Applicability of This Module

Use the following General Applicability Checklist to determine whether a rulebook and its sections apply to your operation.

If you answer YES to the rulebook question, the rulebook applies to you unless you answer YES for a rulebook exemption.

Once you determine that the rulebook does apply to your operation, you must answer the section questions. If a section question does not exist, then that section applies if the rulebook applies. If you answer YES to a section question, that section applies to you unless you answer YES for an exemption from that section. If you answer YES to a rulebook or section exemption, then the rulebook or section does not apply.

<table>
<thead>
<tr>
<th>GENERAL APPLICABILITY CHECKLIST</th>
<th>Applies</th>
<th>Exempt</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rulebook: Cranes and Derricks in Construction</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RULEBOOK: Do you use cranes or derricks in construction other than demolition or underground construction work?</td>
<td>Y N</td>
<td>□ □</td>
</tr>
</tbody>
</table>
### GENERAL APPLICABILITY CHECKLIST

**RULEBOOK Exemption:** Do you use any of the following types of excluded equipment (29 CFR 1926.1400(c)):

- cranes or derricks that have been converted or adapted for a non-hoisting/lifting use, such as power shovels, excavators and concrete pumps;
- power shovels, excavators, wheel loaders, backhoes, loader backhoes or track loaders, even if they are 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;
- 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;
- articulating/knuckle-boom truck cranes that deliver material to a construction site when used to transfer materials from the truck crane to the ground, without arranging the materials in a particular sequence for hoisting; or
- articulating/knuckle-boom truck cranes that deliver material to a construction site when the crane is used to transfer building supply sheet goods or building supply packaged materials from the truck crane onto a structure, using a fork/cradle at the end of the boom, but only when the truck crane is equipped with a properly functioning automatic overload prevention device?

**NOTE:** The exclusion of articulating/knuckle-boom truck cranes does not apply when:
- the equipment is 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 material being handled by the equipment is a prefabricated component such as precast concrete members or panels, roof trusses (wooden, cold-formed metal, steel, or other material), prefabricated building sections such as floor panels, wall panels, roof panels, roof structures, or similar items; or
- the material being handled by the crane is a structural steel member (e.g., steel joists, beams, columns, bundled or unbundled steel decking, or a component of a systems-engineered metal building).

<table>
<thead>
<tr>
<th>Section 2: Do you assemble or disassemble cranes or derricks? (If not, skip to section 7.)</th>
</tr>
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<tbody>
<tr>
<td>Y</td>
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</table>

<table>
<thead>
<tr>
<th>Section 5: Do you use your own procedures for assembly/disassembly, rather than the manufacturer’s?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Y</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Section 7: Do you ever work near power lines? (If not, skip to section 12.)</th>
</tr>
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<tbody>
<tr>
<td>Y</td>
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</table>

<table>
<thead>
<tr>
<th>Section 22: Do you use the equipment to hoist personnel?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Y</td>
</tr>
</tbody>
</table>
## GENERAL APPLICABILITY CHECKLIST

<table>
<thead>
<tr>
<th>Section</th>
<th>Question</th>
<th>Applies</th>
<th>Exempt</th>
</tr>
</thead>
<tbody>
<tr>
<td>Section 23</td>
<td>Do you perform multiple crane/derrick lifts?</td>
<td>Y</td>
<td>N</td>
</tr>
<tr>
<td></td>
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<td>☐</td>
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</tr>
<tr>
<td>Section 24</td>
<td>Do you use equipment with a capacity of more than 2000 lbs? (If not, section 32 will apply.)</td>
<td>Y</td>
<td>N</td>
</tr>
<tr>
<td></td>
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<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Section 26</td>
<td>Do you use tower cranes?</td>
<td>Y</td>
<td>N</td>
</tr>
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<td></td>
<td></td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Section 27</td>
<td>Do you use derricks?</td>
<td>Y</td>
<td>N</td>
</tr>
<tr>
<td></td>
<td></td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Section 28</td>
<td>Do you use floating cranes or derricks, or land equipment on barges?</td>
<td>Y</td>
<td>N</td>
</tr>
<tr>
<td></td>
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<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Section 29</td>
<td>Do you use overhead or gantry cranes?</td>
<td>Y</td>
<td>N</td>
</tr>
<tr>
<td></td>
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<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Section 30</td>
<td>Do you use dedicated pile drivers?</td>
<td>Y</td>
<td>N</td>
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<td></td>
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<td>☐</td>
<td>☐</td>
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<tr>
<td>Section 31</td>
<td>Do you use sideboom cranes?</td>
<td>Y</td>
<td>N</td>
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</table>
This module covers regulations found in 29 CFR 1926 Subpart CC, including 29 CFR 1926.1400 – 1926.1441. The federal regulations that apply are organized into the following major sections:

- 29 CFR 1926.1400 — Scope
- 29 CFR 1926.1401 — Definitions
- 29 CFR 1926.1402 — Ground Conditions
- 29 CFR 1926.1403 — Assembly/Disassembly – Selection of Manufacturer or Employer Procedures
- 29 CFR 1926.1404 — Assembly/Disassembly – General Requirements (applies to all assembly and disassembly operations)
- 29 CFR 1926.1405 — Disassembly – Additional Requirements for Dismantling of Booms and Jibs (applies to both the use of manufacturer procedures and employer procedures)
- 29 CFR 1926.1407 — Power Line Safety (up to 350 kV) – Assembly and Disassembly
- 29 CFR 1926.1408 — Power Line Safety (up to 350 kV) – Equipment Operations
- 29 CFR 1926.1409 — Power Line Safety (over 350 kV)
- 29 CFR 1926.1410 — Power Line Safety (all voltages) – Equipment Operations
- 29 CFR 1926.1411 — Power Line Safety – Traveling (under or near power lines with no load)
- 29 CFR 1926.1412 — Inspections
- 29 CFR 1926.1413 — Wire Rope – Inspection
- 29 CFR 1926.1414 — Wire Rope – Selection and Installation Criteria
- 29 CFR 1926.1415 — Safety Devices
- 29 CFR 1926.1416 — Operational Aids
- 29 CFR 1926.1417 — Operation
- 29 CFR 1926.1418 — Authority to Stop Operation
- 29 CFR 1926.1419 — Signals – general requirements
- 29 CFR 1926.1420 — Signals – radio, telephone, or other electronic transmission of signals
- 29 CFR 1926.1421 — Signals – voice signals additional requirements
- 29 CFR 1926.1422 — Signals – hand signal chart
- 29 CFR 1926.1423 — Fall Protection
- 29 CFR 1926.1424 — Work Area Control – keeping clear of swing radius
- 29 CFR 1926.1425 — Work Area Control – keeping clear of the load
- 29 CFR 1926.1426 — Work Area Control – free fall and controlled load lowering
- 29 CFR 1926.1427 — Operator Qualification and Certification
- 29 CFR 1926.1428 — Qualifications of Additional Personnel – signal person qualifications
- 29 CFR 1926.1429 — Qualifications of Additional Personnel – maintenance and repair employees
- 29 CFR 1926.1430 — Training
- 29 CFR 1926.1431 — Hoisting Personnel
- 29 CFR 1926.1432 — Multiple-Crane/Derrick Lifts – supplemental requirements
- 29 CFR 1926.1433 — Equipment with a Capacity of More than 2,000 Pounds – design, construction, and testing
- 29 CFR 1926.1434 — Equipment Modifications
- 29 CFR 1926.1435 — Tower Cranes
- 29 CFR 1926.1436 — Derricks
- 29 CFR 1926.1437 — Floating Cranes/Derricks and Land Cranes/Derricks on Barges
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- 29 CFR 1926.1438 — Overhead and Gantry Cranes
- 29 CFR 1926.1439 — Dedicated Pile Drivers
- 29 CFR 1926.1440 — Sideboom Cranes
- 29 CFR 1926.1441 — Equipment with a Rated Capacity of 2,000 Pounds or Less

This standard applies to power-operated equipment, when used in construction, that can hoist, lower, and horizontally move a suspended load. Such equipment includes, but is not limited to: articulating cranes (such as knuckle-boom cranes); crawler cranes; floating cranes; land cranes on barges; locomotive cranes; mobile cranes (such as wheelmounted, rough-terrain, all-terrain, commercial truck-mounted, and boom truck cranes); multi-purpose machines when configured to hoist and lower (by means of a winch or hook) and horizontally move a suspended load; industrial cranes (such as carry-deck cranes); dedicated pile drivers; service/mechanic trucks with a hoisting device; a crane on a monorail; tower cranes (such as a fixed jib (i.e., “hammerhead boom”), luffing boom, and self-erecting); pedestal cranes; portal cranes; overhead and gantry cranes; straddle cranes; sideboom cranes; derricks; and variations of such equipment.

