

Crane Operator, Rigger and Signal Person Training in Compliance with OSHA 1926.1400

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What does the Federal OSHA Subpart CC say with regard to training of Crane Operators, Riggers and Signal Persons?

For many years employers have had a requirement to train their employees in the safe operation of the equipment they operate. When the Subpart CC was implemented November 2010, OSHA included specifics related to what topics should be addressed. While the employer has the requirement to make sure the employees are qualified and trained according to the OSHA regulation, it is just as important to make sure the employee is comfortable and competent in performing the task assigned.

Crane Operator Training / Certification

What equipment does the standard apply to?

Before we look at the training/certification requirements of Crane Operators, let's look the equipment list included in the standard.

- Articulating cranes (such as knuckle-boom cranes)
- Crawler cranes
- Floating cranes
- Cranes on barges
- Mobile cranes, (such as wheel-mounted, rough-terrain, all-terrain, commercial truck-mounted, and boom truck cranes)
- Multi-purpose machines, when configured to hoist and lower (by means of a winch or hook) and horizontally move a suspended load
- Industrial cranes (such as carry-deck cranes)
- Dedicated pile drivers
- Service/mechanic trucks with a hoisting device
- Tower cranes (such as fixed jib ("hammerhead boom"), luffing boom and self-erecting)
- and variations of such equipment

The certification requirement of Crane Operators has directly resulted in an increase of Crane Operators being trained. OSHA has listed many items the Crane Operators should be trained and knowledge tested on to include:

- (a) General technical information.
 - (1) The functions and limitations of the crane and attachments.
 - (2) Wire rope:
 - (i) Background information necessary to understand the inspection and removal from service criteria in § 1926.1413 and § 1926.1414.
 - (ii) Capacity and when multi-part rope is needed.
 - (iii) Relationship between line pull and safe working load.
 - (iv) How to determine the manufacturer's recommended rope for the crane.
 - (3) Rigging devices and their use, such as:
 - (i) Slings.
 - (ii) Spreaders.
 - (iii) Lifting beams.
 - (iv) Wire rope fittings, such as clips, shackles and wedge sockets.
 - (v) Saddles (softeners).
 - (vi) Clamps (beams).
 - (4) The technical limitations of protective measures against electrical hazards:
 - (i) Grounding.
 - (ii) Proximity warning devices.
 - (iii) Insulated links.
 - (iv) Boom cages.
 - (v) Proximity to electric power lines, radii, and microwave structures.
 - (5) The effects of load share and load transfer in multi-crane lifts.
 - (6) Basic crane terms.
 - (7) The basics of machine power flow systems.
 - (i) Mechanical.
 - (ii) Electrical.
 - (iii) Pneumatic.
 - (iv) Hydraulic.
 - (v) Combination.
 - (8) The significance of the instruments and gauge readings.
 - (9) The effects of thermal expansion and contraction in hydraulic cylinders.
 - (10) Background information necessary to understand the requirements of pre-operation and inspection.
 - (11) How to use the safety devices and operational aids required under § 1926.1415 and § 1926.1416.
 - (12) The difference between duty-cycle and lifting operations.
 - (13) How to calculate net capacity for every possible configuration of the equipment using the manufacturer's load chart.
 - (14) How to use manufacturer-approved attachments and their effect on the equipment.
 - (15) How to obtain dimensions, weight, and center of gravity of the load.
 - (16) The effects of dynamic loading from:
 - (i) Wind.
 - (ii) Stopping and starting.
 - (iii) Impact loading.
 - (iv) Moving with the load.
 - (17) The effect of side loading.
 - (18) The principles of backward stability.

(b) Site information.

- (1) How to identify the suitability of the supporting ground/surface to support the expected loads of the operation. Elements include:
 - (i) Weaknesses below the surface (such as voids, tanks, loose fill).
 - (ii) Weaknesses on the surface (such as retaining walls, slopes, excavations, depressions).
- (2) Proper use of mats, blocking/cribbing, outriggers, stabilizers, or crawlers.
- (3) Identification of site hazards such as power lines, piping, and traffic.
- (4) How to review operation plans with supervisors and other workers (such as the signal person), including how to determine working height, boom length, load radius, and travel clearance.
- (5) How to determine if there is adequate room for extension of crawlers or outriggers/stabilizers and counterweights.

(c) Operations.

