.

6.2.3 OPERATORS OF MOBILE CRANES

- a. Operators and operator trainees shall meet the following physical qualifications:
 1. Have vision of at least 20/30 Snellen in one eye and 20/50 in the other, with or without corrective lenses.

2. Be able to distinguish colors, regardless of position, if color differentiation is required for operation. frequently if supervision deems it necessary.
 3. Have adequate hearing, with or without a hearing aid, for a specific operation.
 4. Have physical strength, coordination, and sufficient reaction speed to meet the demands of equipment operation.
 5. Show no evidence of physical defects or of emotional instability that could be a hazard to themselves or others, or which, in the opinion of the examiner, could interfere with their safe performance; such evidence may be sufficient cause for disqualification. In these cases, medical judgments and tests may be required.
 6. Show no evidence of being subject to seizures or to loss of physical control; such evidence shall be sufficient reason for disqualification. Medical examinations may be required to determine these conditions.
 7. Have normal depth perception, field of vision, manual dexterity, coordination, and no tendencies to dizziness or similar potentially hazardous characteristics.
 8. Have no detectable or known disease or physical restriction that would render them incapable of safely operating equipment or carrying out rigging duties. Where any deficiency of an upper or lower extremity exists, the acceptability of a candidate shall be the decision of the supervisor, after consulting with the designated physician.
 9. Shall successfully pass with a negative result, a substance abuse test. The level of testing will be determined by the standard practice for the industry where the crane is employed and this test shall be confirmed by a recognized laboratory service.
 10. Operator physical examinations shall be required every three years or more
- b. Operators shall be required by the employer to satisfactorily pass a written examination covering operational characteristics, controls, and emergency control skills such as response to:
 1. Fire.
 2. Power line contact.
 3. Loss of stability.
 4. Control malfunction.
 5. As well as characteristic and performance questions appropriated to the crane type for which qualifications is sought.
 - c. Operators shall demonstrate their ability to read, write, comprehend and exhibit arithmetic skills and load/capacity chart usage, in the language of the crane manufacturer's operation and maintenance instruction materials.
 - d. Operators shall satisfactorily complete a combination written and verbal test on load/chart usage that covers a selection of the configurations (the crane may be equipped to handle) for the type crane for which qualification is being sought.
 - e. The operator shall complete a practical operating skill evaluation test (actual or simulated), demonstrating proficiency and basic knowledge in handling the specific type crane for which the operator is being evaluated, including:
 1. Pre-start and post-start inspection.
 2. Maneuvering skills.
 3. Shutdown.
 4. Securing the crane.
 5. Ability to use and respond to signals as found in Figure 9-6.

- f. Qualification shall be limited to the type of equipment for which the operator is being evaluated.
- g. Trainee qualification requirements shall include, but are not limited to the following:
 1. Satisfactory completing of a written examination covering safety, operational characteristics and limitations, and controls of the type crane for which they are being qualified.
 2. Demonstrate their ability to read, write, comprehend, and exhibit arithmetic skills and load/capacity chart usage, in the language of the crane manufacturer's operations and maintenance instruction materials.
 3. Satisfactory completion of a combination written and verbal test on load/capacity chart usage covering various crane configurations.

6.2.4 OPERATORS OF TRUCK MOUNTED CRANES – CAPACITY 1 TON OR LESS

- a. Physical qualifications shall be based on specific job requirements.
- b. Operators shall be required by their employer to pass a practical operating skill evaluation. Qualification shall be limited to the type of equipment for which the operator is being evaluated.

6.2.5 OPERATORS OF FLOOR-OPERATED CRANES AND HOISTS

- a. Physical qualifications shall be based on specific job requirements.
- b. Operators shall be required by their employer to pass a practical operating skill evaluation. Qualification shall be limited to the type of equipment for which the operator is being evaluated.
- c. The actual or simulated operation shall enable operators to demonstrate basic knowledge and skills at a level that ensures the safety of personnel and equipment.

6.2.6 OPERATORS OF REMOTE OPERATED CRANES

- a. The use of remote-controlled equipment involves such a wide variety of service requirements and conditions that each installation should be carefully analyzed and operation reviewed to determine whether sections 6.2.2.a or 6.2.5.a should apply.
- b. Operators shall be required by the employer to satisfactorily pass a written examination covering operational characteristics, controls, and emergency control skills.
- c. Operators shall be required by their employer to pass a practical operating skill evaluation. Qualification shall be limited to the type of equipment for which the operator is being evaluated.
- d. The actual or simulated operation shall enable operators to demonstrate basic knowledge and skills at a level that ensures the safety of personnel and equipment.