This standard applies to the listed equipment when used with attachments. Such attachments, whether crane-attached or suspended 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.

This subpart does not cover the following:
- listed machinery including that which has been converted or adapted for a non-hoisting/lifting use such as power shovels, excavators, and concrete pumps;
- power shovels, excavators, wheel loaders, backhoes, loader backhoes, 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;
- 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; and
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- certain articulating/knuckle-boom truck cranes that deliver material to a construction site.

OSHA frequently adopts third party standards by incorporating them by reference into the regulations. These standards are provided by other governmental, non-profit, or trade organizations (such as the American National Standards Institute [ANSI]). Many of these third party standards have been revised since they were first incorporated into the regulations; however, because OSHA frequently has not adopted the updates, it typically cannot enforce the requirements contained in the most recent version of the standard (unless imminent danger is present).

Key Compliance Definitions

These definitions are derived from 29 CFR 1926.1401.

Assembly/Disassembly – 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.

Blocking (also referred to as “cribbing”) – Wood or other material used to support equipment or a component and distribute loads to the ground. It is typically used to support lattice boom sections during assembly/disassembly and under outrigger and stabilizer floats.

Climbing – The process in which a tower crane is raised to a new working height, either by adding additional tower sections to the top of the crane (top climbing), or by a system in which the entire crane is raised inside the structure (inside climbing).

Competent person – 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 the hazards.

Crossover points – Locations on a wire rope that is spooled on a drum where one layer of rope climbs up on and crosses over the previous layer. This takes place at each flange of the drum as the rope is spooled onto the drum, reaches the flange, and begins to wrap back in the opposite direction.

Dedicated spotter (power lines) – A person who meets the requirements of 29 CFR 1926.1428 (signal person qualifications) and whose sole responsibility is to watch the separation between the power line and the equipment, load line, and load (including rigging and lifting accessories), and to ensure through communication with the operator that the applicable minimum approach distance is not breached.

Directly under the load – When part or all of an employee is directly beneath the load.

Encroachment – Where any part of the crane, load line, or load (including rigging and lifting accessories) breaches a minimum clearance distance that this subpart requires to be maintained from a power line.

Fall zone – The area (including but not limited to the area directly beneath the load) in which it is reasonably foreseeable that partially or completely suspended materials could fall in the event of an accident.

Flange points – Points of contact between rope and drum flange where the rope changes layers.
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**Free fall (of the load line)** – When only the brake is used to regulate the descent of the load line (the drive mechanism is not used to drive the load down faster or retard its lowering).

**Free surface effect** – The uncontrolled transverse movement of liquids in compartments that reduce a vessel’s transverse stability.

**Freeboard** – The vertical distance between the water line and the main deck of a vessel.

**List** – The angle of inclination about the longitudinal axis of a barge, pontoons, vessel, or other means of floatation.

**Multi-purpose machine** – A machine that is designed to be configured in various ways, at least one of which allows it to hoist (by means of a winch or hook) and horizontally move a suspended load. For example, a machine that can rotate and can be configured with removable forks/tongs (for use as a forklift) or with a winch pack, jib (with a hook at the end), or jib used in conjunction with a winch. When configured with the forks/tongs, it is not covered by this subpart. When configured with a winch pack, jib (with a hook at the end), or jib used in conjunction with a winch, it is covered by this subpart.

**Pendants** – Includes both wire and bar types.

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

**Runway** – A firm, level surface designated and prepared as a path of travel for the weight and configuration of the crane being used to lift and travel with the crane-suspended platform. An existing surface may be used as long as it meets these criteria.

**Tagline** – A rope (usually fiber) attached to a lifted load for purposes of controlling load spinning and pendular motions or used to stabilize a bucket or magnet during material handling operations.

**Travel bogie (tower cranes)** – An assembly of two or more axles arranged to permit vertical wheel displacement and equalize the loading on the wheels.

**Trim** – The angle of inclination about the transverse axis of a barge, pontoons, vessel, or other means of floatation.

**Two blocking** – A condition in which a component that is uppermost on the hoist line such as the load block, hook block, overhaul ball, or similar component, comes in contact with the boom tip, fixed upper block or similar component. This binds the system and continued application of power can cause failure of the hoist rope or other component.
CRANES AND DERRICKS IN CONSTRUCTION

PART 2: PRE–AUDIT PREPARATION

**Items to consider getting in advance:**

- Access to the information in 29 CFR 1926 Subpart CC.

OSHA has also adopted the following third party standards. We have listed the standards that are cited in the regulations. We have also provided contact information for each of the referenced third parties (see Appendix: Contact Information in the Introduction to this Guide).

- The following ASME standards:
  - ASME B30.2-2005, Overhead and Gantry Cranes (Top Running Bridge, Single or Multiple Girder, Top Running Trolley Hoist)
  - ASME B30.5-2004, Mobile and Locomotive Cranes
  - ASME B30.7-2001, Base-Mounted Drum Hoists
  - ASME B30.14-2004, Side Boom Tractors

**Items to have facility personnel prepare or gather in advance:**

- Inspection and maintenance records.
- Personnel training, qualification and/or certification records.
- Design criteria.
- Manufacturer’s manuals.
### Acronyms and Abbreviations Used in This Module

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Description</th>
<th>Acronym</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A/D</td>
<td>assembly/disassembly</td>
<td>FAA</td>
<td>Federal Aviation Administration</td>
</tr>
<tr>
<td>ANSID</td>
<td>American National Standards Institute</td>
<td>ft</td>
<td>foot/feet</td>
</tr>
<tr>
<td>ASTM</td>
<td>American Society for Testing and Materials</td>
<td>KV</td>
<td>kilovolt(s)</td>
</tr>
<tr>
<td>AWS</td>
<td>American Welding Society</td>
<td>mph</td>
<td>mile(s) per hour</td>
</tr>
<tr>
<td>CFR</td>
<td>Code of Federal Regulations</td>
<td>OSHA</td>
<td>Occupational Safety and Health Administration</td>
</tr>
<tr>
<td>CPL</td>
<td>Compliance (related to OSHA Directives)</td>
<td>PPE</td>
<td>personal protective equipment</td>
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<tr>
<td>DOT</td>
<td>Department of Transportation</td>
<td>RPE</td>
<td>registered professional engineer</td>
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<tr>
<td></td>
<td></td>
<td>SAE</td>
<td>Society of Automotive Engineers</td>
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</tbody>
</table>
CRANES AND DERRICKS IN CONSTRUCTION

PART 3: RULEBOOK

Where provisions of this rulebook direct an operator, crewmember, or other employee to take certain actions, the employer must establish, effectively communicate to the relevant persons, and enforce work rules to ensure compliance with such provisions.

For work covered by Power Transmission and Distribution (Module V), compliance with 29 CFR 1926.959 is deemed compliance with the power line safety requirements in sections 6 – 10 of this rulebook (29 CFR 1926.1400(g)).

1. Ground Conditions

This section does not apply to cranes designed for use on railroad tracks when used on tracks that are part of the general railroad system that is regulated by the Federal Railroad Administration under 49 CFR 213 and that comply with applicable Federal Railroad Administration requirements (29 CFR 1926.1402(f)).

1.1 Cranes and derricks must not be assembled or used unless certain ground conditions are met. (29 CFR 1926.1402(b) and (e))

Guide Note
- Verify that the equipment is not assembled or used unless ground conditions are firm, drained, and graded sufficiently so that, in conjunction with the use of any necessary supporting materials, the equipment manufacturer’s specifications for adequate support and degree of level of the equipment are met (29 CFR 1926.1402(b)).
  
  EXCEPTION: The requirement for the ground to be drained does not apply to marshes/wetlands.
- If the assembly/disassembly (A/D) director determines that ground conditions do not meet these requirements, verify that the director’s employer has a discussion with the controlling entity regarding the additional ground preparations, including any necessary use of suitable supporting materials/devices, that are needed so that they can be met (29 CFR 1926.1402(e)).

