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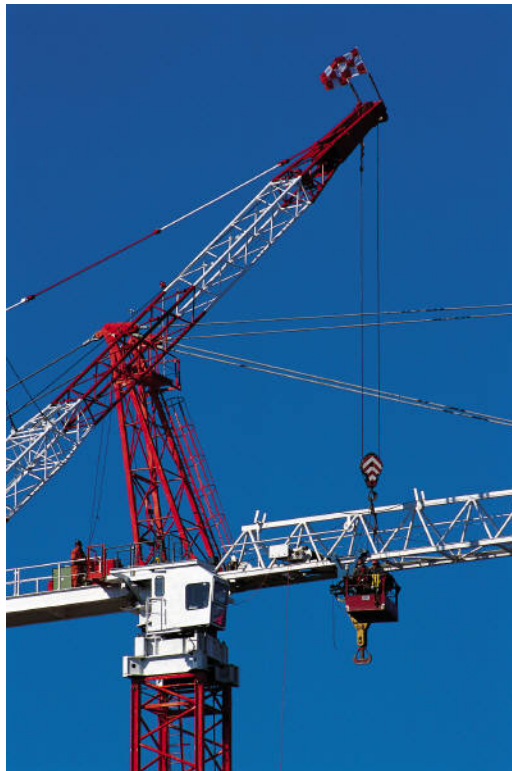
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**OCCUPATIONAL SAFETY AND HEALTH  
ADMINISTRATION**

**SMALL ENTITY  
COMPLIANCE GUIDE  
FOR FINAL RULE FOR  
CRANES AND DERRICKS IN CONSTRUCTION**



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## INTRODUCTION

This guide is intended to help small businesses comply with OSHA's standard for Cranes and Derricks in Construction. **It is designed to address the most common compliance issues that employers will face and to provide sufficient detail to serve as a useful compliance guide. It does not, however, describe all provisions of the standard or alter the compliance responsibilities set forth in the standard, which is published at 29 CFR 1926.1400 - 1442. The reader must refer to the standard itself, which is available on OSHA's website and in the *Federal Register* and will be published in the *Code of Federal Regulations*, to determine all of the steps that must be taken to comply with the standard.**

In addition to this guide, other information that will be helpful in complying with the standard can be found on OSHA's website.

If you are seeking advice about complying with the standard, OSHA's On-site Consultation Program offers free and confidential advice to small and medium-sized businesses in all states across the country, with priority given to high-hazard worksites. On-site Consultation services are separate from enforcement and do not result in penalties or citations. Consultants from state agencies and universities work with employers to identify workplace hazards, provide advice on compliance with OSHA standards, and help establish safety and health management systems. To find the OSHA On-site Consultation Program office nearest you, go to:  
[https://www.osha.gov/dcsp/smallbusiness/consult\\_directory.html](https://www.osha.gov/dcsp/smallbusiness/consult_directory.html).

In 21 states and one territory, occupational safety and health standards are enforced by the state agency responsible for the OSHA-approved state plan. These states are: Alaska, Arizona, California, Hawaii, Indiana, Iowa, Kentucky, Maryland, Michigan, Minnesota, Nevada, New Mexico, North Carolina, Oregon, Puerto Rico, South Carolina, Tennessee, Utah, Vermont, Virginia, Washington and Wyoming. New York, Connecticut, Illinois, New Jersey, and the Virgin Islands also operate OSHA-approved state plans limited in scope to state and local government employees.

States operating OSHA-approved state plans must adopt and enforce standards that are either identical to or at least as effective as federal standards. Therefore, these states must adopt a standard for cranes and derricks in construction that is at least as effective as OSHA's standard and must extend that protection to state and local government employees. If you are operating a small business in one of the above-listed states or territories, you must determine whether requirements in addition to those in the OSHA standard apply. For example, the OSHA standard requires that crane operators be qualified or certified by November 10, 2014, but states may require such qualification or certification by an earlier date. In addition, state or local licensing requirements may apply. (A list of phone numbers and addresses for the state programs is included in Appendix A).

### ***Who must comply with the standard?***

Employers who use cranes and derricks in construction work must comply with the standard. In addition, other employers on construction sites where cranes and derricks are used are responsible for violations that expose their employees to hazards and, therefore, need to know the requirements of the standard that may affect their employees. Crane lessors who provide operators and/or maintenance personnel with the equipment also have duties under the standard. See the section of this guide entitled “Employer Responsibilities” for additional information on the compliance responsibilities of different employers.

### ***Who should read this guide?***

Employers who have compliance responsibilities under the standard should read this guide. In addition, crane operators and other workers who work with or near cranes on construction sites can find information in this guide that will make them aware of the hazards that cranes present to them and their co-workers and the steps that employers must take to protect against those hazards.

### ***How do I use this guide?***

This guide is divided into chapters that correspond to the sections of the standard. The guide focuses on the standard’s provisions that address the most serious hazards and the compliance issues that employers will face most frequently. Some issues that arise less frequently are addressed briefly or not at all. In some places, the guide refers the reader to sections of the standard for more detailed information about particular topics.

When this guide uses the word “you,” it is referring to an employer who operates a crane on a construction site unless the context indicates otherwise. However, as noted above, other employers may also have responsibilities under the standard.

### ***How does the new standard differ from the old standard it replaces?***

Most requirements of the prior OSHA standard for cranes and derricks used in construction work (29 CFR 1926.550) incorporated requirements of certain pre-1970 national consensus standards. This standard sets forth most of its requirements in the text of the standard and incorporates national consensus standards by reference in only a few locations. In addition, this new standard includes a number of new provisions designed to improve safety. Several significant changes are:

- Effective November 10, 2014, most operators must be formally qualified or certified.
- New requirements during assembly and disassembly will protect workers from being struck or crushed by unanticipated movement of crane components and will ensure that equipment is properly assembled.

- New requirements are included for maintaining sufficient clearance distances from power lines and protecting against electrocution hazards.
- New requirements for pre-erection inspection of tower cranes, use of synthetic slings during climbing of tower cranes and other assembly activities, and use of qualified riggers for those activities, will ensure the structural stability of such equipment.
- The new standard covers equipment (such as floating cranes) that was subject to very few requirements in the prior standard because the prior standard did not incorporate national consensus standards applicable to such equipment. It also covers equipment (such as dedicated pile drivers) that was not subject to the prior standard at all.

## EMPLOYER RESPONSIBILITIES

Employers who operate cranes on a construction site are responsible for complying with all aspects of the standard, but other employers whose personnel work at the site have responsibilities as well. These employer duties are consistent with OSHA's multi-employer policy, which recognizes that the Occupational Safety and Health Act imposes compliance duties on (1) employers who create or control hazards, (2) employers whose employees are exposed to hazards, and (3) employers with general supervisory authority over a worksite.

The following Questions and Answers explain the compliance duties of different employers under various common situations.

**Question 1:** I own and operate a crane on a construction site. The crane operator is my employee. What are my responsibilities under the standard?

**Answer 1:** You must comply with all requirements of the standard, as you control all hazards the crane may create.

**Question 2:** I operate a leased crane on a construction site. The crane's lessor has informed me that the crane meets OSHA's standard. Can I rely on the lessor's word and assume that the crane complies with the standard?

**Answer 2:** No. As the employer operating the crane you are responsible for complying with all requirements of the standard. Even if the lessor states that the crane meets the standard, you must take steps to verify that claim. One way to verify their claim is to ask the lessor for the most recent monthly and annual inspections reports, which will identify any problems found by the inspectors that either needed to be fixed or that need to be checked in future inspections. These documents must be made available to all persons who conduct inspections under the standard, including the shift inspections you must conduct while operating the crane. See Sections 1412(k) and 1413(e). If the lessor cannot produce the required inspection documents, you will need to conduct an annual inspection and document the results of that inspection before operating the crane. See Section 1412 for a description of the inspections required by the standard.

**Question 3:** I lease a crane to a construction contractor and provide an operator for the crane. While on the site, the operator is supervised exclusively by the lessee's foreman. Do I have any responsibilities under the standard?

**Answer 3:** Yes. You must comply with all requirements of the standard because your employee, the operator, would be exposed to any hazards resulting from the crane's operation. Moreover, you are responsible for any violations caused by the crane operator because you are the operator's employer and the lessee is relying on the operator's knowledge and skills to ensure that operations are conducted safely. See section 1427(a) (Operator qualification and certification).



**Question 4:** I lease a crane to a construction contractor. I do not provide an operator with the crane. However, when the lessee tells me that the crane requires maintenance or repair, I send my mechanic to do the necessary work. Do I have any responsibilities under the standard?

**Answer 4:** Yes. Because the mechanic is your employee, you must comply with section 1429 (Qualifications of maintenance and repair workers), and you are responsible for any hazards that result from the actions of your mechanic that expose other workers on the site to hazards. In addition, you are responsible for any violations to which your mechanic is exposed while he/she is working on the crane.

**Question 5:** I lease a crane to a construction contractor. I do not provide an operator for the crane, nor do I have anyone inspect or repair the crane while it is on the site. Do I have any responsibilities under the standard?

**Answer 5:** No. An employer who leases (or sells) a crane but does not send any employees to the worksite where the crane is used is not subject to the standard. However, as noted in Answer 2, the lessee is responsible for the condition of the crane and may ask you to produce written records of past crane inspections or to provide other information about the crane.

**Question 6:** I am a contractor on a construction site. Another contractor is using a crane on the site. None of my work involves the crane. Do I have any responsibilities under the standard?

**Answer 6:** Yes, because your employees may be exposed to hazards caused by the crane's operation. For example, if a crane collapses due to being overloaded, employees working elsewhere on the site can be killed or injured. And if, for example, a crane makes electrical contact with a power line, any employee touching or even near the crane can be electrocuted.

Even though you are not operating the crane, you must be aware of potential crane hazards and are responsible for protecting your employees against hazards you can reasonably foresee. You must take reasonable steps to protect your employees. For example, if you are concerned with a crane's stability due to potential overloading, unstable ground conditions, or high winds, you must satisfy yourself that the crane is stable before allowing your employees to work where they would be in danger if the crane collapses. One way is to ask the company operating the crane or the controlling contractor on the site whether all necessary precautions are being taken to ensure the crane's stability. Also, you have a duty to train your employees in the hazards associated with their work, including those that might arise from working near a crane.

**Question 7:** What training must I provide to my employees?

**Answer 7:** Training that must be provided under the standard to equipment operators, signal persons, competent and qualified persons, maintenance and repair workers, and workers who work near the equipment is referenced primarily in Section 1430. Additional training requirements are specified in other provisions of the standard. In addition, 29 CFR 1926.21(b)(2) requires employers to train construction workers how to recognize and avoid the hazards associated with their work and, depending on the circumstances, may require training in topics not listed in the cranes and derricks standard.

**Question 8:** I operate a lumberyard and deliver sheet goods (such as drywall or plywood) or packaged goods (such as roofing shingles, bags of cement, or rolls of roofing felt) to a construction site using a flatbed truck equipped with an articulating crane. At the site, I use the crane to place the material either onto the ground or onto the structure being erected. Must I comply with the standard?

**Answer 8:** If you only place materials on the ground without arranging the materials in a particular order for hoisting, you are not engaged in construction work and have no duties under the standard. If you place materials onto the structure, you are engaged in construction work, and the standard applies to your work. However, if you deliver only building supply sheet goods or building supply packaged materials onto the structure and your articulating/knuckleboom truck crane is equipped with a properly functioning automatic overload prevention device, you have no further duties under the standard. Otherwise, you must comply with the entire standard when using the crane to place material onto the structure.

**Question 9:** I deliver prefabricated roof trusses and wall panels to a construction site using a flatbed truck equipped with an articulating crane. At the site, I use the crane to place the material either onto the ground or onto the structure being erected. Must I comply with the standard?

**Answer 9:** You must comply with the standard if you unload the material onto the structure. You need not comply with the standard if you unload the material onto the ground without arranging the materials in a particular order for hoisting because that activity is not construction work.

**Question 10:** I am the general contractor on a homebuilding project. The framing subcontractor informs me that he will be bringing a crane onto the site to lift roof trusses onto the structure. Do I have any responsibilities under the standard?

**Answer 10:** You are responsible for seeing that the ground on which the crane will operate is sufficiently firm and level to enable the crane to operate safely. See Section 1402 (Ground conditions). In addition, you must inform the framing contractor of the location of hazards beneath the equipment set-up area (such as voids, tanks, utilities) if those hazards are identified in documents (such as site drawings, as-built drawings, or

soil analyses) that are in your possession or the hazards are otherwise known to you. If there is more than one crane on the site and the working radii of the cranes overlap, you must establish a system to control their operations. See Section 1424(b). In addition to these specific duties under the standard, as the controlling contractor on the site you have the same responsibility under this standard as you have under other OSHA standards: you must exercise reasonable care to prevent and detect violations on the site. See OSHA Instruction CPL 2-0.124, "Multi-Employer Citation Policy," (Dec. 10, 1999), section X.E (available on OSHA's website).

**Question 11:** I notice that certain provisions of the standard direct my employees, such as my crane operator, to take certain steps. Do I have any responsibilities under such provisions?

**Answer 11:** Yes. Where provisions of this standard direct an operator, crewmember, or other employee to take certain actions, Section 1400(f) requires you to establish, effectively communicate to the relevant persons, and enforce work rules to ensure compliance with such provisions.

## SECTION 1400 – SCOPE

**COVERED AND EXCLUDED EQUIPMENT:** The rule applies to power-operated equipment used in construction work that can hoist, lower and horizontally move a suspended load, unless such equipment is specifically excluded from coverage.

Section 1400 lists specific types of equipment that are covered and specific types that are excluded from coverage.

**COVERED EQUIPMENT: The types of cranes and derricks that are most commonly used in construction are covered, including:**

- Mobile cranes, including crawler mounted, wheel-mounted, rough terrain, all-terrain, commercial truck-mounted, and boom truck cranes.
- Tower cranes, including those with a fixed jib (i.e., “hammerhead boom”) those with a luffing boom and self-erecting tower cranes.
- Articulating cranes, such as knuckle-boom cranes. (See below for rules that apply when such cranes are used to deliver material to a construction site).
- All derricks, except for gin poles used for the erection of communication towers. (Note that, despite their name, “digger derricks” are not “derricks” under the standard. As noted below, the standard applies to “digger derricks” unless they are used for certain work).

The rule also applies to the following more specialized types of equipment when used in construction:

- Floating cranes
- Cranes on barges
- Locomotive 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
- Monorail mounted cranes

- Pedestal cranes
- Portal cranes
- Overhead and gantry cranes (except that such cranes that are permanently installed in a facility are subject to OSHA's general industry standard, 29 CFR 1910.179, even when used for construction work.)
- Straddle cranes
- Sideboom cranes
- Digger derricks (except when used for augering holes for poles carrying electric and telecommunication lines, placing and removing the poles, and for handling associated materials to be installed on or removed from the poles).

**ATTACHMENTS:** Equipment that is covered under the standard continues to be covered when used with crane-attached or crane-suspended attachments. Such attachments include, but are not limited to: hooks, magnets, grapples, clamshell buckets, orange peel buckets, concrete buckets, drag lines, personnel platforms, augers or drills, and pile driving equipment.

**EXCLUDED EQUIPMENT:** The following types of equipment are specifically excluded from coverage:

- Equipment that would otherwise be covered while it has been converted or adapted for a non-hoisting/lifting use. Such conversions/adaptations include, but are not limited to, power shovels, excavators, and concrete pumps.
- Power shovels, excavators, wheel loaders, backhoes, loader backhoes, and track loaders. This machinery is also excluded when used with chains, slings, or other rigging to lift suspended loads.
- Automotive wreckers and tow trucks when used to clear wrecks and haul vehicles.
- Digger derricks when used for augering holes for poles carrying electric and telecommunication lines, placing and removing the poles, and for handling associated materials to be installed on or removed from the poles. Digger derricks used in such pole work must comply with either 29 CFR 1910.269 (electric lines) or 29 CFR 1910.268 (telecommunication lines).
- Machinery originally designed as vehicle-mounted aerial devices (for lifting personnel) and self-propelled elevating work platforms.
- Telescopic/hydraulic gantry systems.