6.2.7 OPERATORS OF FORKLIFT TRUCKS

- a. Physical qualifications shall be based on specific job requirements.
- b. Operators shall be required by the employer to pass a practical operating skill evaluation. Qualification shall be limited to the type of forklift for which the operator is being evaluated.
- c. The actual or simulated operation shall enable operators to demonstrate basic knowledge and skills at a level that ensures the safety of personnel and equipment.

6.2.8 RIGGERS

Riggers shall be required to pass a practical rigging skill evaluation that requires the use of rigging equipment in safe configurations. The actual or simulated operation shall enable personnel to demonstrate basic knowledge and skills at a level that ensures the safety of personnel and equipment.

6.2.9 PERSON-IN-CHARGE (PIC)

The PIC shall have the necessary knowledge and experience of the specific type of equipment and completion of the operation. The PIC shall understand the rules and procedures implemented at the site to ensure that the following are completed:

- a. Necessary administrative requirements.
- b. Personnel assignments and responsibilities.
- c. Selection of proper equipment/tools.
- d. Recognition and control of hazardous or unsafe conditions.
- e. Job efficiency and safety.
- f. Critical-lift documentation.

In addition, the PIC shall:

- a. Direct operations in the case of an accident.
- b. Exercise authority to start and stop work activities.

6.2.10 DESIGNATED LEADER

The designated leader shall have sufficient knowledge and experience to accomplish the following responsibilities:

- a. Ensure that personnel involved understand how the lift is to be made.
- b. Ensure that the weight of the load is determined and that proper equipment and accessories are selected.
- c. Survey the lift site for hazardous or unsafe conditions.
- d. Ensure that equipment is properly set up and positioned.
- e. Ensure that a signaler is assigned, if required, and is identified to the operator.
- f. Direct the lifting operation to ensure that the job is done safely and efficiently.
- g. Stop the job when any potentially unsafe condition is recognized.

- h. Direct operations if an accident or injury occurs.

6.2.11 INSPECTORS

- a. Qualified inspectors shall have the necessary knowledge, training and experience to properly inspect hoisting and rigging equipment.
- b. Employees who operate cranes to perform crane inspections shall be trained and qualified to operate the crane on which the inspection is being performed. See general and crane specific qualification requirements in Section 6.2., "Qualification."
- c. Crane operation by crane inspectors shall be limited to those crane functions necessary to perform the inspection on the crane.

6.2.12 INSTRUCTORS

Instructors responsible for developing or presenting hoisting and rigging training programs shall meet the qualification standards specified by the responsible training organization.

6.2.13 FIRST-LINE SUPERVISORS

The first-line supervisor of hoisting and rigging operations should be knowledgeable of the specific types of hoisting and rigging operations under their supervision and their operational hazards. The supervisor shall be familiar with applicable rules and procedures implemented at the site to ensure that hoisting and rigging work under their control is done efficiently and safely, with safety as top priority. Supervisors should ensure that employees fully understand the importance of safety and that they recognize their own authority and responsibility to stop work when safety is questionable.

6.2.14 MAINTENANCE PERSONNEL

- a. Employees who operate cranes to perform crane maintenance shall be trained and qualified to operate the cranes on which maintenance is being performed.
- b. Crane operation by maintenance personnel shall be limited to those crane functions necessary to perform maintenance on the

- crane or to verify the performance of the crane after maintenance has been performed.
- c. Employees who perform maintenance activities on equipment covered by this standard should have an understanding of the following criteria:
1. The tools to safely accomplish their work.
 2. Access to operating instructions to perform adjustments.
 3. Parts information furnished by the manufacturer or the responsible maintenance/engineering organization.
 4. Manufacturers' recommendations as to points and frequency of lubrication and levels and types of lubricant to be used.
 5. Maintenance and repair procedures recommended by the manufacturer or responsible maintenance/engineering organization.
 6. Wiring diagrams.
 7. Documentation requirements for maintenance and repair.

6.3.1 GENERAL

- a. Organizations that employ personnel who operate, rig, inspect, or perform maintenance on equipment covered in this standard shall provide training programs, including a means of evaluation, to ensure that the personnel are competent to perform the operations. This training shall also include applicable site-specific hoisting and rigging procedures which address abnormal or emergency operations as well possible equipment failure.
- b. The training organization shall use training methods best suited for the students and the subject material. This may include, but is not limited to, computer-aided training, classroom training, simulated field training, on-the-job training (OJT), and training by equipment manufacturer or commercial training companies.
- c. Score standards shall be set for each examination by the training organization. The minimum passing score will depend on the subject, testing technique, and test difficulty. Management shall determine the course of action for persons receiving negative evaluations.