1.2 The controlling entity must take certain actions. (29 CFR 1926.1402(c) and (d))

Guide Note
- Verify that the controlling entity does the following (29 CFR 1926.1402(c)):
  - ensures that the ground is prepared as required; and
  - informs the equipment user and the operator of the location of hazards beneath the equipment set-up area (such as voids, tanks, utilities, etc.) if those hazards are identified in documents that are in the possession of the controlling entity or are otherwise known to that controlling entity.
  
  NOTE: Applicable documents would include site drawings, as-built drawings, and soil analyses. Information must be shared regardless of whether the documents are at the site or off-site.
- If there is no controlling entity for the project, verify that the employer who has authority at the site to make or arrange for necessary ground preparations takes these actions (29 CFR 1926.1402(d)).
2. Assembly and Disassembly – Selection of Manufacturer or Employer Procedures

2.1 The employer must follow proper procedures for assembly/disassembly. (29 CFR 1926.1403)

Guide Note
- Verify that the employer selects one of the following types of assembly/disassembly (29 CFR 1926.1403):
  - the applicable manufacturer procedures; or
  - employer procedures, if the employer can demonstrate that the procedures used meet the requirements in 29 CFR 1926.1406 (see section 5).

NOTE: The employer must follow manufacturer’s procedures when using synthetic slings during assembly or disassembly rigging.

3. Assembly and Disassembly – General Requirements

3.1 Assembly and disassembly must be overseen by an assembly/disassembly (A/D) director. (29 CFR 1926.1404(a) – (d))

Guide Note
- Verify that the assembly/disassembly is directed by an A/D 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 (29 CFR 1926.1404(a)(1)).
  NOTE: The person performing the assembly/disassembly may also serve as the A/D Director providing he or she meets all of the criteria (29 CFR 1926.1404(a)(2)).
- Verify that the A/D director understands the applicable assembly/disassembly procedures (29 CFR 1926.1404(b)).
- Verify that the A/D director reviews the applicable procedures immediately prior to the commencement of assembly/disassembly unless he or she already understands the procedures and has applied them to the same type and configuration of equipment, including any accessories (29 CFR 1926.1404(c)).
- Verify that the A/D director ensures that the crew members understand all of the following, both before commencing assembly/disassembly and also during operations if a crew member takes on a different task or if any new crew members are added (29 CFR 1926.1404(d)):
  - their tasks;
  - hazards associated with their tasks; and
  - hazardous positions/locations that they need to avoid.

3.2 Crew members must be protected during assembly/disassembly. (29 CFR 1926.1404(e) – (f))

Guide Note
- Verify that crew members inform the operator before going to a location that is out of the operator’s view and where the crew member will be in, on, under, or near the equipment or load and could be injured by movement of the equipment or load (29 CFR 1926.1404(e)(1)).
- Where the operator knows that a crew member has gone to a potentially hazardous location, verify that the operator does not move any part of the equipment or load without being informed in accordance with a prearranged system of communication that the crew member is in a safe position (29 CFR 1926.1404(e)(2)).
- When pins or similar devices are being removed, verify that employees are not allowed under the boom, jib, or other component (29 CFR 1926.1404(f)(2)).

EXCEPTION: Where the employer demonstrates that site constraints require one or more employees to be under the equipment when pins are being removed, 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 (see Non-mandatory Appendix B of 29 CFR Suppart CC).
3.3 Capacity limits must be observed during assembly/disassembly. 
(29 CFR 1926.1404(g), (j) and (k))

Guide Note
- Verify that during all phases of assembly/disassembly the rated capacity of the equipment being assembled/disassembled is not exceeded (29 CFR 1926.1404(g)).
  NOTE: This requirement applies to the loads imposed on the equipment, equipment components (including rigging), lifting lugs, and equipment accessories.
- Verify that the manufacturer’s limitations on the maximum amount of boom supported only by cantilevering are not exceeded (29 CFR 1926.1404(j)).
  NOTE: Where manufacturer’s limitations are not available, a registered professional engineer familiar with the type of equipment involved must determine a limitation, which must not be exceeded, in writing.
- Verify that the weight of each of the components is readily available (29 CFR 1926.1404(k)).

3.4 The A/D director must address the hazards associated with the operation. (29 CFR 1926.1404(h), (o) and (p))

Guide Note
- Verify that A/D director addresses the following specific hazards (29 CFR 1926.1404(h)):
  - adequacy of site and ground bearing conditions (see section 1);
  - adequacy of the size, amount, condition, and method of stacking the blocking material to sustain the loads and maintain stability;
  - proper location of blocking used to support lattice booms or components to be able to protect the structural integrity of the equipment and prevent dangerous movement and collapse;
  - loads that will be imposed on any assist crane that might be used at each phase of assembly/disassembly (in accordance with 29 CFR 1926.1417(o)(3)) before the operation begins (see paragraph 15.4);
  - suitability of the point(s) of attachment of rigging to a boom (or boom sections, or jib or jib sections) for preventing structural damage and facilitating safe handling of these components;
  - identification of the center of gravity of the load if that is necessary for the method used for maintaining stability;
    NOTE: Where there is not sufficient 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 (see Non-mandatory Appendix B of 29 CFR Subpart CC for an example.)
  - proper rigging or support of the boom sections, boom suspension systems (such as gantry A-frames and jib struts) and components to maintain stability upon the removal of the pins;
  - assurance that suspension ropes and pendants will not catch on the boom or jib connection pins or cotter pins (including keepers and locking pins);
  - potential for unintended movement from inadequately supported counterweights and from hoisting counterweights;
  - backward stability before swinging the upperworks, travel, and when attaching or removing equipment components; and
  - the effect of wind speed and weather on the equipment.
- Verify that each time a boom hoist brake will be relied on to prevent boom movement during assembly/disassembly, the brake has been tested first to determine if it is sufficient to prevent boom movement (29 CFR 1926.1404(h)(10)).
  NOTE: If the brake is not sufficient, a boom hoist pawl, other locking device/back-up braking device, or another method (such as blocking or using an assist crane) of preventing dangerous movement of the boom due to a boom hoist brake failure must be used.
- Verify that reusable shipping pins, straps, links, and similar equipment are removed and stowed or otherwise stored so that they do not present a falling object hazard (29 CFR 1926.1404(o)).
- Verify that equipment used for pile driving does not have a jib attached during pile driving operations (29 CFR 1926.1404(p)).
3.5 Equipment components must be properly selected, configured, and inspected. (29 CFR 1926.1404(m))

Guide Note
- Verify that the selection and configuration of components and equipment that affect the capacity or safe operation of the equipment is in accordance with one of the following (29 CFR 1926.1404(m)):
  - manufacturer’s instructions, prohibitions, limitations, and specifications;
  - where manufacturer’s information is not available, the written approval of a registered professional engineer familiar with the type of equipment involved; or
  - approved modifications that meet the requirements of 29 CFR 1926.1434 (see section 25).
- Verify that upon completion of assembly the equipment is inspected to ensure compliance with this paragraph (see paragraph 11.3 for post-assembly inspection requirements).

3.6 Outriggers and stabilizers must be used in accordance with certain requirements. (29 CFR 1926.1404(q))

Guide Note
- Verify that 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, all of the following requirements are met (29 CFR 1926.1404(q)):
  - the outriggers or stabilizers must be either fully extended or, if the manufacturer’s procedures permit, deployed as specified in the load chart;
  - the outriggers (but not the stabilizers) must be set to remove the equipment weight from the wheels, except for locomotive cranes;
  - for locomotive cranes, the manufacturer’s procedures must be followed either for the use of outriggers and stabilizers or for the use of truck wedges or screws;
  - 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; and
  - outrigger and stabilizer blocking must be adequate and 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.