- Stacker cranes.
- Powered industrial trucks (forklifts), except when configured to hoist and lower (by means of a winch or hook) and horizontally move a suspended load.
- Mechanic's truck with a hoisting device when used in activities related to equipment maintenance and repair.
- Machinery that hoists by using a come-a-long or chainfall.
- Dedicated drilling rigs.
- Gin poles when used for the erection of communication towers.
- Tree trimming and tree removal work.
- Anchor handling or dredge-related operations with a vessel or barge using an affixed A-frame.
- Roustabouts.
- Helicopter cranes.

**SPECIAL RULES FOR ARTICULATING/KNUCKLE BOOM CRANES USED TO DELIVER MATERIAL TO A CONSTRUCTION SITE:**

It is common for material to be delivered to and unloaded on a construction site using a truck on which is mounted an articulating/knuckle-boom crane. Such equipment is covered by the standard when used in construction work.

When such equipment delivers materials by placing them on the ground without arranging them in a particular sequence for hoisting, the activity is not considered construction work and is not covered under the standard. This exclusion applies regardless of the type of material being delivered.

However, when the delivery equipment is used to transfer the materials onto a structure, the activity is considered construction work. Nevertheless, the activity is excluded from the standard if **all** of the following conditions are met:

- The materials are sheet goods (such as sheet rock, plywood, or sheets of roofing shingles) or packaged goods (such as roofing shingles, bags of cement, or rolls of roofing felt).
- The equipment uses a fork/cradle at the end of the boom to deliver the materials.

- The equipment is not used to hold, support, or stabilize the material to facilitate a construction activity, such as holding material in place while it is attached to the structure.
- The equipment is equipped with a properly functioning automatic overload prevention device.

This exception, as noted, is limited to delivery of sheet goods and packaged goods. It does **not** apply to delivery of prefabricated components or building sections, such as roof trusses and wall panels. It also does **not** apply to delivery of structural steel members or components of a systems-engineered metal building.

## SECTION 1401 – DEFINITIONS

Section 1401 defines numerous terms that are used in the standard. The terms discussed below are of general interest and deserve particular attention. The definitions are in bold, and following each definition is an explanation of its significance

**A/D director (Assembly/Disassembly director) means an individual who meets this subpart’s requirements for an A/D director, irrespective of the person’s formal job title or whether the person is non-management or management personnel.**

All assembly and disassembly operations must be carried out under the direction of an A/D director. The A/D director must be both a “competent person” and a “qualified person,” or must be a “competent person” assisted by one or more “qualified persons.” “Competent person” and “qualified person” are defined below.

**Assembly/Disassembly means the assembly and/or disassembly of equipment covered under this standard. With regard to tower cranes, “erecting and climbing” replaces the term “assembly,” and “dismantling” replaces the term “disassembly.” Regardless of whether the crane is initially erected to its full height or is climbed in stages, the process of increasing the height of the crane is an erection process.**

All assembly and disassembly operations must comply with either the procedures specified by the manufacturer or procedures developed by the employer that meet the criteria listed in Section 1406. Under either alternative, procedures must comply with all manufacturer prohibitions.

**Competent person means one who is capable of identifying existing and predictable hazards in the surroundings or working conditions which are unsanitary, hazardous, or dangerous to employees, and who has authorization to take prompt corrective measures to eliminate them.**

A competent person must conduct shift and monthly inspections of all equipment. The A/D director must meet the test for a competent person (as well as a qualified person – see below). In addition, duties under the sections of this standard governing Operations, Hoisting Personnel, Multiple Crane/Derrick Lifts, Derricks, and Floating Cranes must be carried out by competent persons. In general, a qualified crane operator who has the authority to take corrective measures will be a competent person under this definition.

**Controlling entity means an employer that is a prime contractor, general contractor, construction manager or any other legal entity which has the overall responsibility for the construction of the project – its planning, quality and completion.**

The controlling entity is responsible for seeing that the ground conditions are adequate to support the equipment. The controlling entity must also inform the user and the operator of the equipment of the location of hazards beneath the equipment set-up area (such as



voids, tanks, utilities) if those hazards are identified in documents (such as site drawings, as-built drawings, and soil analyses) in the possession of the controlling entity (whether at the site or off-site) or of any other hazards known to the controlling entity. See section 1402(c). The controlling entity must also establish a system to coordinate the operations of two cranes that operate within each other's working radius. See Section 1424(b).

***Dedicated spotter (power lines):* To be considered a dedicated spotter, the requirements of § 1926.1428 (Signal person qualifications) must be met and his/her sole responsibility is to watch the separation between the power line and the equipment, load line and load (including rigging and lifting accessories), and ensure through communication with the operator that the applicable minimum approach distance is not breached.**

The use of a dedicated spotter is one of the safeguards used to prevent a crane, as well as its load and load line, from breaching the applicable minimum distance from a power line, and thereby prevent death by electrocution and electric shock and burn injuries. The minimum distances that must be maintained, and the safeguards that must be used, are addressed in sections 1407 – 1411.

***Electrical contact* occurs when a person, object, or equipment makes contact or comes in close proximity with an energized conductor or equipment that allows the passage of current.**

Equipment (including the load and load line) coming into electrical contact with power lines is the leading cause of crane-related fatalities. Note that the equipment does not need to actually touch the power line to make electrical contact, as electricity can arc from a power line to nearby equipment. It is therefore critical to maintain a safe minimum distance and not merely prevent physical contact.

***Fall protection equipment* means guardrail systems, safety net systems, personal fall arrest systems, positioning device systems or fall restraint systems.**

This standard contains fall protection requirements for cranes. The only provisions of OSHA's general fall protection requirements for construction (found in 29 CFR 1926 subpart M) that apply to cranes are specifically referenced in this standard. The listed types of fall protection equipment are further defined in the standard.

***Qualified person* means a person who, by possession of a recognized degree, certificate, or professional standing, or who by extensive knowledge, training and experience, successfully demonstrated the ability to solve/resolve problems relating to the subject matter, the work, or the project.**

Numerous duties under the standard must be carried out by a person who meets this definition. These include conducting annual/comprehensive inspections of all equipment as well as inspections of modified equipment. The A/D director (see definition above) must be a qualified person as well as a competent person. A qualified person also is

responsible for duties under various provisions of the standard, including those dealing with developing assembly/disassembly procedures, wire rope safety, fall protection, maintenance and repair, hoisting personnel, multiple crane/derrick lifts, equipment modifications, tower cranes, derricks, and floating cranes/derricks.

**Rated capacity means the maximum working load permitted by the manufacturer under specified working conditions. Such working conditions typically include a specific combination of factors such as equipment configuration, radii, boom length, and other parameters of use.**

Workers have been killed and injured when cranes have collapsed because their rated capacity was exceeded. Compliance with the rated capacity is therefore one of the most critical protective measures required by the standard.

## SECTION 1402 – GROUND CONDITIONS

**IMPORTANCE OF GROUND CONDITIONS:** Adequate ground conditions are essential for safe crane operations because the crane's capacity and stability depend on such conditions being present. If, for example, the ground is muddy or otherwise unstable, a crane could overturn even if operated with the load limits specified by the manufacturer.

**BASIC RULE:** You must not assemble or use a crane unless ground conditions are firm, drained, and graded to a sufficient extent so that, in conjunction (if necessary) with the use of supporting materials (such as blocking, mats, cribbing, or marsh buggies (in marshes/wetlands)), the equipment manufacturer's specifications for adequate support and degree of level of the equipment are met. The requirement for the ground to be drained does not apply to marshes/wetlands.

**RESPONSIBILITIES OF CONTROLLING ENTITY:** A contractor operating a crane on a construction site may not have the ability or authority to provide for adequate ground conditions at the site. The standard therefore places the responsibility for ensuring that the ground conditions are adequate on the "controlling entity" at the site, that is the prime contractor, general contractor, construction manager, or other legal entity with overall responsibility for the project's planning, quality, and completion.

The controlling entity must also inform the user and operator of the equipment of hazards beneath the equipment set-up area (such as voids, tanks, utilities) if those hazards are identified in documents (such as site drawings, as-built drawings, and soil analyses) in the possession of the controlling entity (whether at the site or off-site) and of any other hazards known to the controlling entity.

If there is no controlling entity for the project, the responsibility for providing adequate ground conditions rests on the employer that has authority at the site to make or arrange for ground preparations.

**RESPONSIBILITY OF COMPANY OPERATING CRANE:** Although the controlling entity is responsible for providing adequate ground conditions, the company operating the crane will often be better able than the controlling entity to determine whether those conditions are adequate. If you are operating a crane and decide that ground conditions are inadequate, you must discuss the problem with the controlling entity and see that the problem is corrected before beginning or continuing operations.

## SECTIONS 1403-1406 – ASSEMBLY AND DISASSEMBLY

Accidents during assembly and disassembly of lattice boom and tower cranes are one of the major causes of crane-related fatalities. These sections are designed to prevent such accidents by requiring safe assembly/disassembly procedures for lattice boom and tower cranes. Hydraulic-boom cranes are not generally assembled on-site, but these sections contain some provisions, such as the requirement (section 1404(q)) for proper setting of outriggers and stabilizers, that apply to cranes with hydraulic booms.

**REQUIRED PROCEDURES:** When assembling or disassembling a crane, you must comply with either:

- Manufacturer procedures, or
- Your own employer procedures, which must be developed by a qualified person. Such procedures must, at a minimum (1) prevent unintended dangerous movement or collapse of any part of the equipment; (2) provide adequate support and stability of all parts of the equipment; and (3) position employees involved in the assembly/disassembly operation so that their exposure to unintended movement or collapse of part or all of the equipment is minimized.

Regardless of which of these options you choose, you must follow any manufacturer prohibitions that apply to the assembly/disassembly operation.

**THE A/D DIRECTOR:** All assembly/disassembly operations must be directed by an individual who meets the criteria for both a competent person and a qualified person, or by a competent person who is assisted by one or more qualified persons. The A/D director must understand the applicable assembly/disassembly procedures. The A/D director must take the following precautions to protect against potential hazards associated with the operation, including:

- Site and ground conditions must be able to support the equipment during assembly/disassembly.
- Blocking material must be the correct size, amount, and condition. The blocking must be stacked so as to sustain the loads and maintain stability.
- When used to support lattice booms or components, blocking must be placed appropriately to protect the structural integrity of the equipment, and prevent dangerous movement and collapse.

- When using an assist crane, the loads that will be imposed on the assist crane at each phase of assembly/disassembly must be verified as being within its rated capacity.
- The point(s) of attachment of rigging to a boom (or boom sections, jib, or jib sections) must be suitable for preventing structural damage and facilitating safe handling of these components.
- The center of gravity of the load must be identified if necessary for the method used for maintaining stability. Where there is insufficient information to accurately identify the center of gravity, measures designed to prevent unintended dangerous movement resulting from an inaccurate identification of the center of gravity must be used.
- The boom sections, boom suspension systems (such as gantry A-frames and jib struts), and components must be rigged or supported to maintain stability upon the removal of the pins.
- Suspension ropes and pendants must not be allowed to catch on the boom or jib connection pins or cotter pins (including keepers and locking pins).
- Steps must be taken to prevent unintended movement from counterweights that are inadequately supported or are being hoisted.
- Each time reliance is to be placed on the boom hoist brake to prevent boom movement during assembly/disassembly, the brake must be tested prior to such reliance to determine if it is sufficient to prevent boom movement. If it is not sufficient, a boom hoist pawl, other locking device/back-up braking device, or another method of preventing dangerous movement of the boom (such as blocking or using an assist crane) from a boom hoist brake failure must be used.
- Backward stability must be assured before swinging the upperworks, travel, and when attaching or removing equipment components.
- The effect of wind speed and weather on the equipment must be taken into account.

**THE CREW:** Before the operation begins, the A/D director must ensure that the crew members understand all of the following:

- Their tasks.
- The hazards associated with their tasks.
- The hazardous positions/locations that they need to avoid.

Before a crew member goes to a location that is out of view of the operator and is either in, on, or under the equipment, or near the equipment (or load) where the crew member could be injured by movement of the equipment (or load), the crew member must inform the operator that he/she is going to that location. Whenever the operator knows that a crew member is in such a potentially dangerous position, the operator must not move any part of the equipment (or load) until the operator is informed in accord with a pre-arranged system of communication that the crew member is in a safe position.

**THE RIGGER:** When rigging is used for assembly/disassembly, the employer must ensure that the rigging work is done by a qualified rigger, i.e., a rigger who meets the definition of a qualified person.

**WORKING UNDER THE BOOM, JIB OR OTHER COMPONENTS:** When pins (or similar devices) are being removed, employees must not be under the boom, jib, or other components, unless site constraints require one or more employees to be in such a position. In such a case, the A/D director must implement procedures that minimize the risk of unintended dangerous movement and minimize the duration and extent of exposure under the boom.

**SYNTHETIC SLINGS:** When using synthetic slings during assembly or disassembly, you must follow the synthetic sling manufacturer's instructions, limitations, specifications and recommendations. Synthetic slings must be protected from abrasive, sharp or acute edges, and configurations that could cause a reduction of the sling's rated capacity, such as distortion or localized compression.

**OUTRIGGERS AND STABILIZERS.** When the load to be handled and the operating radius require the use of outriggers or stabilizers, or at any time when outriggers or stabilizers are used:

- The outriggers or stabilizers must be either fully extended or, if manufacturer procedures permit, deployed as specified in the load chart.
- The outriggers must be set to remove the equipment weight from the wheels, except for locomotive cranes. This provision does not apply to stabilizers.

- When outrigger floats are used, they must be attached to the outriggers. When stabilizer floats are used, they must be attached to the stabilizers.
- Each outrigger or stabilizer must be visible to the operator or to a signal person during extension and setting.
- Outrigger and stabilizer blocking must be the correct size, amount, and condition. The blocking must be placed only under the outrigger or stabilizer float/pad of the jack or, where the outrigger or stabilizer is designed without a jack, under the outer bearing surface of the extended outrigger or stabilizer beam.

**DISMANTLING BOOMS AND JIBS:** The following precautions must be taken to prevent dangerous movement of boom and jib sections that are being dismantled.

- None of the pins in the pendants are to be removed (partly or completely) when the pendants are in tension.
- None of the pins (top or bottom) on boom sections located between the pendant attachment points and the crane/derrick body are to be removed (partly or completely) when the pendants are in tension.
- None of the pins (top or bottom) on boom sections located between the uppermost boom section and the crane/derrick body are to be removed (partly or completely) when the boom is being supported by the uppermost boom section resting on the ground (or other support).
- None of the top pins on boom sections located on the cantilevered portion of the boom being removed (the portion being removed ahead of the pendant attachment points) are to be removed (partly or completely) until the cantilevered section to be removed is fully supported.

**FALL PROTECTION:** During assembly/disassembly work, fall protection is generally required when a worker is more than 15 feet above an unprotected side or edge. See section 1423.

## SECTIONS 1407-1411 – POWER LINES

**DANGER – HIGH VOLTAGE:** Electrocutions caused by a crane, load, or load line contacting a power line have caused numerous fatalities. To prevent such accidents in the future, the standard contains detailed, systematic procedures that employers must follow when operating cranes near power lines. These procedures are designed to 1) prevent equipment from making electrical contact with power lines; and 2) protect workers in the event that such contact occurs.

**NOTE:** Special rules apply to work covered by 29 CFR, Subpart V, Power Transmission and Distribution. This Guide does not cover Subpart V work.

**THE FIRST STEP – COULD THE CRANE GET CLOSER THAN 20 FEET TO A POWER LINE?** Keeping a safe distance from power lines is the key to preventing power line accidents. Therefore, the first step you must take when planning to operate a crane on a site where a power line is present is to identify the crane's work zone and use that work zone to determine how close it could come to the power line. If you determine that no part of the crane, load, or load line could get closer than 20 feet to a power line, no further precautions are required. If the initial plan for the crane's use changes during the project, you must reevaluate whether the equipment could get closer than 20 feet to the power line. [**Note:** If the line's voltage is over 350,000 volts, a 50-foot, rather than 20-foot, minimum clearance must be maintained. This Guide assumes that the voltage is less than 350,000 volts and uses the 20-foot clearance distance.]