6.3.2 OPERATORS OF CAB-OPERATED, PULPIT-OPERATED, AND FLOOR-OPERATED CRANES

- a. Only qualified and authorized operators or operator trainees under the direct supervision of a qualified operator shall be permitted to operate cab-operated, pulpit-operated, and floor-operated cranes.
- b. The initial training of operators shall include:
 - 1. Applicant training on equipment for which qualification is sought, under the direction of a qualified operator or instructor who is designated by management to instruct in the operation of hoisting equipment.
 - 2. Instructor review of the applicant's knowledge, including results of written and oral evaluation, and witnessing a demonstration of the operator's skills.
- c. Operators should be able to demonstrate a knowledge of equipment operating characteristics, capabilities, limitations, effects of variables, safety features, and operating procedures. The following checklist contains basic factors with which an operator should be familiar. This checklist must be tailored to suit actual conditions.
 - 1. Operating characteristics.
 - 2. Environmental hazards – weather.
 - 3. Electrical hazards.
 - 4. Traveling with load.
 - 5. Traveling without load.
 - 6. Lifting personnel.
 - 7. Inspections/tests.
 - 8. Load weight estimation.
 - 9. Emergency procedures.
 - 10. Rigging.
 - 11. Lessons learned.
 - 12. Hand signals.
 - 13. Load dynamics.
 - 14. Applicable standards and regulations.
 - 15. Critical lifts.
 - 16. Safety features of equipment.
 - 17. Terminology and definitions.
 - 18. Ropes and reeving.
 - 19. Two-blocking.
 - 20. Records and documents.
 - 21. Limit switches, warning signals.
 - 22. Operating practices.
 - 23. Fire protection.

- 24. Crane components.
- 25. Access and egress.
- 26. Warning devices.

6.3.3 MOBILE CRANE OPERATORS

- a. Only qualified and authorized operators or operator trainees under the direct supervision of a qualified operator shall be permitted to operate mobile cranes.
- b. Operators shall meet the criteria specified in paragraphs 6.3.2.b and c, and they should also be able to demonstrate an understanding of the following:
 - 1. Stability.
 - 2. Load charts.
 - 3. Crane setup.
 - 4. Refueling.
 - 5. Lifting operations involving multiple cranes.
 - 6. Assembly and disassembly.
 - 7. Outriggers.
 - 8. Operator aids.

6.3.4 OPERATORS OF TRUCK MOUNTED CRANES – CAPACITY 1 TON OR LESS

- a. Only qualified and authorized operators or operator trainees under the direct supervision of a qualified operator shall be permitted to operate truck mounted cranes – capacity 1 ton or less.
- b. The initial training of operators shall include applicable training on equipment for which qualification is sought, under the direction of a qualified operator or instructor.
- c. Instructor review of the applicant’s knowledge shall include results of written and/or oral evaluation, and witnessing a demonstration of the operator’s skills.

- d. Operators should be able to demonstrate knowledge of equipment operating characteristics, capabilities, limitations, effects of variables, safety features, and operating procedures.

6.3.5 FORKLIFT TRUCK OPERATORS

- a. Only qualified and authorized operators shall be permitted to operate powered forklift trucks. Operator trainees may operate powered forklift trucks under the direct supervision of a qualified operator or trainer and only where such operation does not endanger the trainee or other employees.
- b. The initial training of operators shall include:
 - 1. A combination of formal instruction (e.g., lecture, discussion, interactive computer learning, videotape, written material).
 - 2. Practical training (demonstrations performed by the trainer and practical exercises performed by the trainee).
 - 3. Evaluation of the operator’s performance in the workplace including results of written and oral evaluation, and witnessing a demonstration of the operator’s skills.
- c. The following checklist contains basic factors with which a forklift truck operator should be familiar. This checklist must be tailored to suit actual conditions.
 - 1. Operating instruction, warnings, and precautions for the type of forklift truck the operator will be authorized to operate.
 - 2. Differences between the forklift truck and the automobile.
 - 3. Forklift truck controls and instrumentation:
 - i. Where they are located.
 - ii. What they do.
 - iii. How they work.