3.7 Rigging used for assembly/disassembly must meet certain requirements. (29 CFR 1926.1404(r))

Guide Note
- Verify that rigging meets the requirements of 29 CFR 1926.251 (see Materials Handling (Module H) Rulebook section 2) and any other applicable requirements (29 CFR 1926.1404(r)).
- Verify that rigging work is done by a qualified rigger (29 CFR 1926.1404(r)(1)).
- Verify that synthetic slings are protected from abrasive, sharp, or acute edges, and configurations such as distortion or localized compression that could cause a reduction of the sling’s rated capacity (29 CFR 1926.1404(r)(2)).
- Verify that when synthetic slings are used, the manufacturer’s instructions, limitations, specifications, and recommendations are followed (29 CFR 1926.1404(r)(3)).
4. Disassembly – Additional Requirements for Dismantling of Booms and Jibs

4.1 Dismantling of booms and jibs, including when done for changing the length of the equipment, must meet certain requirements. (29 CFR 1926.1405)

Guide Note
- Verify that the following precautions are taken when dismantling a boom or jib for any reason (29 CFR 1926.1405):
  - pins in the pendants must NOT be removed (partly or completely) when the pendants are in tension;
  - pins (top or bottom) on boom sections located between the pendant attachment points and the crane/derrick body must NOT be removed (partly or completely) when the pendants are in tension;
  - pins (top or bottom) on boom sections located between the uppermost boom section and the crane/derrick body must NOT be removed (partly or completely) when the boom is being supported by the uppermost boom section resting on the ground or other support; and
  - 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) must NOT be removed (partly or completely) until the cantilevered section to be removed is fully supported.

5. Assembly and Disassembly – Employer Procedures – General Requirements

5.1 Employer procedures used instead of the manufacturer’s procedures for assembly/disassembly must meet certain requirements. (29 CFR 1926.1406)

Guide Note
- Verify that when using employer procedures instead of the manufacturer’s procedures for assembly/disassembly, the employer ensures that the procedures accomplish the following (29 CFR 1926.1406(a)):
  - prevent collapse or unintended dangerous movement of any part of the equipment;
  - provide adequate support and stability of all parts of the equipment; and
  - 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.
- Verify that employer procedures are developed by a qualified person (29 CFR 1926.1406(b)).

6. Power Line Safety (up to 350 kV) – Assembly and Disassembly

6.1 Certain precautions must be taken during assembly/disassembly of equipment in proximity to power lines. (29 CFR 1926.1407(a) and (c) – (g))

Guide Note
- Verify that the employer determines if any part of the equipment could get closer than 20 feet to a power line during the assembly/disassembly process before beginning assembly/disassembly (29 CFR 1926.1407(a)).
- Verify that in making this determination the employer considers all parts of the equipment, load line, and load, including rigging and lifting accessories, in the direction or area of assembly/disassembly (29 CFR 1926.1407(a)).
- If the determination shows that equipment could get within 20 feet of a power line, verify that the requirements of one of the following options are met (29 CFR 1926.1407(a)):
  - confirm from the utility owner/operator that the power line has been deenergized and visibly grounded at the worksite;
  - ensure that no part of the equipment, load line, or load (including rigging and lifting accessories), gets closer than 20 feet to the power line by implementing the measures specified in paragraph 6.2; or
  - determine if any part of the equipment, load line, or load could get closer to the power line than the minimum clearance distance permitted under Table 1 in paragraph 7.1. If so, the requirements of paragraph 6.2 must be followed to ensure the minimum clearance distance is maintained.

NOTE: In order to allow this determination to be made, the utility owner/operator of the power lines must provide the information about the line’s voltage within two working days of the employer’s request (29 CFR 1926.1407(e)).
Verify that no part of a crane/derrick, load line, or load, whether partially or fully assembled, is allowed below a power line unless the employer has confirmed that the utility owner/operator has deenergized the power line and visibly grounded it at the worksite (29 CFR 1926.1407(c)).

Verify that no part of a crane/derrick, load line, or load, whether partially or fully assembled, is allowed closer to the power line than the minimum clearance distance in Table 1 in paragraph 7.1 unless the employer has confirmed that the utility owner/operator has deenergized the power line and visibly grounded it at the worksite.

Verify that the employer assumes that all power lines are energized unless the utility owner/operator confirms that the power line has been and continues to be deenergized and visibly grounded at the worksite (29 CFR 1926.1407(f)).

Verify that there is at least one electrocution hazard warning conspicuously posted in the cab in view of the operator and at least two posted on the outside of the equipment (29 CFR 1926.1407(g)).

**EXCEPTION:** The exterior warnings are not required for overhead gantry and tower cranes.

### 6.2 If equipment can get closer than 20 feet or alternate minimum clearance distances to energized power lines during assembly/disassembly, encroachment precautions must be taken. (29 CFR 1926.1407)

**Guide Note**
- Where encroachment precautions are required under paragraph 6.1, verify that all of the following requirements are met (29 CFR 1926.1407(b)):
  - a planning meeting must be held with the A/D director, operator, crew, and all other employees who will be in the assembly/disassembly area to review the location of the power line(s) and the steps that will be taken to prevent encroachment which could result in electrocution;
  - if tag lines are used, they must be nonconductive; and
  - at least one of the following additional measures must be in place and determined to be effective:
    1) use of a dedicated spotter who is in continuous contact with the equipment operator (using any necessary communication equipment), has a visual aid to identify the minimum clearance distance, is positioned to effectively gauge the clearance distance, and gives timely information to the operator so that the required clearance distance can be maintained;
    NOTE: Examples of a visual aid include a clearly visible line painted on the ground, line of stanchions, or set of line-of-sight landmarks.
    2) use of a proximity alarm set to give the operator sufficient warning when approaching the minimum clearance distance;
    3) use of a device such as a range control warning device that automatically warns the operator to stop movement when approaching the minimum clearance distance;
    4) use of a device that automatically limits range of movement so that the equipment cannot encroach on the minimum clearance distance; or
    5) use of an elevated warning line, barricade, or a line of signs equipped with flags or similar high-visibility markings in the operator’s view.

### 7. Power Line Safety (up to 350 kV) – Equipment Operations

#### 7.1 Certain precautions must be taken during operation of equipment in proximity to power lines. (29 CFR 1926.1408(a), (c), (d), (e), (f), and (h))

**Guide Note**
- Verify that before beginning operations the employer identifies the work zone by either (29 CFR 1926.1408(a)):
  - demarcating boundaries with flags, a range limit device, a range control warning device, etc., and prohibiting the operator from operating the equipment past those boundaries; or
  - defining the work zone as the area 360º around the equipment, up to the equipment’s maximum working radius.

**NOTE:** OSHA has provided some examples of acceptable demarcation of boundaries using flags in its Standard Interpretation Letter of 3/29/12. These examples may assist employers and auditors in evaluating whether the work zone has been properly identified.
Verify that before beginning operations the employer determines if any part of the equipment load line or load (including rigging and lifting accessories) could get closer than 20 feet to a power line if operated up to the equipment’s maximum working radius in the work zone (29 CFR 1926.1408(b)).

If the determination shows that equipment could get within 20 feet of a power line, verify that the requirements of one of the following options are met (29 CFR 1926.1408(b)):

- confirm from the utility owner/operator that the power line has been deenergized and visibly grounded at the worksite;
- ensure that no part of the equipment, load line, or load (including rigging and lifting accessories), gets closer than 20 feet to the power line by implementing the measures specified in paragraph 7.2; or
- determine if any part of the equipment, load line, or load could get closer to the power line than the minimum clearance distance permitted under Table 1 of this paragraph. If so, the requirements of paragraph 7.2 must be followed to ensure the minimum clearance distance is maintained.

NOTE: In order to allow this determination to be made, the utility owner/operator of the power lines must provide the information about the line’s voltage within two working days of the employer’s request (29 CFR 1926.1408(c)).

Verify that no part of a crane/derrick, load line, or load is allowed below a power line unless the employer has confirmed that the utility owner/operator has deenergized the power line and visibly grounded it at the worksite (29 CFR 1926.1408(d)(1)).

EXCEPTIONS: This requirement does not apply where the employer demonstrates one of the following (29 CFR 1926.1408(d)(2)):

- the work is covered by 29 CFR 1926 Subpart V (see Power Transmission and Distribution (Module V));
- for equipment with non-extensible booms, the uppermost part of the equipment with the boom at true vertical would be more than 20 feet or more than the Table 1 minimum clearance distance below the plane of the power line;
- for equipment with articulating or extensible booms, the uppermost part of the equipment with the boom in the fully extended position, at true vertical, would be more than 20 feet or more than the Table 1 minimum clearance distance below the plane of the power line; or
- it is infeasible to prohibit work below the power line, and the employer meets the requirements of 29 CFR 1926.1410 (see section 9).