There are two ways to identify the work zone and use it to determine whether the equipment could get closer than 20 feet to the power line. First, if the equipment (crane, load, load line, or rigging) could not get closer than 20 feet to the line even if the crane is operated at its maximum working radius, the 20-foot requirement is satisfied. Alternatively, you may establish a work zone by establishing boundaries (using flags or a device such as a range limit device or range control warning device) that are more than 20 feet from the power line and prohibiting the operator from operating the equipment past those boundaries.



**ALTERNATIVE TO 20-FOOT CLEARANCE (TABLE A):** If you know the line’s voltage, you may use the minimum clearance distance in Table A in lieu of 20 feet. Table A provides:

**Table A – Minimum Clearance Distances**

Voltage (nominal, kV, alternating current)	Minimum clearance distance (feet)
up to 50	10
over 50 to 200	15
over 200 to 350	20
over 350 to 500	25
over 500 to 750	35
over 750 to 1,000	45
over 1,000	(as established by the utility owner/ operator or registered professional engineer who is a qualified person with respect to electrical power transmission and distribution)

Note: The value that follows “to” is up to and includes that value. For example, over 50 to 200 means up to and including 200kV.

One way to determine the line’s voltage is to ask the line’s owner or operator. The utility must respond to such a voltage inquiry within two working days.

If you use Table A to determine the minimum clearance distance, you must determine whether any part of the crane, load, or load line could get closer than the Table A distance to a power line if the equipment is operated up to its maximum working radius in the work zone.

If you determine that part of the crane, load, or load line could come closer to the power line than the required minimum clearance distance (either 20 feet or the Table A clearance), you must either **deenergize and ground** the line or take specified steps to **maintain the required minimum clearance distance**. These options will now be discussed.

**DEENERGIZE AND GROUND:** Deenergizing and visibly grounding the line will protect against electrocution and avoid the need for additional precautions. However, the employer must rely on the power line’s owner or operator to take these steps, and utilities are generally unwilling to deenergize their lines because doing so will cut off service to their customers. As a result, this precaution will usually not be available. **You must assume that all power lines are energized unless the utility owner/operator confirms**

**that the power line has been and continues to be deenergized and the line is visibly grounded at the worksite.**

**STEPS YOU MUST TAKE TO MAINTAIN THE REQUIRED MINIMUM CLEARANCE DISTANCE:** You must take **all of** the following steps.

- Conduct a planning meeting with the crane operator and the other workers who will be in the area of the equipment or load to review the location of the power line(s), and the steps that will be implemented to prevent encroachment/electrocution.
- If tag lines are used, they must be non-conductive.
- Erect and maintain an elevated warning line, barricade, or line of signs equipped with flags or similar high-visibility markings at the minimum clearance distance. If the operator cannot see the elevated warning line, a dedicated spotter must be used to signal the operator that the crane is passing the marked line.

In addition, you must use at least **one** of the following precautions:

- A dedicated spotter (a worker whose only duty is to observe the clearance between the equipment and the line) who is in continuous contact with the operator.
- A proximity alarm set to give the operator sufficient warning to prevent encroachment.
- A device that automatically warns the operator when to stop movement, such as a range control warning device. Such a device must be set to give the operator sufficient warning to prevent encroachment.
- A device that automatically limits the crane's range of movement, set to prevent encroachment.
- An insulating link/device installed between the end of the load line and the load.

**If you use a dedicated spotter**, the dedicated spotter must be able to judge the distance between the equipment and the line and inform the operator if the equipment is getting too close to the line. Therefore, the spotter must:

- Be equipped with a visual aid (such as a clearly visible line painted on the ground or a clearly visible line of stanchions) to assist in identifying the minimum clearance distance.
- Be positioned to effectively gauge the clearance distance.

- Where necessary, use equipment that enables the spotter to communicate directly with the operator.
- Give timely information to the operator so that the required clearance distance can be maintained.
- Be trained to be able to perform his/her duties effectively.

**OPERATION BELOW POWER LINES GENERALLY PROHIBITED:** No part of the equipment, load line, or load (including rigging and lifting accessories) is allowed below a power line unless:

- the employer has confirmed that the utility owner/operator has deenergized and visibly grounded the power line at the worksite, **or**
- the highest point of the equipment's boom, even if completely extended and vertical, will be more than the required minimum distance from the power line.

**EMPLOYEE TRAINING:** If the equipment contacts a power line, death or injury may be avoided if the workers in and on the crane know and understand the steps they can take to protect themselves. In general, the crane operator and any other person on the crane will be safe as long as they remain on the crane. The greatest danger is faced by a person who simultaneously touches both the crane and the ground, but a person who is near, but not touching, the crane can also suffer electric shock. To ensure that employees have the information they need to protect themselves, you must train each operator and crew member assigned to work with the equipment on how to avoid electrocution in the event the equipment contacts a power line. Such training must include:

- Information regarding the danger of electrocution if a person simultaneously touches the equipment and the ground.
- The importance to the operator's safety of remaining inside the cab except where there is an imminent danger of fire, explosion, or other emergency that necessitates leaving the cab.
- The safest means of evacuating from equipment that may be energized.
- The danger of the potentially energized zone around the equipment (step potential).
- The need for crew in the area to avoid approaching or touching the equipment and the load.
- Safe clearance distance from power lines.

- The limitations of an insulating link/device, proximity alarm, and range control (and similar) device, if used.
- How to properly ground equipment and the limitations of grounding.

**ASSEMBLING A CRANE NEAR A POWER LINE:** The precautions described above for crane operations must also be taken when assembling or disassembling a crane near a power line. Under no circumstances may a crane be assembled or disassembled beneath an energized power line.

**PRECAUTIONS FOR MOVING EQUIPMENT:** A crane traveling with a load must comply with the minimum clearance distance and associated precautions listed above. If the crane is traveling with no load, the following clearance distances must be maintained.

**Table T – Minimum Clearance Distances While Traveling With No Load**

Voltage (nominal, kV, alternating current)	While Traveling – Minimum clearance distance (feet)
up to 0.75	4
over .75 to 50	6
over 50 to 345	10
over 345 to 750	16
Over 750 to 1,000	20
Over 1,000	(as established by the utility owner/operator or registered professional engineer who is a qualified person with respect to electrical power transmission and distribution)

In determining whether the equipment will maintain the required clearance distance, you must take into account the effects of speed and terrain on the equipment’s movement (including movement of the boom/mast). In addition, if any part of the equipment can get closer than 20 feet to the line, you must use a dedicated spotter to observe the clearance and signal the operator in order to keep the required minimum clearance.

## **LIMITED EXCEPTION TO MANDATORY MINIMUM CLEARANCE**

In some circumstances, it is impossible to perform a required lift while staying the required minimum distance from a power line. The standard provides a limited exception for such circumstances that allows operations closer than the minimum distance. However, it requires additional precautions due to the extreme danger of operating so close to a power line.

Before using this exception, you must determine that specific work required to complete the project cannot be performed while maintaining the Table A clearance. In making this determination, you must consider whether an alternative method of performing the lift, such as repositioning the crane or the load, will enable you to maintain the required minimum distance. If you have decided that it is absolutely necessary to operate closer than the required minimum distance, you must consult the utility that owns or operates the line to determine whether it is feasible to deenergize and ground or relocate the line. Only if deenergizing/grounding or relocation is not feasible may you operate closer than the Table A distance to an energized line. In such a case, you must take the following precautions to protect workers:

**FIRST: DETERMINE AN ABSOLUTE MINIMUM CLEARANCE:** You must have the power line owner/operator or a registered professional engineer who is a qualified person with respect to electrical power transmission and distribution determine the minimum clearance distance that must be maintained to prevent electrical contact in light of the on-site conditions. The factors that must be considered in making this determination include, but are not limited to: conditions affecting atmospheric conductivity; time necessary to bring the equipment, load line, and load (including rigging and lifting accessories) to a complete stop; wind conditions; degree of sway in the power line; lighting conditions; and other conditions affecting the ability to prevent electrical contact.

**SECOND: HOLD A PLANNING MEETING:** You must hold a planning meeting with the utility owner/operator (or registered professional engineer who is a qualified person with respect to electrical power transmission and distribution) to determine the procedures that will be followed to prevent electrical contact and electrocution.

**THIRD: USE PROTECTIVE PROCEDURES:** The procedures required by the standard and any additional procedures developed at the planning meeting must be followed. The following procedures are required by the standard and **must be followed without exception:**

- If the power line is equipped with a device that automatically reenergizes the circuit in the event of a power line contact, before the work begins, the automatic reclosing feature of the circuit interrupting device must be made inoperative if the design of the device permits.
- A dedicated spotter who is in continuous contact with the operator must be used to ensure that the equipment does not breach the minimum clearance. The requirements for a dedicated spotter are discussed above.
- An elevated warning line, or barricade (not attached to the crane), in view of the operator (either directly or through video equipment), equipped with flags or similar high-visibility markings, must be erected.

- An insulating link/device must be installed at a point between the end of the load line (or below) and the load. (NOTE: certain safety procedures or devices may be substituted for a Nationally Recognized Testing Laboratory-approved insulating link during an interim time period. Refer to section 1926.1410(d)(4)(iv) and (v) of the standard for details)
- All employees who may come in contact with the equipment, the load line, or the load (except operators located on the equipment) must be insulated or guarded from the equipment, the load line, and the load by wearing insulating gloves rated for the voltage involved or using another effective means of insulating them from the equipment.
- Nonconductive rigging must be used.
- If the equipment is equipped with a device that automatically limits range of movement, it must be used and set to prevent any part of the equipment, load line, or load (including rigging and lifting accessories) from breaching the minimum approach distance.
- Any tag line that is used must be of the nonconductive type.
- Barricades forming a perimeter at least 10 feet away from the equipment must be erected to prevent unauthorized personnel from entering the work area. In areas where obstacles prevent the barricade from being at least 10 feet away, the barricade must be as far from the equipment as feasible.
- Workers other than the operator must be prohibited from touching the load line above the insulating link/device and crane. The operator is excluded from this requirement because, while on the equipment, the operator is, in effect, touching the load line above the insulating link/device. However, if the operator is remotely operating the equipment from the ground, he/she must use either wireless controls that isolate the operator from the equipment or insulating mats that insulate the operator from the ground.
- Only personnel essential to the operation are permitted in the area of the crane and load.
- The equipment must be properly grounded.
- Insulating line hose or cover-up must be installed by the utility owner/operator except where such devices are unavailable for the line voltages involved.
- Each operator and crew member assigned to work with the equipment must be trained in the topics listed earlier in this section.

**FOURTH: APPOINT A PROJECT DIRECTOR:** You, along with the utility owner/operator (or registered professional engineer) and all other employers involved in the work, must identify one person who will direct the implementation of the procedures. That person must have the authority to stop work at any time to ensure safety.

**FIFTH: RECONSIDER YOUR PLAN IF A PROBLEM ARISES:** The danger of operating a crane close to a power line cannot be overemphasized. Procedures that may appear adequate at the beginning of a job may not be adequate in practice. For example, if electricity arcs from the line to the equipment, whatever precautions are being taken are not sufficient. Therefore, if there is any indication that the procedures being followed are inadequate to protect workers, you must safely stop operations and either develop new, more protective procedures or have the utility owner/operator deenergize and visibly ground or relocate the power line before resuming work.

**SECTION 1412 – INSPECTIONS**  
**(with section 1435(f) (Tower crane inspections) and section 1436(p) (Derricks inspections))**

To ensure that equipment is in a safe condition, the standard requires a variety of inspections. The following inspections are required of all equipment:

- Shift inspections
- Monthly inspections
- Annual inspections
- Shift, monthly, and annual wire rope inspections (if the equipment uses wire rope)

In addition, the following special inspections are required in particular circumstances:

- Post-assembly inspections
- Pre- and post-erection inspections of tower cranes (section 1435(f))
- Equipment used in severe service
- Equipment not in regular use
- Inspections of certain modified equipment
- Inspections of certain repaired/adjusted equipment

As described below, certain inspections must be conducted by a competent person and others by a qualified person. See Section 1401 (Definitions) for an explanation of these terms.

**SHIFT INSPECTIONS:** A competent person must visually inspect the equipment each shift the equipment is used. Taking apart equipment components and booming down is not required as part of this inspection unless the results of the visual inspection or trial operation indicate that further investigation necessitating taking apart equipment components or booming down is needed. At a minimum the inspection must include all of the following:

- Control mechanisms for maladjustments interfering with proper operation.
- Control and drive mechanisms for apparent excessive wear of components and contamination by lubricants, water or other foreign matter.



- Air, hydraulic, and other pressurized lines for deterioration or leakage, particularly those which flex in normal operation.
- Hydraulic system for proper fluid level.
- Hooks and latches for deformation, cracks, excessive wear, or damage such as from chemicals or heat.
- Wire rope reeving for compliance with the manufacturer's specifications.
- Wire rope (see section 1413 for the rules for wire rope inspections).
- Electrical apparatus for malfunctioning, signs of apparent excessive deterioration, or dirt or moisture accumulation.
- Tires (when in use) for proper inflation and condition.
- Ground conditions around the equipment for proper support, including ground settling under and around outriggers/stabilizers and supporting foundations, ground water accumulation, or similar conditions.
- The equipment for level position within the tolerances specified by the equipment manufacturer's recommendations, both before each shift and after each move and setup.
- Operator cab windows for significant cracks, breaks, or other deficiencies that would hamper the operator's view.
- Rails, rail stops, rail clamps and supporting surfaces when the equipment travels on rails.
- Safety devices and operational aids for proper operation.
- For derricks, guys for proper tension (section 1436(p)).
- Deficiencies identified during the most recent annual inspection that the inspector determined must be monitored in the monthly inspections.

If the inspection shows that a safety device (see section 1415 for a list of required safety devices) is not working properly, the equipment must not be used. If it shows that an operational aid (see section 1416 for a list of required operational aids) is not working properly, the equipment may be used for a limited period of time (7 or 30 calendar days depending on the type of operational aid) as long as specified temporary alternative precautions are taken. For the other items covered by the inspection, if the inspector finds any deficiency in an item, he/she must determine if the deficiency is serious enough

to be a safety hazard. If so, the equipment must not be used until the deficiency is corrected. Shift inspections need not be documented.

**MONTHLY INSPECTIONS:** The monthly inspection is the same as a shift inspection for most equipment. For tower cranes, the following additional items must be included (section 1435(f)(4)):

- Tower (mast) bolts and other structural bolts (for loose or dislodged condition) from the base of the tower crane up or, if the crane is tied to or braced by the structure, those above the uppermost brace support.
- The uppermost tie-in, braces, floor supports and floor wedges where the tower crane is supported by the structure, for loose or dislodged components.

**Documentation of monthly inspection:** The following information must be documented and maintained for a minimum of three months by the employer that conducts the inspection:

- The items checked and the results of the inspection.
- The name and signature of the person who conducted the inspection and the date.

**ANNUAL/COMPREHENSIVE INSPECTIONS:** The annual inspection must be conducted by a qualified person and is far more thorough than a shift or monthly inspection. In addition to those items that must be checked during a shift inspection, the annual inspection must include:

- Equipment structure (including the boom and, if equipped, the jib) as follows:
  - Structural members: deformed, cracked, or significantly corroded.
  - Bolts, rivets and other fasteners: loose, failed, or significantly corroded.
  - Welds for cracks.
- Sheaves and drums for cracks or significant wear.
- Parts such as pins, bearings, shafts, gears, rollers and locking devices for distortion, cracks, or significant wear.
- Brake and clutch system parts, linings, pawls, and ratchets for excessive wear.
- Safety devices and operational aids for proper operation (including significant inaccuracies).
- Gasoline, diesel, electric, or other power plants for safety-related problems (such as leaking exhaust and emergency shutdown feature) and conditions, and proper operation.