4. Engine or motor operation.
 5. Steering and maneuvering.
 6. Visibility, including restrictions due to loading.
 7. Fork and attachment adaptation, operation, and use limitations.
 8. Forklift truck capacity and load weight determination.
 9. Forklift truck stability and load dynamics.
 10. Forklift truck inspections and maintenance that the operator will be required to perform.
 11. Refueling and/or charging and recharging of batteries.
 12. Operating limitations.
 13. Any other operating instructions, warning, or precautions listed in the operator's manual for the type of forklift truck that the employee is being trained to operate.
 14. Traveling with and without a load.
 15. Lifting personnel.
 16. Emergency procedures.
 17. Lessons learned.
 18. Hand signals.
 19. Applicable standards and regulations.
 20. Critical lifts.
 21. Modifications.
 22. Terminology and definitions.
 23. Records and documents.
 24. Operating practices.
 25. Fire protection.
- d. The following checklist contains basic factors with which a forklift operator should be familiar as they relate to workplace topics.
 1. Surface conditions where the forklift will be operated.
 2. Composition of loads to be carried and load stability.
 3. Load manipulation, stacking, and unstacking.
 4. Pedestrian traffic in areas where the forklift will be operated.
 5. Narrow aisles and other restricted places where the forklift will be operated.
 6. Hazardous (classified) locations where the forklift will be operated.
 7. Ramps and other sloped surfaces that could affect the forklift's stability.
 8. Closed environments and other areas where insufficient ventilation or poor vehicle maintenance could cause a buildup of engine exhaust, gasoline or diesel.
 9. Other unique or potentially hazardous environmental conditions in the workplace that could affect safe operation.
 - e. Refresher training in relevant topics shall be provided to the operator when:
 1. The operator has been observed to operate the forklift truck in an unsafe manner.
 2. The operator has been involved in an accident or near-miss incident.
 3. The operator has received an evaluation that reveals that the operator is not operating the forklift truck safely.
 4. The operator is assigned to drive a different type of forklift truck.

5. A condition in the workplace changes in a manner that could affect the safe operation of the forklift truck.

6.3.6 RIGGERS

- a. Training programs for riggers should address two levels of required performance:
 1. Persons who may perform rigging functions as an incidental part of their normal work assignment.
 2. Persons whose principal assignment is the performance of rigging work.
- b. Only qualified and authorized riggers or rigger trainees under the direct supervision of a qualified rigger shall be permitted to perform rigging functions.
- c. Initial training of riggers shall include the instructor's review of the applicant's knowledge, including results of written or oral evaluation, and witnessing a demonstration of the rigger's skills. The following checklist contains basic factors with which a rigger should be familiar. This checklist must be tailored to suit actual conditions.
 1. Stability (equipment).
 2. Operating characteristics of equipment.
 3. Environmental hazards – weather.
 4. Electrical hazards.
 5. Traveling with load/load control.
 6. Lifting personnel.
 7. Inspection/tests.
 8. Load weight estimation.
 9. Emergency procedures.
 10. Rigging equipment selection.
 11. Lessons learned.
 12. Hand signals.

13. Lifting operations involving multiple cranes.
14. Maintenance/storage of slings and rigging components.
15. Assembly and disassembly.
16. Load dynamics.
17. Applicable standards and regulations.
18. Critical lifts.
19. Safety features of equipment.
20. Terminology and definitions.
21. Ropes and reeving.
22. Records and documentation.
23. Adjustments and repairs.
24. Rigging/operating practices.
25. Sling loading.
26. Load-indicating devices.
27. Personal protective equipment.
28. Below-the-hook lifting devices.
29. Rigging or hitch configuration.
30. D/d ratio.
31. Sling types and application.

6.3.7 INSPECTORS

- a. Employees who perform required, documented inspections of equipment covered by this standard shall receive inspector training.
- b. Inspector training shall include basic inspection techniques and acceptance/rejection criteria as specified in this standard and other applicable sources. See Chapter 3, "Preengineered Production Lifts."

- c. The following equipment categories for general inspection are examples that should be considered:
 - 1. Overhead, gantry, and polar cranes.
 - 2. Monorail, jib, and other hoists.
 - 3. Mobile cranes (hydraulic and lattice boom).
 - 4. Forklift trucks.
 - 5. Wire-rope, chain, and synthetic-web slings.
 - 6. Rigging accessories.
- d. Employees who operate cranes to perform crane inspections shall be trained and qualified to operate the crane on which the inspection is being performed.

6.3.8 INSTRUCTORS

- a. Instructors designated by management to be responsible for developing or presenting hoisting and rigging training programs shall develop technical competence by becoming familiar with the requirements of this standard and by satisfactorily completing documented training or technical experience in the hoisting and rigging discipline.
- b. Instructors should attend recognized training courses, workshops, or seminars in order to remain current on industry practices and changes in applicable codes and standards.

6.3.9 MAINTENANCE PERSONNEL

- a. Employees who operate cranes to perform crane maintenance shall be trained and qualified to operate the cranes on which maintenance is being performed.

6.4 REQUALIFICATION

- a. Operator, rigger, and inspector qualification is for a period not to exceed 3 years, unless the qualification is revoked sooner by the employee's manager.
- b. The program for requalification shall include:
 - 1. Completion of a written or oral evaluation relevant to the type of equipment used or participation in a refresher training program.
 - 2. A performance evaluation.

6.5 RECORDS

A record of training and skill evaluations shall be kept on file and shall be readily available.