Verify that the employer assumes that all power lines are energized unless the utility owner/operator confirms that the power line has been and continues to be deenergized and visibly grounded at the worksite (29 CFR 1926.1408(e)).

When working near transmitter/communication towers where the equipment is close enough for an electrical charge to be induced in the equipment or materials being handled, verify that the transmitter is deenergized or that both of the following precautions has been taken (29 CFR 1926.1408(f)):

- the equipment has been provided with an electrical ground; and
- if tag lines are used, they must be non-conductive.

Verify that devices originally designed by the manufacturer for use as a safety device, operational aid, or a means to prevent power line contact or electrocution meet the manufacturer’s procedures for use and conditions of use when used to comply with this section (29 CFR 1926.1408(h)).

<table>
<thead>
<tr>
<th>Table 1: Minimum Clearance Distances</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal Voltage AC (in kV)</td>
</tr>
<tr>
<td>---------------------------</td>
</tr>
<tr>
<td>up to 50</td>
</tr>
<tr>
<td>over 50 to 200</td>
</tr>
<tr>
<td>over 200 to 350</td>
</tr>
<tr>
<td>over 350 to 500</td>
</tr>
<tr>
<td>over 500 to 750</td>
</tr>
<tr>
<td>over 750 to 1,000</td>
</tr>
<tr>
<td>over 1,000</td>
</tr>
</tbody>
</table>

Source: 29 CFR 1926.1408 Table A
7.2 If equipment can get closer than 20 feet or alternate minimum clearance distances to energized power lines during operation in the work zone, encroachment precautions must be taken. (29 CFR 1926.1408)

Guide Note
- Where encroachment precautions are required under paragraph 7.1, verify that all of the following requirements are met (29 CFR 1926.1408(b)):
  - a planning meeting must be held with the operator and all other employees 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 taken to prevent encroachment which could result in electrocution;
  - if tag lines are used, they must be nonconductive;
  - an elevated warning line, barricade, or a line of signs equipped with flags or similar high-visibility markings, must be erected in view of the operator at 20 feet from the power line or at the minimum approach distance in Table 1 (see paragraph 7.1) as appropriate to the option being used; and
  
  NOTE: If the operator is unable to see the elevated warning line, the use of a dedicated spotter as described in the following additional measures becomes mandatory, rather than optional.
  - at least one of the following additional measures must be in place and determined to be effective:
    1) use of a dedicated spotter who is in continuous contact with the equipment operator (using any necessary communication equipment), has a visual aid to identify the minimum clearance distance, is positioned to effectively gauge the clearance distance, and gives timely information to the operator so that the required clearance distance can be maintained;
    
    NOTE: Examples of a visual aid include a clearly visible line painted on the ground, line of stanchions, or a set of line-of-sight landmarks.
  2) use of a proximity alarm set to give the operator sufficient warning when approaching the minimum clearance distance;
  3) use of a device such as a range control warning device that automatically warns the operator to stop movement when approaching the minimum clearance distance;
  4) use of a device that automatically limits range of movement so that the equipment cannot encroach on the minimum clearance distance; or
  5) use of an insulating device installed at a point between the end of the load line (or below) and the load.

EXCEPTION: The use of one of these additional measures is not required for work covered in 29 CFR 1926 Subpart V (see Power Transmission and Distribution (Module V)).

7.3 Operators, crew members, and dedicated spotters must be properly trained. (29 CFR 1926.1408(g))

Guide Note
- Verify that operators and crew members are trained in the procedures to be followed in the event of electrical contact with a power line, including (29 CFR 1926.1408(g)(1)):
  - information regarding the danger of electrocution from the operator simultaneously touching 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; and
  - safe clearance distance from power lines.

- Verify that operators and crew members are also trained in the following information (29 CFR 1926.1408(g)(1)):
  - power lines are always presumed to be energized unless the utility owner/operator confirms that the power line has been and continues to be deenergized and visibly grounded at the worksite;
  - power lines are always presumed to be uninsulated unless the utility owner/operator or a registered engineer who is a qualified person with respect to electrical power transmission and distribution confirms that a line is insulated;
  - the limitations of any insulating link/devices, proximity alarms, range control devices, etc., used; and
  - the procedures to be followed to properly ground equipment and the limitations of grounding.
8. **Power Line Safety (over 350 kV)**

8.1 Certain precautions must be taken during assembly/disassembly and operation of equipment in proximity to power lines over 350 kV. (29 CFR 1926.1409)

Guideline Note

- Verify that all work in proximity to power lines over 350 kV meets the requirements of sections 6 and 7 with the following differences (29 CFR 1926.1409):
  - for power lines at or below 1000 kV, wherever the distance “20 feet” is specified, the distance “50 feet” must be substituted; and
  - for power lines over 1000 kV, the minimum clearance distance must be established by the utility owner/operator or registered professional engineer who is a qualified person with respect to electrical power transmission and distribution.

9. **Power Line Safety (all voltages) – Equipment Operations**

9.1 Equipment operations in which any part of the equipment, load line, or load (including rigging and lifting accessories) is closer to an energized power line than the minimum approach distance under Table 1 in paragraph 7.1 is prohibited, unless certain conditions are all met. (29 CFR 1926.1410)

Guideline Note

- Verify that the employer determines that it is infeasible to do the work without breaching the specified minimum approach distances (29 CFR 1926.1410(a)).
- Verify that the employer consults with the utility owner/operator and that together they determine that it is infeasible to deenergize and ground the power line or relocate it (29 CFR 1926.1410(b)).
- Verify that the power line owner/operator or a registered professional engineer who is a qualified person with respect to electrical power transmission and distribution determines the minimum clearance distance that must be maintained to prevent electrical contact in light of the on-site conditions, after considering at least the following factors (29 CFR 1926.1410(c)(1)):
  - 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
  - any other conditions affecting the ability to prevent electrical contact.

**EXCEPTION:** This requirement does not apply to work covered by 29 CFR 1926 Subpart V. For such work, the minimum clearance distances specified in 29 CFR 1926.950 Table V-1 apply. Employers engaged in Subpart V work are permitted to work closer than the distances in 29 CFR 1926.960(c)(1)(i) (see Power Transmission and Distribution (Module V) Rulebook section 12) (29 CFR 1926.1410(c)(2)).

- Verify that a planning meeting is held with the employer and utility owner/operator or qualified registered professional engineer to determine the procedures that will be followed to prevent electrical contact and electrocution, and that those procedures include at least the following (29 CFR 1926.1410(d)):
  - If the power line is equipped with a device that automatically reenergizes the circuit in the event of a power line contact, the automatic reclosing feature of the circuit-interrupting device must be made inoperative (if the design of the device permits) before the work begins.
  - A dedicated spotter who is in continuous contact with the equipment operator (using any necessary communication equipment), has a visual aid to identify the minimum clearance distance, is positioned to effectively gauge the clearance distance, and gives timely information to the operator so that the required clearance distance can be maintained must be used.
NOTE: Examples of a visual aid include a clearly visible line painted on the ground, a line of stanchions, or a set of line-of-sight landmarks.

- 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 used to prevent electrical contact.

EXCEPTION: The warning line or barricade is not required for work covered by 29 CFR 1926 Subpart V.

- An insulating link/device must be installed at a point between the end of the load line (or below) and the load.

EXCEPTION 1: For work covered by 29 CFR 1926 Subpart V this requirement applies only when working inside the 29 CFR 1926.950 Table V-1 clearance distances. Where use of an insulating link/device is infeasible in this type of work, the requirements of 29 CFR 1910.269(p)(4)(iii)(B) or (C) may be substituted for the requirement for an insulating link/device.

EXCEPTION 2: Until November 8, 2011, insulating or guarding all employees (excluding equipment operators located on the equipment) who may come in contact with the equipment, the load line, or the load from such contact is an acceptable alternative to the requirement for an insulating link/device. Insulating gloves rated for the voltage of the power line meet this alternate requirement (29 CFR 1926.1410(d)(4)(iv)).

EXCEPTION 3: Until November 8, 2013, the employer may use an insulating link/device that has not been approved by a Nationally Recognized Testing Laboratory as long as the device is maintained and used in accordance with manufacturer requirements and recommendations and employees are also insulated or guarded with additional means such as properly rated insulating gloves (29 CFR 1926.1410(d)(4)(v)).