- Chains and chain drive sprockets for excessive wear of sprockets and excessive chain stretch.
- Travel steering, brakes, and locking devices, for proper operation.
- Tires for damage or excessive wear.
- Hydraulic, pneumatic and other pressurized hoses, fittings, and tubing, as follows:
  - Flexible hose or its junction with the fittings for indications of leaks.
  - Threaded or clamped joints for leaks.
  - Outer covering of the hose for blistering, abnormal deformation, or other signs of failure/impending failure.
  - Outer surface of a hose, rigid tube, or fitting for indications of excessive abrasion or scrubbing.
- Hydraulic and pneumatic pumps and motors, as follows:
  - Performance indicators: unusual noises or vibration, low operating speed, excessive heating of the fluid, low pressure.
  - Loose bolts or fasteners.
  - Shaft seals and joints between pump sections for leaks.
- Hydraulic and pneumatic valves, as follows:
  - Spools: sticking, improper return to neutral, and leaks.
  - Leaks.
  - Valve housing cracks.
  - Relief valves: failure to reach correct pressure (if there is a manufacturer procedure for checking pressure, it must be followed).
- Hydraulic and pneumatic cylinders, as follows:
  - Drifting caused by fluid leaking across the piston.
  - Rod seals and welded joints for leaks.
  - Cylinder rods for scores, nicks, or dents.
  - Case (barrel) for significant dents.
  - Rod eyes and connecting joints: loose or deformed.
- Outrigger or stabilizer pads/floats for excessive wear or cracks.
- Slider pads for excessive wear or cracks.
- Electrical components and wiring for cracked or split insulation and loose or corroded terminations.
- Warning labels and decals originally supplied with the equipment by the manufacturer or otherwise required under this standard: missing or unreadable.
- Originally equipped operator seat (or equivalent): missing.

- Operator seat: unserviceable.
- Originally equipped steps, ladders, handrails, or guards: missing.
- Steps, ladders, handrails, or guards: in unusable/unsafe condition.
- For tower cranes, all turntable and tower bolts must be inspected for proper condition and torque (section 1435(f)).
- For derricks, gudgeon pins for cracks, wear, and distortion, and foundation supports for continued ability to sustain the imposed loads (section 1436(p)).

If necessary, disassembly is required to complete the annual inspection. Also, the inspection must include functional testing to determine that the equipment as configured in the inspection is functioning properly.

**Corrective action:** If the qualified person who conducts the inspection identifies any deficiency in any of the items inspected and determines that the deficiency constitutes a safety hazard, the equipment must be taken out of service until the deficiency is corrected. (See the discussion above under shift inspections for the corrective action required if an operational aid is not working properly). If the qualified person determines that, though not presently a safety hazard, the deficiency needs to be monitored, the employer must ensure that the deficiency is checked in the monthly inspections.

**Documentation of annual/comprehensive inspection.** The following information must be documented, maintained, and retained for a minimum of 12 months, by the employer that conducts the inspection:

- The items checked and the results of the inspection.
- The name and signature of the person who conducted the inspection and the date.

**POST-ASSEMBLY INSPECTIONS:** Before the equipment can be used, it must be inspected by a qualified person to ensure that it is configured in accord with manufacturer equipment criteria. This qualified person may be the A/D director. Where manufacturer equipment criteria are unavailable, a qualified person must:

- Determine if a registered professional engineer (RPE) familiar with the type of equipment involved is needed to develop criteria for the equipment configuration. If an RPE is not needed, the employer must ensure that the criteria are developed by the qualified person. If an RPE is needed, the employer must ensure that they are developed by an RPE.
- Determine if the equipment meets these criteria before the equipment is used.

**PRE- AND POST-ERECTION INSPECTION OF TOWER CRANES (section 1435(f)):** Tower crane components must be inspected by a qualified person before being erected for damage or excessive wear. The qualified person must pay particular attention to components that will be difficult to inspect thoroughly during shift inspections.

If the qualified person determines that a component is damaged or worn to the extent that it would create a safety hazard if used on the crane, that component must not be erected on the crane unless it is repaired and, upon reinspection by the qualified person, found to no longer create a safety hazard. If the qualified person determines that, though not presently a safety hazard, the component needs to be monitored, the employer must ensure that the component is checked in the monthly inspections. Any such determination must be documented, and the documentation must be available to any individual who conducts a monthly inspection.

In addition to the other requirements listed above for post-assembly inspections, the following requirements must be met:

- A load test using certified weights, or scaled weights using a certified scale with a current certificate of calibration, must be conducted after each erection.
- The load test must be conducted in accord with the manufacturer's instructions when available. Where these instructions are unavailable, the test must be conducted in accord with written load test procedures developed by a registered professional engineer familiar with the type of equipment involved.

**SEVERE SERVICE INSPECTIONS:** Where the severity of use/conditions is such that there is a reasonable probability of damage or excessive wear (such as loading that may have exceeded rated capacity, shock loading that may have exceeded rated capacity, or prolonged exposure to a corrosive atmosphere), the employer must stop using the equipment and a qualified person must:

- Inspect the equipment for structural damage to determine if the equipment can continue to be used safely.
- In light of the use/conditions determine whether any items/conditions that must be inspected during an annual inspection need to be inspected; if so, the qualified person must inspect those items/conditions.

**INSPECTION OF EQUIPMENT NOT IN REGULAR USE:** Equipment that has been idle for 3 months or more must be inspected by a qualified person in accord with the requirements for monthly inspections before being used.

**INSPECTION OF MODIFIED EQUIPMENT:** Equipment that has had modifications or additions which affect the safe operation of the equipment (such as modifications or additions involving a safety device or operational aid, critical part of a control system, power plant, braking system, load-sustaining structural components, load hook, or in-use

operating mechanism) or capacity must be inspected by a qualified person after such modifications/additions have been completed, prior to initial use. Note that, under section 1434, any such modification/addition must be approved by either the manufacturer or a registered professional engineer. The inspection must assure that the modifications or additions have been made in accord with that approval and must include functional testing of the equipment.

**INSPECTION OF REPAIRED/ADJUSTED EQUIPMENT:** Equipment that has had a repair or adjustment that relates to safe operation (such as a repair or adjustment to a safety device or operator aid, or to a critical part of a control system, power plant, braking system, load-sustaining structural components, load hook, or in-use operating mechanism) must be inspected by a qualified person after such a repair or adjustment has been completed, prior to initial use. The qualified person must determine if the repair/adjustment meets manufacturer equipment criteria (where applicable and available). Where manufacturer equipment criteria are unavailable or inapplicable, the qualified person must determine if a registered professional engineer (RPE) is needed to develop criteria for the repair/adjustment. If an RPE is not needed, the employer must ensure that the criteria are developed by the qualified person. If an RPE is needed, the employer must ensure that the criteria are developed by the RPE. The inspection must determine if the repair/adjustment meets the criteria developed by the RPE or qualified person and must include functional testing.

## SECTION 1413 – WIRE ROPE INSPECTION

Wire rope must be inspected as part of the shift, monthly, and annual inspections required by section 1412. The shift and monthly inspections must evaluate all rope that is visible during the shift in which the inspection is conducted. The annual inspection must include the entire length of the rope.

The shift and monthly inspections must pay particular attention to the following:

- Rotation resistant wire rope in use.
- Wire rope being used for boom hoists and luffing hoists, particularly at reverse bends.
- Wire rope at flange points, crossover points, and repetitive pickup points on drums.
- Wire rope at or near terminal ends.
- Wire rope in contact with saddles, equalizer sheaves, or other sheaves where rope travel is limited.

In addition to these items, the annual inspection must include:

- Those sections that are normally hidden during shift and monthly inspections.
- Wire rope subject to reverse bends.
- Wire rope passing over sheaves.

You must take certain action if an inspection reveals a defect in the rope. Some defects require either that the rope be removed from service or the damaged section be severed. For others, the inspector must evaluate whether the defect constitutes a safety hazard, with the corrective action depending on the outcome of the evaluation. Note that, if a wire rope must be repaired or replaced, either the equipment (as a whole) or the hoist with that wire rope must be tagged-out during the repair/replacement process.

**SEVERING WIRE ROPE:** Where severing the rope is permitted, the section that is damaged must be discarded. Two undamaged sections may not be spliced to make a longer rope. If the undamaged part that remains is too short for the drum to have two full wraps of rope when the load and/or boom is in its lowest position, the rope cannot be used and must be replaced.

**ELECTRICAL CONTACT WITH POWER LINE:** Wire rope that has made electrical contact with a power line (either by the rope, the equipment, or the load

contacting the line) must be immediately removed from service even if no damage is visible. The rope may have suffered internal damage that cannot be repaired.

**DEFECTS THAT REQUIRE REMOVAL FROM SERVICE OR SEVERING:**

The following defects require that the rope either be removed from service or the defective part severed.

- Visible broken wires, as follows:
  - In running wire ropes: six randomly distributed broken wires in one rope lay, or three broken wires in one strand in one rope lay, where a rope lay is the length along the rope in which one strand makes a complete revolution around the rope.
  - In rotation resistant ropes: two randomly distributed broken wires in six rope diameters, or four randomly distributed broken wires in 30 rope diameters.
  - In pendants or standing wire ropes: more than two broken wires in one rope lay located in rope beyond end connections, or more than one broken wire in a rope lay located at an end connection.
- A diameter reduction of more than 5% from nominal diameter.
- In rotation resistant wire rope, core protrusion or other distortion indicating core failure.
- A broken strand.

**Exception:** If the wire rope manufacturer has approved different criteria for visible broken wires or diameter reduction, you may follow those criteria instead of those above.

**DEFECTS THAT REQUIRE EVALUATION:** The following defects must be evaluated by the inspector to determine whether they constitute a safety hazard:

- Significant distortion of the wire rope structure such as kinking, crushing, unstranding, birdcaging, signs of core failure, or steel core protrusion between the outer strands.
- Significant corrosion.
- Electric arc damage (from a source other than power lines) or heat damage.
- Improperly applied end connections.
- Significantly corroded, cracked, bent, or worn end connections (such as from severe service).



***If these defects are found to be hazardous:*** The rope must be removed from service or the defective part severed.

***If they are not found to be an immediate hazard:*** You may continue to use the rope. However, if such a defect is identified during an annual inspection, you must check it during each monthly inspection. Note that this may require a more complete monthly inspection than would otherwise be required because the annual inspection must cover the entire rope and may reveal a defect in a part of the rope that would not normally be visible during a shift or monthly inspection.

## SECTION 1414 – WIRE ROPE – SELECTION AND INSTALLATION CRITERIA

This section requires that wire rope be used in accord with the recommendations of the wire rope manufacturer, the equipment manufacturer, or a qualified person. It establishes a classification system for rotation resistant rope and specifies design factors for the different classes of such rope.

**ROPE CLASSIFICATION:** Wire rope is classified as either “standard rope” or “rotation resistant rope.” Rotation resistant rope, in turn, can be constructed in various ways, and the standard lists three different “Types” that vary in their construction.

For all three types, rotation resistant rope’s internal design resists twisting better than standard rope. Rotation resistant rope therefore enables better control of the load because it tends to keep the load from rotating while it is being hoisted or suspended. However, the design of rotation resistant rope makes it more susceptible to internal damage than standard rope and such internal damage can be hard to detect. Because of the chance of hidden damage, this section restricts the use of rotation resistant rope for boom hoist reeving and duty cycle/repetitive lifts.

**Boom hoist reeving:** Rotation resistant rope may only be used for boom hoist reeving when load hoists are used as boom hoists for attachments such as luffing attachments or boom and mast attachment systems. When you use rotation resistant rope for such a purpose, you must comply with six conditions specified in section 1414(e)(4)(ii).

**Duty cycle/repetitive lifts:** You must meet certain criteria when using rotation resistant rope for duty cycle and repetitive lifts. These are defined as follows:

**Duty Cycle:** A type of crane service in which bulk material is transferred from one point to another by rapidly lifting, swinging, booming, and placing the material. Typical types of duty cycle service are dragline, clamshell, grapple, and magnet. This type of service is differentiated from standard crane “lift service” in that cycle times are very short and continuous, often less than 1 minute per load, and loads are lifted and placed in general areas rather than precise positions to permit such rapid cycles.

**Repetitive lifts:** A continuous operation with loads that may vary in size and weight.

The requirements for using rotation resistant rope for duty cycle and repetitive lifts vary with the type of rotation resistant rope being used and the operating design factor of the rope. If you are using rotation resistant rope for one of these purposes, check the standard for the criteria that apply to the type of rope you are using.

Section 1414 also contains the following requirements:

- Wire rope clips used in conjunction with wedge sockets must be attached to the unloaded dead end of the rope only, except that the use of devices specifically designed for dead-ending rope in a wedge socket is permitted.
- Socketing must be done in the manner specified by the manufacturer of the wire rope or fitting.
- Prior to cutting a wire rope, seizings must be placed on each side of the point to be cut. The length and number of seizings must be in accord with the wire rope manufacturer's instructions.

## SECTIONS 1415 (SAFETY DEVICES) & 1416 (OPERATIONAL AIDS)

These sections require that cranes/derricks be equipped with certain types of safety equipment. Some types are called safety devices, while others are called operational aids. Safety devices must be in proper working order for the equipment to be permitted to operate. If an operational aid is not working properly, the equipment may still be operated for a limited time as long as certain alternative precautions are taken.

Note that section 1412 requires that safety devices and operational aids must be checked for proper operation during all shift inspections.

**Safety devices and operational aids must not be used as a substitute for the exercise of professional judgment by the operator.**

**SAFETY DEVICES:** The following safety devices are required on all equipment unless otherwise specified:

- **Crane level indicator** (except on portal cranes, derricks, floating cranes/derricks and land cranes/derricks on barges, pontoons, vessels or other means of flotation).
- **Boom stops** (except for derricks and hydraulic booms).
- **Jib stops** (if a jib is attached), except for derricks.
- **Locks** on foot pedal brakes.
- **Integral holding device/check valve** on hydraulic outrigger jacks and hydraulic stabilizer jacks.
- **Rail clamps and rail stops** for equipment on rails (except portal cranes).
- **Horn** (either built into the equipment or on the equipment and immediately available to the operator).

**OPERATIONAL AIDS:** These are divided into two categories that differ in the amount of time the equipment may operate before they are repaired. **While an operational aid is not working properly, the temporary alternative measures specified in the standard must be taken.** Category I aids must be repaired within 7 calendar days after a deficiency occurs, while equipment may operate for 30 calendar days before a Category II aid is repaired. In both cases, additional time is permitted if a necessary part is ordered in a timely manner but is not received within the 7- or 30-day period.

Certain operational aids are only required on equipment manufactured after a specified date. In some cases, these are past dates that reflect when these devices began to be installed on equipment. In other cases, they are future dates that are intended to give manufacturers time to install the devices on new equipment.

#### **CATEGORY I OPERATIONAL AIDS:**

- **Boom hoist limiting device** (required on equipment manufactured after December 16, 1969).
- **Luffing jib limiting device.**
- **Automatic anti two-blocking device** (required on telescopic boom cranes manufactured after February 28, 1992; lattice boom cranes manufactured after November 8, 2011; derricks manufactured after November 8, 2011; articulating cranes equipped with a load hoist manufactured after December 31, 1999; digger derricks manufactured after November 8, 2011).
- **Automatic or warning-type anti two-blocking device** (required on lattice boom cranes manufactured after February 28, 1992 and before November 8, 2011).

**Note:** Two-block protection is not required for lattice boom equipment used for dragline, clamshell (grapple), magnet, drop ball, container handling, concrete bucket, marine operations that do not involve hoisting personnel, and pile driving work.

## CATEGORY II OPERATIONAL AIDS:

- **Boom angle or radius indicator** (required on all equipment, except digger derricks manufactured before November 9, 2010).
- **Jib angle indicator if the equipment has a luffing jib.**
- **Boom length indicator if the equipment has a telescopic boom** (unless the rated capacity is independent of the boom length).
- **Load weighing and similar devices** (required on equipment (other than derricks, articulating cranes, and digger derricks manufactured before November 8, 2011) manufactured after March 29, 2003 with a rated capacity over 6,000 pounds).
- **Automatic overload prevention device, load weighing device, load moment (or rated capacity) indicator, or load moment (rated capacity) limiter** (required on articulating cranes manufactured after November 8, 2011).
- **Outrigger/stabilizer position (horizontal beam extension) sensor/monitor if the equipment has outriggers or stabilizers** (required on equipment manufactured after November 8, 2011).
- **Hoist drum rotation indicator if the equipment has a hoist drum not visible from the operator's station** (required on equipment manufactured after November 8, 2011).