- (1) How to pick, carry, swing and place the load smoothly and safely on rubber tires and on outriggers/stabilizers or crawlers (where applicable).
- (2) How to communicate at the site with supervisors, the crew and the signal person.
- (3) Proper procedures and methods of reeving wire ropes and methods of reeving multiple-part lines and selecting the proper load block and/or ball.
- (4) How to react to changes in conditions that affect the safe operation of the equipment.
- (5) How to shut down and secure the equipment properly when leaving it unattended.
- (6) Know how to apply the manufacturer's specifications for operating in various weather conditions, and understand how environmental conditions affect the safe operation of the equipment.
- (7) How to properly level the equipment.
- (8) How to verify the weight of the load and rigging prior to initiating the lift.
- (9) How to determine where the load is to be picked up and placed and how to verify the radii.
- (10) Know basic rigging procedures.
- (11) How to carry out the shift inspection required in this subpart.
- (12) Know that the following operations require specific procedures and skill levels:
 - (i) Multi-crane lifts.
 - (ii) Hoisting personnel.
 - (iii) Clamshell/dragline operations.
 - (iv) Pile driving and extracting.
 - (v) Concrete operations, including poured-in-place and tilt-up.
 - (vi) Demolition operations.
 - (vii) Operations on water.
 - (viii) Magnet operations.
 - (ix) Multi-drum operations.
- (13) Know the proper procedures for operating safely under the following conditions:
 - (i) Traveling with suspended loads.
 - (ii) Approaching a two-block condition.
 - (iii) Operating near power lines.
 - (iv) Hoisting personnel.
 - (v) Using other than full outrigger/crawler or stabilizer extensions.
 - (vi) Lifting loads from beneath the surface of the water.
 - (vii) Using various approved counterweight configurations.
 - (viii) Handling loads out of the operator's vision ("operating in the blind").
 - (ix) Using electronic communication systems for signal communication.
- (14) Know the proper procedures for load control and the use of hand-held tag lines.
- (15) Know the emergency response procedure for:
 - (i) Fires.
 - (ii) Power line contact.

- (iii) Loss of stability.
 - (iv) Control malfunction.
 - (v) Two-blocking.
 - (vi) Overload.
 - (vii) Carrier or travel malfunction.
- (16) Know how to properly use outriggers and stabilizers in accordance with manufacturer specifications.
- (d) Use of load charts.
- (1) Know the terminology necessary to use load charts.
 - (2) Know how to ensure that the load chart is the appropriate chart for the equipment in its particular configuration and application.
 - (3) Know how to use load charts. This includes knowing:
 - (i) The operational limitations of load charts and footnotes.
 - (ii) How to relate the chart to the configuration of the crane, crawlers, or outriggers/stabilizers extended or retracted, jib erected or offset, and various counterweight configurations.
 - (iii) The difference between structural capacity and capacity limited by stability.
 - (iv) What is included in capacity ratings.
 - (v) The range diagram and its relationship to the load chart.
 - (vi) The work area chart and its relationship to the load chart.
 - (vii) Where to find and how to use the "parts-of-line" information.
 - (4) Know how to use the load chart together with the load indicators and/or load moment devices.

Crane Operators need to be able to accurately determine the capacity of the crane by means of understanding load charts and specific boom configurations for the crane they operate, this is among many other topics related to safe crane operations.

Signal Person Training

What does the standard say with regard to training of Signal Persons?

In section 1926.1428 we find the criteria outlined for Signal Person Training. The standard gives employers two options.

Option 1- Third party qualified evaluator. The signal person has documentation from a third party qualified evaluator, showing that the signal person meets the Qualification Requirements.

Option (2) - Employer's qualified evaluator. The employer's qualified evaluator assesses the individual and determines that the individual meets the Qualification Requirements and provides documentation of that determination. An assessment by an employer's qualified evaluator under this option is not portable--other employers are not permitted to use it to meet the requirements of this section.

At the end of the day, the employer needs to verify the designated Signal Person is capable of guiding the load, by communicating with the crane operator by means of hand signals or voice commands.

Rigger Training

What does the standard say with regard to training of Rigger Persons?

When workers are located in the “Fall Zone”, then the load needs to be rigged by a qualified rigger. The employer can take a look at the job scope of the employee and then create a training outline that includes the type of rigging scenarios the employee will perform, types of rigging gear they will use and types of loads they will rig. Once the training outline is completed then training can be performed, written exams created and a practical hands on assessment to verify the ability of the employee.

Other Training

When assembling a crane, the assembly/disassembly process needs to be directed by a A/D director, how can the employer comply with this?

Before the A/D director can be considered qualified, the employer should verify the experience and abilities of the individual designated as the A/D director. The easiest way to comply with this is simply by looking at the history and positions of that individual. Then compare it to the equipment that individual will direct the assembly and disassembly of. If shortcomings are noted, then corrected by means of training, document and assess.

Maintenance personnel need to be qualified, how can the employer comply with this?

The employer should verify the qualifications of the maintenance personnel, based on the equipment they will work on as well as the experience related to the specific equipment to be repaired.

Bibliography

Appendix C to Subpart CC of Part 1926--Operator Certification: Written Examination: Technical Knowledge Criteria, 2010

Occupational Safety and Health Administration (OSHA). 1926.1400 Subpart CC
(www.osha.gov)