- If the rigging may encroach on the required minimum clearance distance, it must be nonconductive.
- 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 from breaching the minimum approach distance established by the utility owner/operator or qualified registered professional engineer.
- If tag lines are used, they must be non-conductive.
- Barricades forming a perimeter at least 10 feet away from the equipment must be used to prevent unauthorized personnel from entering the work area. In areas where obstacles prevent the barricade from being at least 10 feet away, it 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.
- Operators operating the equipment remotely from the ground 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 may be allowed 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.

- Verify that these procedures are documented and immediately available on-site (29 CFR 1926.1410(e)).
- Verify that the equipment user and utility owner/operator or qualified registered professional engineer meet with the equipment operator and the other workers who will be in the area of the equipment or load to review the procedures that will be implemented to prevent breaching the minimum approach distance and the potential for electrocution (29 CFR 1926.1410(f)).
- Verify that the procedures are implemented as developed (29 CFR 1926.1410(g)).
- Verify that the utility owner/operator (or registered professional engineer) and all employers of employees involved in the work identify one person who will direct the implementation of the procedures and who has the authority to stop work at any time to ensure safety (29 CFR 1926.1410(h)).
- Verify that if a problem occurs with the implementation of the procedures, or there is an indication that the procedures are not adequate, the employer safely stops operations and either develops new procedures or has the utility owner/operator deenergize and visibly ground or relocate the power line before resuming work (29 CFR 1926.1410(j)).
- Verify that devices originally designed by the manufacturer for use as safety devices, operational aids, or a means to prevent power line contact or electrocution comply with the manufacturer’s procedures for use and conditions of use when used to comply with this section (29 CFR 1926.1410(k)).
- Verify that the employer trains each operator and crew member assigned to work with the equipment in accordance with 29 CFR 1926.1408(g) (see paragraph 7.3) (29 CFR 1926.1410(m)).
10. Power Line Safety – Traveling

This section establishes procedures and criteria that must be met for equipment on a construction site when traveling under or near a power line with no load. Equipment traveling with a load is governed by 29 CFR 1926.1408, 29 CFR 1926.1409 or 29 CFR 1926.1410 (whichever is appropriate), and 29 CFR 1926.1417(u).

10.1 Certain precautions must be taken when traveling under or near power lines with no load. (29 CFR 1926.1411)

Guide Note

- Verify that the employer ensures that the boom/mast and boom/mast support system are lowered sufficiently while traveling (29 CFR 1926.1411(b)(1)).
- Verify that the clearances, specified in Table 1 of this paragraph, are maintained (29 CFR 1926.1411(b)(2)).
- Verify that the effects of speed and terrain on equipment movement (including movement of the boom/mast) are considered so that they do not cause the minimum clearance distances, specified in Table 1 of this paragraph, to be breached (29 CFR 1926.1411(b)(3)).
- If any part of the equipment will get closer than 20 feet to the power line during travel, verify that a dedicated spotter is used who is in continuous contact with the equipment operator (using any necessary communication equipment), has a visual aid to identify the minimum clearance distance, is positioned to effectively gauge the clearance distance, and gives timely information to the operator so that the required clearance distance can be maintained (29 CFR 1926.1411(b)(4)).
- When traveling at night or in conditions of poor visibility, verify that following additional precautions are taken (29 CFR 1926.1411(b)(5)):
  - the power lines are illuminated or another means of identifying the location of the lines is used; and
  - a safe path of travel is identified and used.

<table>
<thead>
<tr>
<th>Nominal Voltage AC (in kV)</th>
<th>Minimum Clearance Distance (in feet)</th>
</tr>
</thead>
<tbody>
<tr>
<td>up to 0.75</td>
<td>4</td>
</tr>
<tr>
<td>over 0.75 to 50</td>
<td>6</td>
</tr>
<tr>
<td>over 50 to 345</td>
<td>10</td>
</tr>
<tr>
<td>over 345 to 750</td>
<td>16</td>
</tr>
<tr>
<td>over 750 to 1,000</td>
<td>20</td>
</tr>
<tr>
<td>over 1,000</td>
<td>As established by the utility owner/operator or registered professional engineer who is a qualified person with respect to electrical power transmission and distribution.</td>
</tr>
</tbody>
</table>

Source: 29 CFR 1926.1411 Table T
11. Inspections

11.1 Modified equipment must be inspected in accordance with certain requirements. (29 CFR 1926.1412(a))

Guide Note
- Verify that equipment that has had modifications or additions which affect its safe operation (such as those 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 is inspected by a qualified person prior to initial use (29 CFR 1926.1412(a)(1)).
- Verify that the inspection includes the following (29 CFR 1926.1412(a)(1)):
  - assurance that the modifications or additions have been done in accordance with the approval obtained pursuant to 29 CFR 1926.1434 (see section 25); and
  - functional testing of the equipment.
- Verify that the equipment is not used until the inspection demonstrates that the equipment modifications or additions have been done properly (29 CFR 1926.1412(a)(2)).

11.2 Repaired or adjusted equipment must be inspected in accordance with certain requirements. (29 CFR 1926.1412(b))

Guide Note
- Verify that equipment that has had a repair or adjustment which relates to its safe operation (such as those 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) is inspected by a qualified person prior to initial use (29 CFR 1926.1412(b)(1)).
- Verify that the inspection includes the following (29 CFR 1926.1412(b)(1)):
  - determination if the repair/adjustment meets the manufacturer’s equipment criteria (where applicable and available);
  - where the manufacturer’s equipment criteria are unavailable or not applicable, a determination as to whether criteria can be developed by the qualified person, or whether criteria must be developed by a registered professional engineer (RPE);
  - where the manufacturer’s equipment criteria are unavailable or not applicable, development of criteria by a qualified person or an RPE, as appropriate; and
  - functional testing of the equipment.
- Verify that the equipment is not used until the inspection demonstrates that the equipment repairs or adjustments have been made properly (29 CFR 1926.1412(b)(4)).

11.3 Post-assembly inspections must be conducted in accordance with certain requirements. (29 CFR 1926.1412(c))

Guide Note
- Verify that equipment is inspected by a qualified person upon completion of assembly to assure that it is configured in accordance with the manufacturers equipment criteria (29 CFR 1926.1412(c)(1)).
- Where the manufacturer’s equipment criteria are unavailable, verify that a determination is made as to whether criteria can be developed by the qualified person, or whether criteria must be developed by an RPE (29 CFR 1926.1412(c)(2)).
- Where the manufacturer’s equipment criteria are unavailable, verify that criteria are developed by a qualified person or an RPE, as appropriate (29 CFR 1926.1412(c)(2)).
- Verify that the equipment is not used until the inspection demonstrates that the equipment is properly configured (29 CFR 1926.1412(c)(3)).
11.4 Inspections must be conducted in accordance with certain requirements prior to each shift that the equipment will be used. (29 CFR 1926.1412(d))

Guide Note

- Verify that a competent person begins a visual inspection of equipment prior to each shift when the equipment will be used, and completes the inspection before or during the shift (29 CFR 1926.1412(d)(1)).
  NOTE: The inspector is not required to take apart equipment components or “boom down” unless the results of the visual inspection or trial operation indicate that further investigation necessitating taking apart equipment components or booming down is needed.
- Verify that the inspection includes at least the following (29 CFR 1926.1412(d)(1)):
  - observation for apparent deficiencies;
  - 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, in accordance with 29 CFR 1926.1413(a) (see paragraph 12.1);
  - electrical apparatus for malfunctioning, signs of apparent excessive deterioration, and 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 condition;
    NOTE: This requirement does not apply to the inspection of ground conditions for railroad tracks and their underlying support when the railroad tracks are part of the general railroad system of transportation that is regulated pursuant to the Federal Railroad Administration under 49 CFR 213.
  - 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 has rail traveling; and
    NOTE: This requirement does not apply to the inspection of ground conditions for railroad tracks and their underlying support when the railroad tracks are part of the general railroad system of transportation that is regulated pursuant to the Federal Railroad Administration under 49 CFR 213.
  - safety devices and operational aids for proper operation.
- Verify that determinations made in conducting the inspection are reassessed in light of observations made during operation (29 CFR 1926.1412(d)(1)).
- If any deficiency is identified (including in additional inspection items required to be checked for specific types of equipment in accordance with other sections of this module), verify that an immediate determination is made by the competent person as to whether the deficiency constitutes a safety hazard (29 CFR 1926.1412(d)(2)).
- If a deficiency is determined to be a safety hazard, verify that the equipment is taken out of service until the deficiency has been corrected (29 CFR 1926.1412(d)(2)).
- If a deficiency is identified in a safety device or operational aid, verify that the actions required in 29 CFR 1926.1415 and 29 CFR 1926.1416 are taken prior to using the equipment (see section 14) (29 CFR 1926.1412(d)(3)).
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11.5 Certain monthly inspections must be conducted. (29 CFR 1926.1412(e))

Guide Note
- Verify that each month the equipment is in service it is inspected in accordance with paragraph 11.4 (29 CFR 1926.1412(e)(1)).
- Verify that equipment is not used until a monthly inspection demonstrates that no corrective action is required in accordance with paragraph 11.4 (29 CFR 1926.1412(e)(2)).
- Verify that the employer who conducts the inspection maintains the following documentation for at least three months (29 CFR 1926.1412(e)(3)):
  - the items checked and the results of the inspections; and
  - the name and signature of the person who conducted the inspection and the date.