**NOTE:** Articulating cranes need not be equipped with boom angle or radius indicators, jib angle indicators, or boom length indicators.

## SECTION 1417 – OPERATION

This section contains a number of requirements that are designed to prevent dangerous conditions during crane operations.

**COMPLIANCE WITH RATED CAPACITY:** One of the most serious hazards that cranes present is collapse of the equipment caused by exceeding the crane’s rated capacity. The term “rated capacity” is defined in section 1401, and that definition reads:

***Rated capacity* means the maximum working load permitted by the manufacturer under specified working conditions. Such working conditions typically include a specific combination of factors such as equipment configuration, radii, boom length, and other parameters of use.**

The combination of factors that enter into rated capacity is set forth in a load chart that must be on the equipment. In general, the load chart states the weight of the load that the crane can lift at different boom radii. The longer the radius at which the lift occurs, the smaller amount of weight the crane can lift.

**You must not operate a crane in excess of its rated capacity. Some crane users believe they can safely exceed the rated capacity because the manufacturer includes a safety factor in the load chart. However, any safety factor included by the manufacturer is not intended to be treated as excess capacity. It is included because a variety of variable worksite conditions, such as swinging of the load caused by wind or other factors, can reduce the capacity of the crane from that which exists under ideal conditions.**

To comply with the rated capacity, the weight of the load must be known. Before beginning a lift, you must determine the load weight by a reliable means.

**OTHER MANUFACTURER PROCEDURES:** In addition to complying with the rated capacity, you must comply with all other manufacturer procedures applicable to the operation of the equipment. If the manufacturer’s procedures are unavailable, you must comply with procedures that you develop. Procedures for the operational controls must be developed by a qualified person. Procedures related to the capacity of the equipment must be developed and signed by a registered professional engineer familiar with the equipment.

All procedures applicable to the operation of the equipment, including rated capacities (load charts), recommended operating speeds, special hazard warnings, instructions, and operator’s manual, must be readily available in the cab at all times for use by the operator.

**OPERATOR ATTENTION:** The operator must not engage in any practice or activity that diverts his/her attention while actually engaged in operating the equipment, such as the use of a cell phone (except when used for signal communications).

**OPERATOR USUALLY MUST REMAIN AT CONTROLS WHILE THE LOAD IS SUSPENDED:** An exception is provided for working gear (such as slings, spreader bars, ladders, and welding machines) when the weight of the working gear is negligible compared to the capacity of the equipment and the working gear is not over an entrance or exit. Another exception applies when the load is to be held suspended for a period of time exceeding that of normal lifting operations. See section 1417(e) for the conditions that must be met for this exception to apply.

**TAGGING OUT OF SERVICE EQUIPMENT AND FUNCTIONS.** When the equipment is out of service, a tag must be placed in the cab stating that the equipment is out of service and is not to be used. Where a function is out of service, a tag must be placed in a conspicuous position stating that the function is out of service and is not to be used. The equipment or function may not be used until the tag is removed by an authorized person.

**PRECAUTIONS DURING STARTUP:** Before starting the engine, the operator must verify that all controls are in the proper starting position and that all personnel are in the clear.

**BAD WEATHER PRECAUTIONS:** When a local storm warning has been issued, the competent person must determine whether it is necessary to implement manufacturer recommendations for securing the equipment. The competent person must adjust the equipment and/or operations to address the effect of wind, ice, and snow on equipment stability and rated capacity.

**SIDELOADING PROHIBITED:** The equipment must not be used to drag or pull loads sideways.

**BRAKE TEST:** The operator must test the brakes each time a load that is 90% or more of the maximum line pull is handled by lifting the load a few inches and applying the brakes. In duty cycle and repetitive lifts where each lift is 90% or more of the maximum line pull, this requirement applies to the first lift but not to successive lifts.

**PROTECTION AGAINST ROPE DETACHMENT:** To prevent rope from becoming detached from a drum, neither the load nor the boom must be lowered below the point where less than two full wraps of rope remain on their respective drums.

**TRAVELING WITH A LOAD:** Traveling with a load is prohibited if the practice is prohibited by the manufacturer. Where it is not prohibited, you must take precautions to prevent hazardous movement of the load and avoid excessive movement of the load that could overload the crane.



## **SECTION 1418 – AUTHORITY TO STOP OPERATION**

This section provides that, whenever there is a concern about safety, the operator must have the authority to stop and refuse to handle loads until a qualified person has determined that safety has been assured.

## SECTIONS 1419-1422 – SIGNALS

A crane operator often needs a second set of eyes, in the form of a signal person, to be able to operate safely. These sections state when a signal person must be provided and the types of signals that are allowed. The qualifications the signal person must possess are specified in section 1428 (Signal person qualifications).

**WHEN A SIGNAL PERSON IS NEEDED:** In each of the following situations, a signal person must be provided:

- When the point of operation, meaning the path the load travels or the area where the load is placed, is not in full view of the operator.
- When the equipment is traveling and the operator's view in the direction of travel is obstructed.
- When, due to site-specific safety concerns, either the operator or the person handling the load determines that it is necessary.

During operations requiring signals, the ability to transmit signals between the operator and signal person must be maintained. If that ability is interrupted at any time, the operator must safely stop operations until signal transmission is reestablished and a proper signal is given and understood.

Only one person may give signals to a crane/derrick at a time, except that any person may give an emergency stop signal.

**TYPES OF SIGNALS:** Hand, voice, audible, or new signals are allowed. The type of signals used and means of transmitting the signals to the operator (such as direct line of sight, video, radio, etc.), must be appropriate for the site conditions. All directions given to the operator by the signal person must be given from the operator's perspective.

**HAND SIGNALS:** When using hand signals, the Standard Method must be used.

***Exception:*** Where an operation or use of an attachment is not covered in the Standard Method or the use of the Standard Method is otherwise infeasible, non-standard hand signals may be used. When using non-standard hand signals, the signal person, operator, and lift director (where there is one) must contact each other prior to the operation and agree on the non-standard hand signals that will be used. Hand signal charts must be either posted on the equipment or conspicuously posted in the vicinity of the hoisting operation.

**VOICE SIGNALS:** These are signals given by oral communication, with or without amplification or electronic transmission. If this type of signal is used, the operator, signal person, and lift director (if there is one) must, before beginning operations, contact each other and agree on the voice signals that will be used. In most cases where voice signals

are given, some type of electronic transmission and reception will be used. When this is the case:

- The device(s) used to transmit signals must be tested on site before beginning operations to ensure that the signal transmission is effective, clear, and reliable.
- Signal transmission must be through a dedicated channel, except:
  - Multiple cranes/derricks and one or more signal persons may share a dedicated channel for the purpose of coordinating operations.
  - Where a crane is being operated on or adjacent to railroad tracks, and the actions of the crane operator need to be coordinated with the movement of other equipment or trains on the same or adjacent tracks.
- The operator's reception of signals must be by a hands-free system.

**AUDIBLE SIGNALS:** These are signals made by a distinct sound or series of sounds, such as sounds made by a bell, horn, or whistle. As with other types of signals, the signal person and operator must clearly understand the meaning of the signals being used.

**NEW SIGNALS:** The standard allows room for development of new signal technology by permitting signals other than hand, voice, or audible signals to be used where the employer demonstrates that:

- The new signals provide at least equally effective communication as voice, audible, or Standard Method hand signals, or
- The new signals comply with a national consensus standard that provides at least equally effective communication as voice, audible, or Standard Method hand signals.

## SECTION 1423 – FALL PROTECTION

Falls from dangerous heights can occur when employees work on boom sections during assembly/disassembly, when employees are gaining access to and from their work stations, or at other times when employees are working at elevations, as on tower crane walkways. The provisions of this section are designed to protect employees who work on elevated parts of equipment from falling.

OSHA's general fall protection standard for construction work, 29 CFR 1926 subpart M, only applies to work on cranes when this section explicitly refers to a provision in that subpart.

**BOOM WALKWAYS:** When lattice boom cranes are assembled and disassembled, it is sometimes necessary for employees to walk and work on the boom sections to install and remove pins or for other purposes. To provide them with a safer surface on which to walk and work, certain booms manufactured after November 8, 2011 must have built-in walkways. The booms that must be equipped with walkways are those more than six feet from cord centerline to cord centerline. The walkways must be at least 12 inches wide and need not be protected by guardrails, railings, or other permanent fall protection attachments.

**STEPS, HANDHOLDS, LADDERS, GRABRAILS, GUARDRAILS AND RAILINGS:** If the equipment was originally equipped with these devices, you must maintain them in good condition. However, the standard does not require existing equipment to be retrofitted with these devices.

Equipment manufactured after November 8, 2011 must be equipped to provide safe access and egress between the ground and the operator work station(s), including the forward and rear positions, by the provision of these types of devices. Walking/stepping surfaces, except for crawler treads, must have slip-resistant features/properties (such as diamond plate metal, strategically placed grip tape, expanded metal, or slip-resistant paint).

**FALL PROTECTION DURING NON-ASSEMBLY/DISASSEMBLY WORK:** As the employer, you must provide and ensure the use of fall protection equipment for employees who are on a walking/working surface with an unprotected side or edge more than 6 feet above a lower level as follows:

- When moving point-to-point:
  - On non-lattice booms (whether horizontal or not horizontal).
  - On lattice booms that are not horizontal.
  - On horizontal lattice booms where the fall distance is 15 feet or more.
- While at a work station on any part of the equipment (including any type of boom), except when the employee is at or near draw-works when the equipment is running, in the cab, or on the deck.

**FALL PROTECTION DURING ASSEMBLY/DISASSEMBLY WORK:** You must provide and ensure the use of fall protection equipment for employees who are on a walking/working surface with an unprotected side or edge more than 15 feet above a lower level, except when the employee is at or near draw-works when the equipment is running, in the cab, or on the deck.

**ANCHORAGE:** Fall protection must be anchored to an apparently substantial part of the equipment that would meet the criteria in 29 CFR 1926 subpart M. A personal fall arrest system may be anchored to the crane/derrick's hook (or other part of the load line) where all of the following requirements are met:

- A qualified person has determined that the set-up and rated capacity of the crane/derrick (including the hook, load line, and rigging) meets or exceeds the requirements in 29 CFR 1926 subpart M.
- The equipment operator must be at the work site and informed that the equipment is being used for this purpose.
- No load is suspended from the load line when the personal fall arrest system is anchored to the crane/derrick's hook (or any other part of the load line).

## SECTION 1424 – WORK AREA CONTROL

This section is designed to protect employees who work near a crane from being struck or crushed by the crane's rotating superstructure. To prevent employees from entering an area where they could be struck/crushed, you must:

- Train each employee assigned to work on or near the equipment in how to recognize struck-by and pinch/crush hazard areas posed by the rotating superstructure.
- Erect and maintain control lines, warning lines, railings, or similar barriers to mark the boundaries of the hazard areas. *Exception:* When you can demonstrate that it is neither feasible to erect such barriers on the ground nor on the equipment, the hazard areas must be clearly marked by a combination of warning signs (such as “Danger – Swing/Crush Zone”) and high visibility markings on the equipment that identify the hazard areas. In addition, you must train each employee to understand what these markings signify.

Before an employee goes to a location in the hazard area that is out of view of the operator, the employee (or someone instructed by the employee) must ensure that the operator is informed that he/she is going to that location. Where the operator knows that an employee went to such a location, the operator must not rotate the superstructure until the operator is informed in accord with a pre-arranged system of communication that the employee is in a safe position.

## SECTION 1425 – KEEPING CLEAR OF THE LOAD

This section seeks to protect employees against being struck by a moving or falling load.

**SAFE HOISTING ROUTES:** Where available, hoisting routes that minimize the exposure of employees to hoisted loads must be used, to the extent consistent with public safety.

**STATIONARY SUSPENDED LOADS:** While the operator is not moving a suspended load, no employee may be within the fall zone, except for employees:

- Engaged in hooking, unhooking, or guiding the load;
- Engaged in the initial attachment of the load to a component or structure; or
- Operating a concrete hopper or concrete bucket.

**HOOKING, UNHOOKING, OR GUIDING THE LOAD:** When employees in the fall zone are engaged in hooking, unhooking, or guiding the load, or are connecting a load to a component or structure, all of the following criteria must be met:

- The materials being hoisted must be rigged to prevent unintentional displacement.
- Hooks with self-closing latches or their equivalent must be used. *Exception:* “J” hooks may be used for setting wooden trusses so that a worker need not go onto the truss to open the hook.
- The materials must be rigged by a qualified rigger.

**RECEIVING A LOAD:** Only employees needed to receive a load are permitted to be within the fall zone when a load is being landed.

**TILT-UP OR TILT-DOWN OPERATION:** During a tilt-up or tilt-down operation:

- No employee may be directly under the load.
- Only employees essential to the operation are permitted in the fall zone (but not directly under the load). Such employees include those who must be in the fall zone to guide the load, monitor the load’s movement, or attach and/or detach the load.

## SECTION 1426 – FREE FALL AND CONTROLLED LOAD LOWERING

**FREE FALL GENERALLY PROHIBITED:** Some older cranes are designed with a “live boom,” where the rate of lowering the boom can only be controlled by a brake. Failure of the brake can lead to free fall of the boom and a risk of death or serious injury to workers near the crane. This standard prohibits the use of equipment with a live boom unless:

- The equipment was manufactured before October 31, 1984, or
- The equipment is a floating crane/derrick or a land crane/derrick on a vessel/flotation device.

**FREE FALL SPECIFICALLY PROHIBITED:** Even in the two situations where the equipment may have a live boom, the equipment may not be used in the following circumstances:

- An employee is in the fall zone of the boom or load.
- An employee is being hoisted.
- The load or boom is directly over a power line, or over any part of the area extending the Table A of § 1926.1408 clearance distance to each side of the power line; or any part of the area extending the Table A clearance distance to each side of the power line is within the radius of vertical travel of the boom or the load.
- The load is over a shaft, except where there are no employees in the shaft.
- The load is over a cofferdam, except where there are no employees in the fall zone of the boom or the load.
- Lifting operations are taking place in a refinery or tank farm.

**BACKUP PROTECTION:** In the situations listed above where the use of equipment with a live boom is prohibited, the boom hoist must have a secondary mechanism or device designed to prevent the boom from falling in the event the primary system used to hold or regulate the boom hoist fails, as follows:

- Friction drums must have:
  - A friction clutch and, in addition, a braking device, to allow for controlled boom lowering.
  - A secondary braking or locking device, which is manually or automatically engaged, to backup the primary brake while the boom is held (such as a secondary friction brake or a ratchet and pawl device).



- Hydraulic drums must have an integrally mounted holding device or internal static brake to prevent boom hoist movement in the event of hydraulic failure.
- Neither clutches nor hydraulic motors may be considered brake or locking devices for purposes of this subpart.
- Hydraulic boom cylinders must have an integrally mounted holding device.

**PREVENTING UNCONTROLLED RETRACTION:** Hydraulic telescoping booms must have an integrally mounted holding device to prevent the boom from retracting in the event of hydraulic failure.

**LOAD LINE FREE FALL PROHIBITED.** In each of the following circumstances, controlled load lowering is required and free fall of the load line hoist is prohibited:

- An employee is directly under the load.
- An employee is being hoisted.
- The load is directly over a power line, or over any part of the area extending the Table A of § 1926.1408 clearance distance to each side of the power line; or any part of the area extending the Table A of § 1926.1408 clearance distance to each side of the power line is within the radius of vertical travel of the load.
- The load is over a shaft.
- The load is over a cofferdam, except where there are no employees in the fall zone of the load.

## SECTION 1427 – OPERATOR QUALIFICATION AND CERTIFICATION

This section contains new requirements designed to ensure that crane operators have the knowledge and skills they need to operate safely. **After November 10, 2014, operators of most equipment covered by the standard must be qualified or certified by, or under the scrutiny of, a third party other than the operator’s employer.** An exception is provided for operators-in-training, who may operate equipment with certain limitations until they can become qualified or certified.

A few types of equipment are **not** covered by this requirement. They are:

- Derricks
- Sideboom cranes
- Equipment with a rated hoisting/lifting capacity of 2,000 pounds or less.

The rule uses the word “**certification**” to describe a process whereby an operator passes both written and practical tests administered by an accredited testing organization. The rule uses the term “**qualification**” in describing three other options: (1) qualification by an audited employer program; (2) qualification by the U.S. Military (limited to employees of the Department of Defense or members of the Armed Forces); and (3) licensing by a government entity. If you are working in a jurisdiction that requires a state or local crane license and the licensing process meets the requirements of this standard, your operator **must** obtain such a license.

The following questions and answers contain additional information you need to know to comply with the qualification/certification requirement:

**QUESTION 1:** Is there anything I must do before November 10, 2014?

**ANSWER 1:** Yes. As in the past, you must ensure that equipment operators are competent to operate the equipment safely. If an employee assigned to operate machinery does not have the required knowledge or ability to operate the equipment safely, you must train that employee prior to allowing him or her to operate the equipment and must evaluate the operator to confirm that he/she understands the information provided in the training. In addition, both before and after November 10, 2014, you must ensure that operators of derricks, sideboom cranes, and equipment rated at 2,000 pounds or less are competent to operate the equipment safely.

In addition, if you are working in a jurisdiction that has a state or local certification or licensing requirement that is effective before November 10, 2014, you must comply with that requirement if the certification or licensing process meets the requirements of this standard.

**QUESTION 2:** Who can certify a crane operator?

**ANSWER 2:** A valid certification can only be issued by an “accredited crane operator testing organization.” To qualify for this title, the testing organization must be accredited by a “nationally recognized accrediting agency.” During the rulemaking, OSHA identified two organizations qualified as “nationally recognized accrediting agencies:” the National Commission for Certifying Agencies (NCCA) and the American National Standards Institute (ANSI). These had accredited several testing organizations, and their websites identify the organizations they have accredited. Note that a testing organization’s accreditation must be reviewed at least every three years.

**QUESTION 3:** How long is a certification valid?

**ANSWER 3:** A certification is valid for 5 years. After 5 years, it must be renewed to make sure that the operator’s knowledge and skills are up-to-date.

**QUESTION 4:** Does an operator’s certification mean that the operator is qualified to operate any type of equipment covered by the standard?

**ANSWER 4:** No. An operator is qualified to operate a particular piece of equipment if the operator is certified for that type and capacity of equipment or for higher-capacity equipment of that type. For example, an operator certified for a 100-ton hydraulic crane may operate a 50-ton hydraulic crane but not a 200-ton hydraulic crane. If no accredited testing agency offers certification examinations for a particular type and/or capacity of equipment, an operator is considered to be qualified to operate that equipment if the operator has been certified for the type/capacity that is most similar to that equipment and for which a certification examination is available. The operator’s certificate must state the type/capacity of equipment for which the operator is certified.

**QUESTION 5:** I am planning to lease a crane with an operator. The lease provides that the operator will be certified in accord with OSHA requirements. Can I rely on the leasing company, or do I need to check the operator’s certification card?

**ANSWER 5:** You are responsible for ensuring that the operator is certified. The rule does not specify how you must do that. Personally examining the operator’s certificate may be advisable. If there is any question as to whether the operator’s certification is valid, you should contact the testing organization that issued the certification.

**QUESTION 6:** I plan to hire a new crane operator. An applicant for the job was certified for the equipment by an accredited testing organization while working for another employer. May I rely on that individual’s certification?

**ANSWER 6:** Yes, such a certification is portable. However, as stated above, the certification is valid for only 5 years, after which it must be renewed. A qualification by an audited employer program or by the U.S. military, on the other hand, is not portable.

**QUESTION 7:** Must a candidate for operator certification take a training course before taking the exam?

**ANSWER 7:** No. The standard requires that the certification exam cover certain topics relevant to safe crane operation but does not require any particular type of training. An experienced operator may have the necessary knowledge and skills without further training. However, a number of organizations offer courses that are designed to prepare an individual to take the exam. Even for experienced crane operators, such a course can help update the individual's knowledge and alleviate test-taking anxiety.

**QUESTION 8:** Does OSHA have a list of approved training providers?

**ANSWER 8:** No. OSHA does not evaluate or approve crane operator training courses.

**QUESTION 9:** I am a crane operator who is preparing to take the certification exam. What is the exam like?

**ANSWER 9:** The exam consists of both a written and a practical test. The written test covers, among other topics, (1) the controls and operational/performance characteristics of the equipment; (2) use of, and the ability to calculate (manually or with a calculator), load/capacity information on a variety of configurations of the equipment; (3) procedures for preventing and responding to power line contact; (4) the ground conditions needed to support the equipment and load.

The practical test is conducted with the operator at the controls of the equipment. It requires the operator to demonstrate, among other things, operational and maneuvering skills, the ability to apply load chart information, and the ability to safely shut down and secure the equipment.

**QUESTION 10:** I am fluent in Spanish but not English. Does OSHA require an operator to speak English in order to become certified?

**ANSWER 10:** No. The examination may be administered in any language the operator candidate understands. It may be administered verbally as long as the operator can demonstrate that he/she is literate in the language of the exam and demonstrates the ability to use the type of written manufacturer procedures applicable to the class/type of equipment for which the candidate is seeking certification. The operator's certificate must note the language in which the exam was given, and the employee may only operate a crane that is furnished with materials required by the standard that are written in the language of the certification.

**QUESTION 11:** After November 10, 2014, I plan to train a new employee to be a crane operator. May that employee operate a crane as part of his/her training before becoming certified?

**ANSWER 11:** Yes, an operator-in-training may operate a crane as long as the following conditions are satisfied.

- The employer must provide each operator-in-training with sufficient training prior to operating the equipment to enable the operator-in-training to operate the equipment safely.
- The tasks performed by the operator-in-training while operating the equipment must be within the operator-in-training's ability.
- While operating the equipment, the operator-in-training must be continuously monitored by an individual ("operator's trainer") who meets all of the following requirements:
  - The operator's trainer is an employee or agent of the operator-in-training's employer.
  - The operator's trainer is either a certified operator under this section, or has passed the written portion of a certification test and is familiar with the proper use of the equipment's controls.
  - While monitoring the operator-in-training, the operator's trainer performs no tasks that detract from the trainer's ability to monitor the operator-in-training.
  - For equipment other than tower cranes: the operator's trainer and the operator-in-training must be in direct line of sight of each other. In addition, they must communicate verbally or by hand signals. For tower cranes: the operator's trainer and the operator-in-training must be in direct communication with each other.
- The operator-in-training must be monitored by the operator's trainer at all times, except for short breaks where all of the following are met:
  - The break lasts no longer than 15 minutes and there is no more than one break per hour.
  - Immediately prior to the break the operator's trainer informs the operator-in-training of the specific tasks that the operator-in-training is to perform and limitations to which he/she must adhere during the operator trainer's break.
  - The specific tasks that the operator-in-training will perform during the operator trainer's break are within the operator-in-training's abilities.

- The operator-in-training must not operate the equipment in any of the following circumstances:
  - If any part of the equipment, load line, or load (including rigging and lifting accessories), if operated up to the equipment's maximum working radius in the work zone, could get within 20 feet of a power line that is up to 350 kV, or within 50 feet of a power line that is over 350 kV.
  - If the equipment is used to hoist personnel.
  - In multiple-equipment lifts.
  - If the equipment is used over a shaft, cofferdam, or in a tank farm.
  - In multiple-lift rigging operations, except where the operator's trainer determines that the operator-in-training's skills are sufficient for this high-skill work.

## SECTION 1428 – SIGNAL PERSON QUALIFICATIONS

Each signal person must meet the following qualification requirements:

- Know and understand the type of signals used. If hand signals are used, the signal person must know and understand the Standard Method for hand signals.
- Be competent in the application of the type of signals used.
- Have a basic understanding of equipment operation and limitations, including the crane dynamics involved in swinging and stopping loads and boom deflection from hoisting loads.
- Know and understand the relevant requirements of the sections of the standard dealing with signals.
- Demonstrate that he/she meets these requirements through an oral or written test, and through a practical test.

The employer of the signal person must ensure that the signal person meets these Qualification Requirements through one of the following qualification options:

*Option (1) – Third party qualified evaluator.* The signal person has documentation from a third party qualified evaluator (see section 1401 for definition of “Qualified Evaluator (third party)”) showing that the signal person meets the qualification requirements.

*Option (2) – Employer’s qualified evaluator.* The employer’s qualified evaluator (see section 1401 for definition of “Qualified Evaluator (not a third party)”) and determines that the individual meets the qualification requirements.

The employer must make the documentation for whichever option is used available at the site while the signal person is employed by the employer. Such documentation is considered “available” when it is physically present on the site or retrievable via an on-site computer. The documentation must specify each type of signaling (e.g., hand signals, radio signals, etc.) for which the signal person meets the requirements of paragraph (c) of this section.

If subsequent actions by the signal person indicate that the individual does not meet the qualification requirements, the employer must not allow the individual to continue working as a signal person until retraining is provided and a reassessment is made under one of the two options that confirms that the individual meets the qualification requirements.

## **SECTION 1429 – QUALIFICATIONS OF MAINTENANCE & REPAIR EMPLOYEES**

Improper crane maintenance and repair can lead to dangerous equipment failure. To ensure that maintenance and repair employees are qualified to perform their assigned tasks, this section requires maintenance and repair personnel to meet the definition of a qualified person with respect to the equipment and maintenance/repair tasks they perform. The definition of “qualified person” is found in section 1401.

Some maintenance and repair tasks may require the maintenance and repair personnel to operate the equipment to diagnose a problem or check its operation. Such personnel need not be qualified or certified under section 1427 to operate the equipment as long as the following requirements are met:

- The operation is limited to those functions necessary to perform maintenance, inspect the equipment, or verify its performance, and
- The personnel either:
  - Operate the equipment under the direct supervision of an operator who meets the qualification/certification requirements of section 1427, **or**
  - Are familiar with the operation, limitations, characteristics, and hazards associated with the type of equipment.



## SECTION 1430 – TRAINING

Other sections of this standard require training in specific topics. This section lists the training requirements found in other sections and includes additional training requirements not found elsewhere.

### TRAINING REQUIREMENTS SPECIFIED ELSEWHERE:

- **Overhead powerlines.** (Sections 1408(g) and 1410(m))
- **Signal persons.** (Section 1428(c))
- **Operators.** (See section 1427 for the training required for operators during the four-year transitional period for operator qualification/certification, for operators of equipment that does not require qualification/certification, and for operators-in-training).

### ADDITIONAL TRAINING REQUIREMENTS:

- **Operators.** You must train each equipment operator in the manufacturer's emergency procedures for halting unintended equipment movement and in the following practice: whenever moving a boom off a support, first raise the boom a short distance (sufficient to take the load of the boom) to determine if the boom hoist brake needs to be adjusted or repaired.
- **Competent persons and qualified persons.** You must train each competent person and each qualified person in the requirements of this standard that apply to them.
- **Crush/pinch points.** You must train each employee who works with the equipment to keep clear of holes, crush/pinch points, and the hazards addressed in section 1424 (Work area control).
- **Tag-out.** You must train each operator and each additional employee authorized to start/energize equipment or operate equipment controls (such as maintenance and repair employees) in the tag-out and start-up procedures in sections 1417(f) and (g).

**TRAINING ADMINISTRATION:** You have the following responsibilities with respect to each employee who must be trained under this standard:

- Evaluate each employee to confirm that the employee understands the information provided in the training.

- Provide refresher training in relevant topics for each employee when, based on the conduct of the employee or an evaluation of the employee's knowledge, there is an indication that retraining is necessary.
- Provide the training at no cost to the employee.

## SECTION 1431 – HOISTING PERSONNEL

**HOISTING PERSONNEL IS GENERALLY PROHIBITED:** Cranes and derricks may not be used to hoist employees except where the employer demonstrates that the erection, use, and dismantling of conventional means of reaching the work area, such as a personnel hoist, ladder, stairway, aerial lift, elevating work platform, or scaffold, would be more hazardous, or is not possible because of the project's structural design or worksite conditions.

This section contains stringent criteria to assure the safety of personnel who must be hoisted by a crane or derrick. These criteria are fundamentally the same as those in the prior standard.

**USE OF PERSONNEL PLATFORM:** A personnel platform **must** be used when hoisting employees **except** when hoisting them:

- Into and out of drill shafts that are 8 feet in diameter or smaller.
- In pile driving operations.
- Solely for transfer to or from a marine worksite in a marine-hoisted personnel transfer device.
- In storage tank (steel or concrete), shaft, and chimney operations.

Where these exceptions apply, the employee may be hoisted in either a personnel platform or a boatswain's chair. See the standard for rules applicable to these special types of lifts.

**PERSONNEL PLATFORM CRITERIA:** The personnel platform must conform to the following:

- A qualified person familiar with structural design must design the personnel platform and attachment/suspension system used for hoisting personnel.
- The system used to connect the personnel platform to the equipment must allow the platform to remain within 10 degrees of level, regardless of boom angle.
- The suspension system must be designed to minimize tipping of the platform due to movement of employees occupying the platform.
- The personnel platform itself (excluding the guardrail system and personal fall arrest system anchorages) must be able to support, without failure, its own weight and at least five times the maximum intended load.

- All welding of the personnel platform and its components must be performed by a certified welder familiar with the weld grades, types and material specified in the platform design.
- The personnel platform must be equipped with a guardrail system which meets OSHA criteria and must be enclosed at least from the toeboard to mid-rail with either solid construction material or expanded metal having openings no greater than ½ inch. Points to which personal fall arrest systems are attached must meet OSHA anchorage requirements.
- A grab rail must be installed inside the entire perimeter of the personnel platform except for access gates/doors.
- If installed, access gates/doors of all types (including swinging, sliding, folding, or other types) must:
  - Not swing outward. However, if due to the size of the personnel platform, such as a 1-person platform, it is infeasible for the door to swing inward and allow safe entry for the platform occupant, then the access gate/door may swing outward.
  - Be equipped with a device that prevents accidental opening.
- Headroom must be sufficient to allow employees to stand upright in the platform.
- In addition to the use of hard hats, employees must be protected by overhead protection on the personnel platform when employees are exposed to falling objects. The platform overhead protection must not obscure the view of the operator or platform occupants (such as wire mesh that has up to ½ inch openings) unless full protection is necessary.
- All edges exposed to employee contact must be smooth enough to prevent injury.
- The weight of the platform and its rated capacity must be conspicuously posted on the platform with a plate or other permanent marking.
- The personnel platform must not be loaded in excess of its rated capacity.
- Personnel platforms must be used only for employees, their tools, and the materials necessary to do their work.
- Materials and tools must be secured to prevent displacement and evenly distributed within the platform.
- The number of employees occupying the personnel platform must not exceed the maximum number the platform was designed to hold or the number required to perform the work, whichever is less.

**HOISTING EQUIPMENT:** The hoisting equipment must meet the following criteria when hoisting personnel:

- The equipment must be uniformly level, within one percent of level grade, and located on footing that a qualified person has determined to be sufficiently firm and stable.
- Equipment with outriggers or stabilizers must have them all extended and locked. The amount of extension must be the same for all outriggers and stabilizers and in accord with manufacturer procedures and load charts.
- The total load (including the hook, load line and rigging) must not exceed 50 percent of the rated capacity for the radius and configuration of the equipment, except during proof testing.
- When the occupied personnel platform is in a stationary working position, the load and boom hoist brakes, swing brakes, and operator actuated secondary braking and locking features (such as pawls or dogs) or automatic secondary brakes must be engaged.
- The equipment must be equipped with the safety devices specified in section 1431(d)(5).
- Attachments and rigging hardware must meet the criteria specified in section 1431(g).

**TRIAL LIFT AND INSPECTION:** A trial lift with the unoccupied personnel platform loaded at least to the anticipated liftweight must be made from ground level, or any other location where employees will enter the platform, to each location at which the platform is to be hoisted and positioned. Where there is more than one location to be reached from a single set-up position, either individual trial lifts for each location, or a single trial lift, in which the platform is moved sequentially to each location, must be performed; the method selected must be the same as the method that will be used to hoist the personnel.

Immediately after the trial lift, a competent person must visually inspect the equipment, base support or ground, and personnel platform, to determine whether the trial lift has exposed any defect or problem or produced any adverse effect. Any condition found during the trial lift and subsequent inspection that fails to meet a requirement of this standard or otherwise creates a safety hazard must be corrected before hoisting personnel.