11.6 Comprehensive inspections must be conducted annually. (29 CFR 1926.1412(f))

Guide Note
- Verify that a qualified person inspects the equipment at least every 12 months in accordance with paragraph 11.5 (29 CFR 1926.1412(f)(1)).

NOTE: For comprehensive annual inspections, the corrective actions specified in this paragraph must be implemented, not those called for in paragraph 11.5.
- Verify that at least every 12 months the qualified person also conducts an inspection for all of the following (29 CFR 1926.1412(f)(2)):

  NOTE: Disassembly is required as necessary to complete the inspection:
  - equipment structure (including the boom and, if equipped, the jib) for deformed, cracked, or significantly corroded structural members; loose, failed, or significantly corroded bolts, rivets, or other fasteners; or cracked welds;
  - 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 shut-down 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:
    1) flexible hose or its junction with the fittings for indications of leaks;
    2) threaded or clamped joints for leaks;
    3) outer covering of the hose for blistering, abnormal deformation, or other signs of failure/impending failure; and
    4) outer surface of a hose, rigid tube, or fitting for indications of excessive abrasion or scrubbing.
  - hydraulic and pneumatic pumps and motors, as follows:
    1) performance indicators: unusual noises or vibration, low operating speed, excessive heating of the fluid, low pressure;
    2) loose bolts or fasteners; and
    3) shaft seals and joints between pump sections for leaks.
  - hydraulic and pneumatic valves, as follows:
    1) spools: sticking, improper return to neutral, and leaks;
    2) leaks;
    3) valve housing cracks; and
    4) relief valves for failure to reach correct pressure (using the manufacturer’s procedure for checking pressure if such exists).
  - hydraulic and pneumatic cylinders, as follows:
    1) drifting caused by fluid leaking across the piston;
    2) rod seals and welded joints for leaks;
    3) cylinder rods for scores, nicks, or dents;
    4) case (barrel) for significant dents; and
    5) rod eyes and connecting joints that are 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;
- missing or illegible warning labels and decals originally supplied with the equipment by the manufacturer or otherwise required under this standard;
- missing originally equipped operator seat (or equivalent);
- unserviceable operator seat;
- missing originally equipped steps, ladders, handrails, or guards; and
- unusable or damaged steps, ladders, handrails, or guards.

- Verify that the inspection includes functional testing to determine that the equipment as configured in the inspection is functioning properly (29 CFR 1926.1412(f)(3)).
- If any deficiency is identified, verify that an immediate determination is made by the qualified person as to whether the deficiency constitutes a safety hazard or, though not yet a safety hazard, needs to be monitored in the monthly inspections (29 CFR 1926.1412(f)(4)).
- If the qualified person determines that a deficiency is a safety hazard, verify that the equipment is taken out of service until it has been corrected, except when temporary alternative measures are implemented as specified in 29 CFR 1926.1416(d) (see paragraph 14.3) or 29 CFR 1926.1435(e) (see paragraph 26.3) (29 CFR 1926.1412(f)(5)).
- If the qualified person determines that the deficiency is not presently a safety hazard but needs to be monitored, verify that the employer ensures that the deficiency is checked in the monthly inspections (29 CFR 1926.1412(f)(6)).
- Verify that the employer that conducts the inspection maintains the following documentation for at least 12 months (29 CFR 1926.1412(f)(7)):
  - the items checked and the results of the inspections; and
  - the name and signature of the person who conducted the inspection and the date.

11.7 Additional inspections must be conducted when the severity of use/conditions is such that there is a reasonable probability of damage or excessive wear. (29 CFR 1926.1412(g))

Guide Note
- Where the severity of use or conditions is such that there is a reasonable probability of damage or excessive wear (such as loading or shock loading that may have exceeded rated capacity, prolonged exposure to a corrosive atmosphere, etc.), verify that the employer stops the work and a qualified person does the following (29 CFR 1926.1412(g)):
  - inspects the equipment for structural damage to determine if it can continue to be used safely;
  - determines whether there are indications that any of the items in paragraph 11.6 need to be inspected, and inspects them as needed;
  - evaluates the seriousness of any deficiencies found; and
  - takes the equipment out of service, takes temporary alternate measures, or continues to monitor the deficiency as appropriate.

11.8 Equipment that has been idle for three months or more must be inspected. (29 CFR 1926.1412(h))

Guide Note
- Where equipment has been idle for three months or more, verify that it is inspected in accordance with requirements of paragraph 11.7 before being put in use (29 CFR 1926.1412(h)).

11.9 Certain additional requirements must be met. (29 CFR 1926.1412(j) and (k))

Guide Note
- Where the manufacturer’s procedures for inspections relating to safe operation of the equipment (such as for 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) are more comprehensive or call for a higher frequency than those in this section, verify that the manufacturer’s procedures are followed (29 CFR 1926.1412(j)).
- Verify that all required documents are made available to all persons who conduct inspections for the required retention times (29 CFR 1926.1412(k)).
12. Wire Rope – Inspection

12.1 Inspections must be conducted in accordance with certain requirements prior to each shift when wire ropes will be used. (29 CFR 1926.1413(a))

Guide Note
- Verify that a competent person begins a visual inspection of running and standing wire ropes prior to each shift when the equipment will be used, and completes the inspection before or during the shift (29 CFR 1926.1413(a)(1)).
  NOTE: The inspector is not required to untwist (open) the wire rope as part of the inspection.
- Verify that the inspection includes the following Category I apparent deficiencies (29 CFR 1926.1413(a)(2)(i)):
  - 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; and
  - significantly corroded, cracked, bent, or worn end connections (such as from severe service).
- Verify that the inspection includes the following Category II apparent deficiencies (29 CFR 1926.1413(a)(2)(ii)):
  - in running wire ropes: six randomly distributed visible 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 visible 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 visible broken wires in one rope lay located in rope beyond end connections and/or more than one broken wire in a rope lay located at an end connection; and
  - a diameter reduction of more than five percent from nominal diameter in any rope.
- Verify that the inspection includes the following Category III apparent deficiencies (29 CFR 1926.1413(a)(2)(iii)):
  - in rotation-resistant wire rope, core protrusion or other distortion indicating core failure;
  - prior electrical contact with a power line; and
  - a broken strand.
- Verify that the inspection gives particular attention to all of the following critical review items (29 CFR 1926.1413(a)(3)):
  - 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; and
  - wire rope in contact with saddles, equalizer sheaves, or other sheaves where rope travel is limited.

12.2 If deficiencies are found during the shift inspections, certain actions must be taken. (29 CFR 1926.1413(a)(4))

Guide Note
- If a deficiency is found in a Category I item, verify that the competent person determines if the deficiency constitutes a safety hazard and, if so, stops the operations using the wire rope until either of the following occurs (29 CFR 1926.1413(a)(4)(i)):
  - the wire rope is replaced; or
  - if the deficiency is localized, the wire rope is cut in two, and operations continue with the undamaged portion providing this portion is long enough that the drum will still have two wraps of wire when the load and/or boom is in its lowest position.
  NOTE: Joining lengths of wire rope by splicing is prohibited.
- If a deficiency is found in a Category II item, verify that operations using the wire rope are stopped until one of the following occurs (29 CFR 1926.1413(a)(4)(ii)):
  - the employer complies with the wire rope manufacturer’s established criteria for removal from service or a different criteria that the wire rope manufacturer has approved in writing for that specific wire rope;
12.3 Certain monthly inspections must be conducted. (29 CFR 1926.1413(b))

Guide Note

- Verify that each month that the equipment is in service it is inspected in accordance with paragraph 12.1 (29 CFR 1926.1413(b)(1)).
- Verify that the inspection includes any items that were determined to require monitoring during annual inspections in accordance with paragraph 12.4 (29 CFR 1926.1413(b)(2)).
- Verify that equipment is not used until a monthly inspection demonstrates that no corrective action is required in accordance with paragraph 12.2 (29 CFR 1926.1413(b)(3)).
- Verify that the employer that conducts the inspection maintains the following documentation for at least three months (29 CFR 1926.1413(b)(4)):
  - the items checked and the results of the inspections; and
  - the name and signature of the person who conducted the inspection and the date.