**PROOF TESTING:** Prior to hoisting employees on the personnel platform, and after any repair or modification, the platform and rigging must be proof tested to 125 percent of the platform's rated capacity. The proof test may be done concurrently with the trial lift. Personnel hoisting must not be conducted until a competent person determines that the platform and rigging have successfully passed the proof test.

**WORK PRACTICES:** The following practices must be used:

- Hoisting of the personnel platform must be performed in a slow, controlled, cautious manner, with no sudden movements of the equipment or the platform.
- Platform occupants must keep all parts of the body inside the platform during raising, lowering, and horizontal movement, and must not stand, sit on, or work from the top or intermediate rail or toeboard, or use any other means/device to raise their working height.
- Before employees exit or enter a hoisted personnel platform that is not landed, the platform must be secured to the structure where the work is to be performed, unless the employer can demonstrate that securing the platform to the structure would create a greater hazard.
- If the platform is tied to the structure, the operator must not move the platform until the operator receives confirmation that it is freely suspended.
- Tag lines must be used when necessary to control the platform.
- Where the platform is not equipped with controls, the equipment operator must remain at the equipment controls, on site, and in view of the equipment, at all times while the platform is occupied.
- Where the platform is equipped with controls, all of the following must be met at all times while the platform is occupied:
  - The occupant using the controls in the platform must be a qualified person with respect to their use, including the safe limitations of the equipment and hazards associated with its operation.
  - The equipment operator must be at a set of equipment controls that include boom and swing functions of the equipment, and must be on site and in view of the equipment.
  - The platform operating manual must be in the platform or on the equipment.
- When wind speed (sustained or gusts) exceeds 20 mph at the personnel platform, or other potentially dangerous weather conditions are present, a qualified person must determine if, in light of the wind conditions, it is not safe to lift personnel. If it is not, the lifting operation must not begin (or, if already in progress, must be terminated).
- Employees being hoisted must remain in direct communication with the signal person (where used) or the operator.
- Except over water, employees occupying the personnel platform must be provided and use a personal fall arrest system attached to a structural member within the

personnel platform. (The fall arrest system must meet the requirements in § 1926.502). When working over or near water, the requirements of § 1926.106 apply.

- No lifts may be made on any other of the equipment's load lines while personnel are being hoisted, except in pile driving operations.
- Hoisting of employees while the equipment (other than derricks) is traveling is prohibited except in certain circumstances. Derricks are prohibited from traveling while personnel are hoisted.

**PRE-LIFT MEETING:** A pre-lift meeting must be held before the trial lift to review the applicable requirements of this section and the procedures that will be followed. The meeting must be attended by the equipment operator, signal person (if used for the lift), employees to be hoisted, and the person responsible for the task to be performed.

**HOISTING PERSONNEL NEAR POWER LINES:** Hoisting personnel within 20 feet of a power line that is up to 350 kV, and hoisting personnel within 50 feet of a power line that is over 350 kV, is prohibited (except for power transmission and distribution work).

## **SECTION 1432 – MULTIPLE-CRANE/DERRICK LIFTS**

Lifts in which more than one crane or derrick is used require careful planning and precise coordination. It is particularly important to determine how the weight of the load will be distributed among the multiple pieces of equipment during all phases of the operation to ensure that all are operated within their rated capacities. Accordingly, when more than one crane/derrick is used to support the load, a plan must be developed and implemented. The plan must be developed by a qualified person and be designed to ensure that all requirements of this standard are met. Where the qualified person determines that engineering expertise is needed for the planning, the employer must ensure that it is provided.

The multiple-crane/derrick lift must be directed by a lift director who meets the criteria for both a competent person and a qualified person, or by a competent person who is assisted by one or more qualified persons. The lift director must review the plan in a meeting with all workers who will be involved with the operation.



## SECTION 1433 – DESIGN, CONSTRUCTION AND TESTING

For equipment to be used safely, it must be built with appropriate safety features and maintained in a safe condition. Although manufacturers are not directly subject to this standard, crane users rely on manufacturers to see that the equipment is built and tested so that it is safe when it leaves the manufacturer. Therefore, with the exceptions discussed below, the crane user's obligations under this section are met where the employer can refer to documentation from the manufacturer showing that the equipment has been designed, constructed and tested in accord with this section and the equipment has not changed since it was manufactured (except in accord with Section 1434 – Equipment Modifications).

You **cannot** rely on manufacturer documentation to comply with the following requirements:

**RATED CAPACITY AND RELATED INFORMATION:** The following information must be available in the cab:

- A complete range of the manufacturer's equipment rated capacities.
- A work area chart for which capacities are listed in the load chart. (The work area figure and load chart must clearly indicate the areas where no load is to be handled).
- Recommended reeving for the hoist lines.
- Recommended parts of hoist reeving, size, and type of wire rope for various equipment loads.
- Recommended boom hoist reeving diagram, where applicable; size, type and length of wire rope.
- Tire pressure (where applicable).
- Caution or warnings relative to limitations on equipment and operating procedures, including an indication of the least stable direction.
- Position of the gantry and requirements for intermediate boom suspension (where applicable).
- Instructions for boom erection and conditions under which the boom, or boom and jib combinations, may be raised or lowered.
- Whether the hoist holding mechanism is automatically or manually controlled, whether free fall is available, or any combination of these.

- The maximum telescopic travel length of each boom telescopic section.
- Whether sections are telescoped manually or with power.
- The sequence and procedure for extending and retracting the telescopic boom section.
- Maximum loads permitted during the boom extending operation, and any limiting conditions or cautions.
- Hydraulic relief valve settings specified by the manufacturer.

**MISCELLANEOUS REQUIREMENTS:**

- Load hooks (including latched and unlatched types), ball assemblies, and load blocks must be of sufficient weight to overhaul the line from the highest hook position for boom or boom and jib lengths and the number of parts of the line in use.
- Hook and ball assemblies and load blocks must be marked with their rated capacity and weight.
- Hooks must be equipped with latches, except where a qualified person has determined that it is safer to hoist and place the load without latches (or with the latches removed/tied-back), and routes for the loads are pre-planned to ensure that no employee is required to work in the fall zone except for employees necessary for the hooking or unhooking of the load.
- Posted warnings required by this standard as well as those originally supplied with the equipment by the manufacturer must be maintained in legible condition.
- An accessible fire extinguisher must be on the equipment.

## SECTION 1434 – EQUIPMENT MODIFICATIONS

This section applies to modifications that affect the capacity or safe operation of the equipment. Its provisions safeguard against unsafe equipment modifications and provide that the modifications are reflected in the equipment's instructions and specifications so that the modified equipment can be used safely.

**MANUFACTURER REVIEW AND APPROVAL:** The equipment's manufacturer is uniquely qualified to evaluate any proposed modifications to the equipment. If the manufacturer is available and is willing to evaluate the proposed modifications, any modifications or additions that affect the capacity or safe operation of the equipment are only permitted where:

- The manufacturer approves the modifications/additions in writing, and
- The load charts, procedures, instruction manuals, and instruction plates/tags/decals are modified as necessary to accord with the modification/addition.

**MANUFACTURER REVIEW UNAVAILABLE:** In the event the manufacturer is unavailable, is unwilling to review the proposed modification/addition or to reject it in writing, fails to initiate the review or acknowledge the request within 30 days, or fails to complete the review within 120 days, the modification/addition may be made if a registered professional engineer who is a qualified person with respect to the equipment involved:

- Approves the modification/addition and specifies the equipment configurations to which that approval applies, and
- Modifies load charts, procedures, instruction manuals, and instruction plates/tags/decals as necessary to accord with the modification/addition.

Under this option as well as that involving manufacturer approval, the original safety factor of the equipment may not be reduced.

## SECTION 1435 – TOWER CRANES

Tower cranes present unique issues that are addressed in this section. In general, all provisions of the standard apply to tower cranes unless this section specifies different or additional requirements.

**ADDITIONAL REQUIREMENTS FOR ERECTING, CLIMBING, AND DISMANTLING:** To reflect industry terminology, “erecting, climbing, and dismantling” are used instead of “assembly/disassembly” when referring to tower cranes. The following requirements apply in addition to those specified in sections 1403-1406:

- Tower crane foundations and structural supports (including both the portions of the structure used for support and the means of attachment) must be designed by the manufacturer or a registered professional engineer.
- The Assembly/Disassembly (A/D) director must determine that tower crane foundations and structural supports are installed in accord with their design.
- The A/D Director must address the backward stability of self-erecting cranes or cranes on traveling or static undercarriages.
- Wind must not exceed the speed recommended by the manufacturer or, where the manufacturer does not specify this information, the speed determined by a qualified person.
- Towers must be erected plumb to the manufacturer’s tolerance and verified by a qualified person. Where the manufacturer does not specify plumb tolerance, the crane tower must be plumb to a tolerance of at least 1:500 (approximately 1 inch in 40 feet).
- On jobsites where more than one fixed jib (hammerhead) tower crane is installed, the cranes must be located such that no crane can come in contact with the structure of another crane. Cranes are permitted to pass over one another.
- Prior to, and during, all climbing procedures (including inside climbing and top climbing), the employer must comply with all manufacturer prohibitions and have a registered professional engineer verify that the host structure is strong enough to sustain the forces imposed through the braces, brace anchorages, and supporting floors.
- Equipment must not be erected, dismantled or operated without the amount and position of counterweight and/or ballast in place as specified by the manufacturer or a registered professional engineer familiar with the equipment. The maximum counterweight and/or ballast specified by the manufacturer or registered professional engineer must not be exceeded.

- The size and location of signs installed on tower cranes must be in accord with manufacturer specifications. Where these are unavailable, a registered professional engineer familiar with the type of equipment involved must approve in writing the size and location of any signs.

**PARTICULAR CAUTION REQUIRED WHEN USING SYNTHETIC SLINGS:**

This requirement appears in section 1404(r) but bears repeating here: when using synthetic slings during erecting, climbing, and dismantling, you must follow the synthetic sling manufacturer's instructions, limitations, specifications and recommendations. Synthetic slings must be protected from abrasive, sharp or acute edges, and configurations that could cause a reduction of the sling's rated capacity, such as distortion or localized compression.

**SAFETY DEVICES:** Different safety devices than those specified in section 1415 are required on tower cranes. Those required on tower cranes are:

- **Boom stops** on luffing boom type tower cranes.
- **Jib stops** on luffing boom type tower cranes if equipped with a jib attachment.
- **Travel rail end stops** at both ends of travel rail.
- **Travel rail clamps** on all travel bogies.
- **Integrally mounted check valves** on all load-supporting hydraulic cylinders.
- **Hydraulic system pressure limiting device.**
- The following **brakes**, which must automatically set in the event of pressure loss or power failure, are required:
  - **A hoist brake** on all hoists.
  - **Swing brake.**
  - **Trolley brake.**
  - **Rail travel brake.**
- **Deadman control** or forced neutral return control (hand) levers.
- **Emergency stop switch** at the operator's station.
- **Trolley end stops** must be provided at both ends of travel of the trolley.

Proper operation of these safety devices is required before operations can begin.

**OPERATIONAL AIDS:** Different operational aids than those specified in section 1416 are required for tower cranes. Those required on tower cranes are:

- **Trolley travel limiting device** at both trolley end stops.
- **Boom hoist limiting device** that limits the range of the boom at the minimum and maximum radius.
- **Anti two-blocking device.**
- **Hoist drum lower limiting device** on tower cranes manufactured after November 8, 2011.
- **Load moment limiting device.**
- **Hoist line pull limiting device.**
- **Rail travel limiting device.**
- **Boom hoist drum positive locking device and control.**
- **Boom angle or hook radius indicator** readable from the operator's station. (Required on all luffing boom tower cranes and on hammerhead tower cranes manufactured after November 8, 2011).
- **Trolley travel deceleration device.**
- **Boom hoist deceleration device.**
- **Load hoist deceleration device.**
- **Wind speed indicator.**
- **Load indicating device** on tower cranes manufactured after November 8, 2011.

As with operational aids on other equipment, tower cranes may be operated for limited amounts of time with malfunctioning aids as long as the temporary alternative measures specified in the standard are taken.

**INSPECTIONS:** Additional inspection requirements for tower cranes are discussed under section 1412 (Inspections).

## SECTION 1436 – DERRICKS

**OPERATOR QUALIFICATIONS:** Derrick operators need not meet the operator qualification/certification requirement of section 1427. However, you must train each derrick operator on how to operate the equipment safely.

**LOAD CHARTS:** For permanently installed derricks with fixed lengths of boom, guy, and mast, a load chart must be posted where it is visible to personnel responsible for the operation of the equipment. For derricks that are not permanently installed, the load chart must be readily available at the job site to personnel responsible for operating the equipment. Load charts must contain at least the following information:

- Rated capacity at corresponding ranges of boom angle or operating radii.
- Specific lengths of components to which the rated capacities apply.
- Required parts for hoist reeving.
- Size and construction of rope must be included on the load chart or in the operating manual.

**CONSTRUCTION:** Derricks must be constructed to meet all stresses imposed on members and components when installed and operated in accord with the manufacturer's/builder's procedures and within its rated capacity. Load anchoring data developed by the manufacturer or a qualified person must be used.

Specific additional construction requirements are specified for:

- Guy derricks
- Stiffleg derricks
- Gin pole derricks
- Chicago boom derricks

**SWINGERS AND HOISTS:** The boom, swinger mechanisms, and hoists must be suitable for the derrick work intended and must be anchored to prevent displacement from the imposed loads.

Hoists must meet the following requirements:

- Base mounted drum hoists must meet certain specified requirements of ASME B30.7-2001 (“Base-Mounted Drum Hoists”).

- New hoists must be load tested to a minimum of 110% of rated capacity, but not more than 125% of rated capacity, unless otherwise recommended by the manufacturer. This requirement is met where the manufacturer has conducted the testing.
- Hoists that have had repairs, modifications, or additions affecting their capacity or safe operation must be evaluated by a qualified person to determine if a load test is necessary. If it is, load testing must be conducted in the manner specified in the standard.

**OPERATIONAL AIDS:** The operational aids requirements listed in section 1416 apply to derricks except 1) a boom hoist limiting device (required by section 1416 for other equipment) is not required for derricks, and 2) alternative requirements to those in section 1416 are specified for the following two operational aids:

**Boom angle or radius indicator:** Such a device is not required, but if the derrick is not equipped with a functioning one, the employer must ensure that either:

- The boom hoist cable is marked with caution and stop marks. The stop marks must correspond to maximum and minimum allowable boom angles. The caution and stop marks must be in view of the operator or a spotter who is in direct communication with the operator; or
- An electronic or other device that signals the operator in time to prevent the boom from moving past its maximum and minimum angles, or automatically prevents such movement, is used.

**Load weight/capacity device.** Derricks manufactured after November 8, 2011 with a maximum rated capacity over 6,000 pounds must have at least one of the following: load weighing device, load moment indicator, rated capacity indicator, or rated capacity limiter.

**POST-ASSEMBLY APPROVAL AND TESTING:** The following requirements apply to new or reinstalled derricks:

- **Anchorage.** Anchorages, including the structure to which the derrick is attached (if applicable), must be approved by a qualified person.
- **Functional test.** Prior to initial use, new or reinstalled derricks must be tested by a competent person with no hook load to verify proper operation. This test must include:
  - Lifting and lowering the hook(s) through the full range of hook travel.
  - Raising and lowering the boom through the full range of boom travel.
  - Swinging in each direction through the full range of swing.
  - Actuating the anti two-block and boom hoist limit devices (if provided).
  - Actuating locking, limiting, and indicating devices (if provided).



- **Load test.** Prior to initial use, new or reinstalled derricks must pass a load test conducted by a competent person. Test loads must be at least 100% and no more than 110% of the rated capacity, unless otherwise recommended by the manufacturer or qualified person, but in no event must the test load be less than the maximum anticipated load. The test must consist of:
  - Hoisting the test load a few inches and holding to verify that the load is supported by the derrick and held by the hoist brake(s).
  - Swinging the derrick, if applicable, the full range of its swing, at the maximum allowable working radius for the test load.
  - Booming the derrick up and down within the allowable working radius for the test load.
  - Lowering, stopping, and holding the load with the brake(s).
  
- **Test documentation.** The functional and load tests must be documented. The document must contain the date, test results, and name of the tester. The document must be retained until the derrick is retested or dismantled, whichever occurs first. All such documents must be available during the applicable document retention period to all persons who conduct required inspections (see section 1412).

**LOAD TESTING REPAIRED OR MODIFIED DERRICKS:** Derricks that have had repairs, modifications, or additions affecting the derrick's capacity or safe operation must be evaluated by a qualified person to determine if a load test is necessary. If it is, load testing must be conducted and documented.

**POWER FAILURE PROCEDURES:** If power fails during operations, the derrick operator must safely stop operations. This must include setting all brakes or locking devices and moving all clutch and other power controls to the off position.

**JUMPING:** The process of jumping a derrick must be supervised by the Assembly/Disassembly (A/D) director.

## **SECTION 1437 -- FLOATING CRANES/DERRICKS AND LAND CRANES/DERRICKS ON BARGES**

This section contains requirements for floating cranes and derricks that supplement the other requirements of the standard. Because this equipment is highly specialized and is not used by most construction employers, this Guide will only address a few of the areas where additional or different requirements are specified for this type of equipment.

**INSPECTIONS:** Additional items must be inspected during the shift, monthly, and annual inspections. In addition, every four years, a marine engineer, marine architect, licensed surveyor, or other qualified person who has expertise with respect to vessels/flotation devices must survey the internal portion of the barge, pontoons, vessel, or other means of flotation.

**SAFETY DEVICES:** The following additional safety devices are required: barge, pontoon, vessel, or other means of flotation list and trim device; positive equipment house lock; wind speed and direction indicator (if a competent person determines that wind is a factor that needs to be considered).

**WORKING WITH A DIVER:** When a crane/derrick is used to lift a diver or divers into and out of the water, it must not be used for any other purpose until all the divers are back on board.

**LAND CRANES/DERRICKS ON FLOTATION DEVICES:** The rated capacity must be reduced to take into account the additional sources of instability (list, trim, wave action, and wind) resulting from operating on water. Alternative means of physical attachment and an exception to the requirement for physical attachment are specified.

**EQUIPMENT DESIGNED FOR USE ON FLOTATION DEVICES:** Requirements for maximum list, trim, and wind speed are specified. Additional rules to ensure the structural integrity and stability of the equipment apply to employer-made (as opposed to manufacturer-made) equipment.

## SECTION 1438 – OVERHEAD & GANTRY CRANES

Most overhead and gantry cranes are used in general industry rather than construction work. In some cases, overhead and gantry cranes that are usually used in general industry may engage in construction work when they are used to renovate the facility in which they are installed. To prevent the same crane from being subject to general industry and construction standards at different times, this section provides that OSHA's General Industry standard (29 CFR 1910.179) applies to an overhead or gantry crane that is **permanently installed in a facility**.

For overhead and gantry cranes that are **not permanently installed in a facility**, this section lists the provisions of this standard that apply. These are:

- Sections 1400 through 1414.
- Sections 1417 through 1425.
- Section 1426(d).
- Sections 1427 through 1434.
- Sections 1437, 1439, and 1441.

In addition, certain provisions of 29 CFR 1910.179 and certain provisions of ASME B30.2-2005 (Overhead and Gantry Cranes) apply to overhead and gantry cranes not permanently installed in a facility. These provisions are listed in section 1438.

## **SECTION 1439 – DEDICATED PILE DRIVERS**

Most provisions of this standard apply to dedicated pile drivers. The only exceptions are:

- The requirement in section 1416 for an anti two-blocking device.
- Certain requirements of section 1433 that apply to design, construction, and testing of mobile cranes.
- The requirement in section 1416 for load weighing and similar devices applies only to dedicated pile drivers manufactured after November 8, 2011.

## **SECTION 1440 – SIDEBOOM CRANES**

Most provisions of this standard apply to sideboom cranes. The exceptions are:

- Section 1402 (Ground conditions),
- Section 1415 (Safety devices),
- Section 1416 (Operational aids), and
- Section 1427 (Operator qualification and certification).

In addition, instead of the provision on boom free fall found in section 1426, sideboom cranes in which the boom is designed to free fall (live boom) are permitted only if manufactured prior to November 8, 2010.

This section also specifies that sideboom cranes mounted on wheel or crawler tractors must meet certain listed requirements of ASME B30.14-2004 (“Side Boom Tractors”).

## **SECTION 1441 – EQUIPMENT WITH A RATED HOISTING/LIFTING CAPACITY OF 2,000 POUNDS OR LESS**

Although equipment with a capacity of 2,000 pounds or less does not require all of the precautions required for heavier equipment, its operation still presents significant hazards that can cause death or injury. For example, operation near energized power lines requires the same precautions as heavier equipment because the potential for electrocution is the same.

This section lists the provisions of the standard that apply to equipment with a capacity of 2,000 pounds or less and those for which modified requirements apply. The most significant differences are:

- The requirement for operator qualification/certification in section 1427 does not apply. Instead, the employer must train each operator on the safe operation of the equipment before the operator may operate the equipment.
- The requirements for shift, monthly, and annual inspections in section 1412 do not apply. However, post-assembly inspections and the wire rope inspections required by section 1413 must be conducted.
- More limited assembly/disassembly requirements apply.
- The safety devices and operational aids listed in sections 1415 – 1416 need not be used, except for two-block protection. However, safety devices and operational aids that are part of the original equipment must be maintained in accord with manufacturer procedures.
- Signal persons must be adequately trained but need not meet the qualification requirements of section 1428.
- Equipment covered by this section must not be used to hoist personnel.

## APPENDIX A

### Directory of States with Approved Occupational Safety and Health Plans

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#### Alaska Department of Labor and Workforce Development

P.O. Box 111149

1111 W. 8th Street, Room 304

Juneau, Alaska 99811-1149

Clark Bishop, Commissioner (907) 465-2700 Fax: (907) 465-2784

Grey Mitchell, Director (907) 465-4855 Fax: (907) 465-6012

#### Industrial Commission of Arizona

800 W. Washington

Phoenix, Arizona 85007-2922

Laura L. McGrory, Director, ICA (602) 542-4411 Fax: (602) 542-7889

Darin Perkins, Program Director (602) 542-5795 Fax: (602) 542-1614

#### California Department of Industrial Relations

455 Golden Gate Avenue, 10th Floor

San Francisco, California 94102

John Duncan, Director (415) 703-5050 Fax: (415) 703-5059

Len Welsh, Chief, Cal/OSHA (510) 286-7000 Fax: (510) 286-7037

Chris Lee, Deputy Chief, Cal/OSHA (510) 286-7000 Fax (510) 286-7037

#### Connecticut Department of Labor

200 Folly Brook Boulevard

Wethersfield, Connecticut 06109

Linda L. Agnew, Acting Commissioner (860) 263-6505 Fax: (860) 263-6529

Conn-OSHA

38 Wolcott Hill Road

Wethersfield, Connecticut 06109

Kenneth Tucker, Program Manager (860) 263-6900 Fax: (860) 263-6940

#### Hawaii Department of Labor and Industrial Relations

830 Punchbowl Street

Honolulu, Hawaii 96813

Pearl Imada Iboshi, Acting Director (808) 586-8842 Fax: (808) 586-9099

#### Illinois Department of Labor

1 W. Old State Capitol Plaza, Room 300

Springfield, Illinois 62701

Catherine Shannon, Director (217) 782-6206 Fax: (217) 782-0596

Joe Lewison, Manager (217) 782-9386

### **Indiana Department of Labor**

State Office Building  
402 West Washington Street, Room W195  
Indianapolis, Indiana 46204-2751  
Lori A. Torres, Commissioner (317) 232-2378 Fax: (317) 233-3790  
Jeffrey S. Carter, Deputy Commissioner, IOSHA (317) 233-3605 Fax: (317) 233-3790

### **Iowa Division of Labor Services**

1000 E. Grand Avenue  
Des Moines, Iowa 50319-0209  
Dave Neil, Commissioner (515) 281-8067 Fax: (515) 281-4698  
Stephen Slater, Deputy Labor Commissioner/IOSH Administrator (515) 281-3469 Fax:  
(515) 281-7995

### **Kentucky Department of Labor**

1047 U.S. Highway 127 South, Suite 4  
Frankfort, Kentucky 40601  
J. R. Gray, Secretary, (502) 564-3070, Fax: (502) 564-5387  
Michael L. Dixon, Commissioner, Office of Occupational Safety & Health, (502) 564-  
3070 ext. 294  
Fax: (502) 564-2248

### **Maryland Division of Labor and Industry**

Department of Labor, Licensing and Regulation  
1100 North Eutaw Street, Room 613  
Baltimore, Maryland 21201-2206  
Ron DeJuliis, Commissioner (410) 767-2241 Fax: (410) 767-2986  
Eric Uttenreither, Assistant Commissioner, MOSH (410) 767-2190

### **Michigan Department of Labor and Economic Growth**

Andrew S. Levin, Acting Director (517) 373-3034 Fax: (517) 373-2129  
Michigan Occupational Safety and Health Administration  
P.O. Box 30643  
Lansing, MI 48909-8143  
Douglas Kalinowski, Director (517) 322-1817 Fax: (517) 322-1775  
Martha Yoder, Deputy Director (517) 322-1817 Fax: (517) 322-1775

### **Minnesota Department of Labor and Industry**

443 Lafayette Road  
St. Paul, Minnesota 55155  
Steve Sviggum, Commissioner (651) 284-5010 Fax: (651) 284-5721  
Thomas Joachim, Assistant Commissioner (651) 284-5018 Fax: (651) 284-5720  
Jeff Isakson, Administrative Director, OSHA Management Team (651) 284-5310 Fax:  
(651) 284-5741

### **Nevada Division of Industrial Relations**



400 West King Street, Suite 400  
Carson City, Nevada 89703  
Donald Jayne, Administrator (775) 684-7260 Fax: (775) 687-6305  
Occupational Safety and Health Administration  
1301 N. Green Valley Parkway, Suite 200  
Henderson, Nevada 89074  
Steve Coffield, Chief Administrative Officer (702) 486-9044 Fax: (702) 990-0365

**New Jersey Department of Labor and Workforce Development**

Office of Public Employees' Occupational Safety & Health (PEOSH)  
1 John Fitch Plaza  
P.O. Box 386  
Trenton, NJ 08625-0386  
Poonam Alaigh, Commissioner (609) 292-2975 Fax: (609) 633-9271  
Leonard Katz, Assistant Commissioner (609) 292-2313 Fax: (609) 695-1314  
Howard Black, Director, PSOSH (609) 292-0501 Fax: (609) 292-3749  
Joe Eldridge, Director Consumer, Environmental and Occupational Health Services New Jersey Department of Health and Senior Services (609) 588-7864 Fax: (609) 984-0849

**New Mexico Environment Department**

525 Camino de los Marquez, Suite 3  
P.O. Box 5469  
Santa Fe, New Mexico 87502  
Ron Curry, Secretary (505) 827-2855 Fax: (505) 827-2836  
Butch Tongate, Bureau Chief (505) 476-8700 Fax: (505) 476-8734

**New York Department of Labor**

New York Public Employee Safety and Health Bureau (PESH)  
State Office Campus Building 12, Room 158  
Albany, New York 12240  
Colleen C. Gardner, Commissioner (518) 457-2741 Fax: (518) 457-6908  
Maureen Cox, Director, Division of Safety and Health (518) 457-3518 Fax: (518) 457-1519  
David Ruppert, Assistant Director, Division of Safety and Health (518) 457-1263 Fax: (518) 457-5545  
Normand Labbe, Public Employee Safety and Health Program Manager (518) 457-1263 Fax: (518) 457-5545

**North Carolina Department of Labor**

1101 Mail Service Center  
Raleigh, North Carolina 27699-1101  
Cherie Berry, Commissioner (919) 733-0359 Fax: (919) 733-6197  
Allen McNeely, Deputy Commissioner, OSH Director (919) 807-2861 Fax: (919) 807-2855  
Kevin Beauregard, OSH Assistant Director (919) 807-2863 Fax: (919) 807-2856

**Oregon Occupational Safety and Health Division**

Department of Consumer and Business Services  
350 Winter Street, NE, Room 430  
P.O. Box 14480  
Salem, Oregon 97309-0405  
Michael Wood, Administrator (503) 378-3272 Fax: (503) 947-7461  
Joan Fraser, Deputy Administrator (503) 378-3272 Fax: (503) 947-7461  
David Sparks, Liaison for Federal & External Communications (503) 378-3272  
Fax: (503) 947-7461

**Puerto Rico Department of Labor**

Prudencio Rivera Martínez Building. 21 Floor  
505 Muñoz Rivera Avenue  
Hato Rey, Puerto Rico 00918  
Miguel Romero, Secretary  
(787) 754-2119 Fax: (787) 753-9550  
Gladys Cruz-Mercado, Assistant Secretary for Occupational Safety and Health  
(787) 754-2172 Fax: (787) 754-2171

**South Carolina Department of Labor, Licensing, and Regulation**

Synergy Business Park, Kingstree Building  
110 Centerview Drive  
P.O. Box 11329  
Columbia, South Carolina 29211  
Adrienne R. Youmans, Director (803) 896-4300 Fax: (803) 896-4393  
Dottie Ison, Administrator (803) 896-7686 Fax: (803) 896-7670  
Office of Voluntary Programs (803) 896-7787 Fax: (803) 896-7750

**Tennessee Department of Labor and Workforce Development**

220 French Landing Drive  
Nashville, Tennessee 37243  
James G. Neeley, Commissioner (615) 741-2582 Fax: (615) 741-5078  
John Winkler, Program Director (615) 741-2793 Fax: (615) 741-3325

**Utah Labor Commission**

160 East 300 South, 3rd Floor  
P.O. Box 146650  
Salt Lake City, Utah 84114-6650  
Sherrie M. Hayashi, Commissioner (801) 530-6848 Fax: (801) 530-6390  
Louis Silva, UOSH Administrator (801) 530-6901 Fax: (801) 530-7606

**Vermont Department of Labor**

5 Green Mountain Drive  
P.O. Box 488  
Montpelier, Vermont 05601-0488  
Patricia Moulton Powden, Commissioner (802) 828-4301 Fax: (802) 888-4022

Robert McLeod, Vermont OSHA Compliance Program Manager (802) 828-2765 Fax:  
(802) 828-0408

**Virgin Islands Department of Labor**

3012 Golden Rock  
Christiansted, St. Croix, Virgin Islands 00840  
Dean R. Andrews, Director, (340) 772-1315 Fax: (340) 772-4323  
Albert Bryant, Commissioner (340) 773-1994 Fax: (340) 773-1858  
Glen Smith, Assistant Commissioner, (340) 776-3700 Fax: (340) 774-5908

**Virginia Department of Labor and Industry**

Powers-Taylor Building  
13 South 13th Street  
Richmond, Virginia 23219-4101  
Courtney Malveaux, Commissioner (804) 786-2377 Fax: (804) 371-6524  
William Burge, Assistant Commissioner (804) 371-2327 Fax: (804) 371-6524  
Glenn Cox, Director, Safety Compliance, VOSHA (804) 786-2391 Fax: (804) 371-6524  
Jay Withrow, Director, Office of Legal Support (804) 371-2327 Fax: (804) 371-6524

**Washington Department of Labor and Industries**

General Administration Building  
PO Box 44001  
Olympia, Washington 98504-4001  
7273 Linderson Way SW  
Tumwater, WA 98501-5414  
Judy Schurke, Director (360) 902-4200 Fax: (360) 902-4202  
Division of Occupational Safety and Health  
Michael Silverstein, Assistant Director, DOSH, (360) 902-4805, Fax: (360) 902-5619  
Anne Soiza, Deputy Assistant Director, DOSH  
Steve Cant, Senior Programs and Policy Advisor

**Wyoming Department of Employment**

Workers' Safety and Compensation Division  
1510 East Pershing Boulevard - West Wing  
Cheyenne, Wyoming 82002  
Steve Czoschke, Administrator (307) 777-5110 Fax: (307) 777-5524  
J.D. Danni, OSHA Program Manager (307) 777-7786 Fax: (307) 777-3646