12.4 Comprehensive inspections must be conducted annually. (29 CFR 1926.1413(c))

Guide Note

- Verify that a qualified person inspects wire ropes in use on equipment at least every 12 months in accordance with paragraph 12.1 (29 CFR 1926.1413(c)(1)).
- Verify that the inspection meets the following requirements (29 CFR 1926.1413(c)(2)):
  - the inspection must be complete and thorough, covering the surface of the entire length of the wire ropes;
  - the inspection must look for Category I, Category II, and Category III deficiencies;
  - particular attention given to all of the following:
    1) critical review items listed in paragraph 12.1;
    2) those portions of the rope that are normally hidden during shift and monthly inspections;
    3) wire rope subject to reverse bends; and
    4) wire rope passing over sheaves.
- If inspections cannot be conducted in accordance with these requirements due to existing set-up and configuration of the equipment (such as where an assist crane is needed) or due to site conditions (such as a dense urban setting), verify that they are conducted as soon as it becomes feasible, but no longer than an additional six months for running ropes and at the time of disassembly for standing ropes (29 CFR 1926.1413(c)(2)(iii)).
- If any deficiency is identified, verify that an immediate determination is made by the qualified person as to whether the deficiency constitutes a safety hazard and, if so, that operations are stopped until either of the following occurs (29 CFR 1926.1413(c)(3)(i)).
  - the wire rope is replaced; or
  - if the deficiency is localized, the wire rope is cut in two, and operations continue with the undamaged portion providing this portion is long enough that the drum will still have two wraps of wire when the load and/or boom is in its lowest position.
  NOTE: Joining lengths of wire rope by splicing is prohibited.
If the qualified person determines that the deficiency is not presently a safety hazard but needs to be monitored, verify that the employer ensures that the deficiency is checked in the monthly inspections (29 CFR 1926.1413(c)(3)(ii)).

Verify that the employer who conducts the inspection maintains the following documentation for at least 12 months (29 CFR 1926.1413(c)(4)):
- the items checked and the results of the inspections; and
- the name and signature of the person who conducted the inspection and the date.

12.5 Certain additional requirements must be met. (29 CFR 1926.1413(d) and (e))

Guide Note
- Verify that rope lubricants that hinder inspection are not used (29 CFR 1926.1413(d)).
- Verify that all required documents are made available to all persons who conduct inspections for the required retention times (29 CFR 1926.1413(e)).

13. Wire Rope – Selection and Installation Criteria

For the purposes of this section, rotation-resistant ropes are defined as follows (29 CFR 1926.1414(e)(1)):
- Type I rotation-resistant rope is stranded rope constructed to have little or no tendency to rotate or, if guided, transmits little or no torque. It has at least 15 outer strands and comprises an assembly of at least three layers of strands laid helically over a center in two operations. The direction of lay of the outer strands is opposite to that of the underlying layer.
- Type II rotation-resistant rope is stranded rope constructed to have significant resistance to rotation. It has at least 10 outer strands and comprises an assembly of two or more layers of strands laid helically over a center in two or three operations. The direction of lay of the outer strands is opposite to that of the underlying layer.
- Type III rotation-resistant rope is stranded rope constructed to have limited resistance to rotation. It has no more than nine outer strands, and comprises an assembly of two layers of strands laid helically over a center in two operations. The direction of lay of the outer strands is opposite to that of the underlying layer.

13.1 Wire rope must be selected and installed in accordance with certain requirements. (29 CFR 1926.1414(a) – (c) and (f) – (h))

Guide Note
- Verify that original equipment wire rope and replacement wire rope are selected and installed in accordance with the requirements of this section (29 CFR 1926.1414(a)).
- Verify that replacement wire rope is selected in accordance with the recommendations of the wire rope manufacturer, the equipment manufacturer, or a qualified person (29 CFR 1926.1414(a)).
- Verify that wire rope other than rotation-resistant rope complies with one of the following options (29 CFR 1926.1414(b)):
  - wire rope must comply with section 5-1.7.1 of ASME B30.5-2004 with the exception of paragraph c; or
  - wire rope must be designed to have a sufficient minimum breaking force and design factor in relation to the equipment’s rated capacity so that compliance with the applicable inspection provisions in Section 12 will be an effective means of preventing sudden rope failure.
- Verify that wire rope is compatible with the safe functioning of the equipment (29 CFR 1926.1414(c)).
- Verify that wire rope clips used in conjunction with wedge sockets are 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 (29 CFR 1926.1414(f)).
- Verify that socketing is done in the manner specified by the manufacturer of the wire rope or fitting (29 CFR 1926.1414(g)).
- Verify that seizings are placed on each side of the point to be cut prior to cutting a wire rope, with the length and number of seizings in accordance with the wire rope manufacturer’s instructions (29 CFR 1926.1414(h)).
13.2 Wire rope used in boom hoist reeving must meet certain requirements. (29 CFR 1926.1414(d) and (e)(4))

Guide Note
- Verify that fiber core ropes are not used for boom hoist reeving, except for derricks (29 CFR 1926.1414(d)(1)).
- Verify that rotation-resistant ropes are not used for boom hoist reeving, except when load hoists are used as boom hoists for attachments such as luffing attachments or boom and mast attachment systems, and all of the following requirements are met (29 CFR 1926.1414(e)(4)(ii)):
  - the drum must provide a first layer rope pitch diameter of no less than 18 times the nominal diameter of the rope used;
  - the use of equipment in which the boom is designed to free fall (live boom) is prohibited in all of the circumstances listed in 29 CFR 1926.1426(a) (irrespective of the date of manufacture of the equipment) (see paragraph 18.3);
  - where the use of equipment with a boom that is designed to free fall (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 in accordance with 29 CFR 1926.1426(b) (see paragraph 18.3);
  - the requirements in ASME B30.5-2004 sections 5-1.3.2(a), (a)(2) – (a)(4), (b), and (d) except that the minimum pitch diameter for sheaves used in multiple rope reeving is 18 times the nominal diameter of the rope used (instead of the value of 16 specified in section 5-1.3.2(d));
  - all sheaves used in the boom hoist reeving system must have a rope pitch diameter of no less than 18 times the nominal diameter of the rope used;
  - the operating design factor for the boom hoist reeving system must be no less than 5;
  - the operating design factor for these ropes must be the total minimum breaking force of all parts of rope in the system divided by the load imposed on the rope system when supporting the static weights of the structure and the load within the equipment’s rated capacity; and
  - when provided, a power-controlled lowering system must be capable of handling rated capacities and speeds as specified by the manufacturer.

13.3 Rotation-resistant rope must meet certain requirements. (29 CFR 1926.1414(e))

Guide Note
- Verify that Types II and III rotation-resistant rope with an operating design factor of less than 5 is not used for duty cycle or repetitive lifts (29 CFR 1926.1414(e)(2)(i)).
- Verify that all types of rotation-resistant rope have an operating design factor of no less than 3.5 (29 CFR 1926.1414(e)(2)(ii)).
- Verify that Type I has an operating design factor of no less than 5, except where the wire rope manufacturer and the equipment manufacturer approves the design factor in writing (29 CFR 1926.1414(e)(2)(iii)).
- Verify that Types II and III rotation-resistant rope have an operating design factor of no less than 5, except where the following requirements are met for each lifting operation (29 CFR 1926.1414(e)(2)(iv) and (e)(3)):
  - a qualified person must inspect the rope in accordance with 29 CFR 1926.1413(a) (see paragraph 12.1);
  - the rope must be used only if the qualified person determines that there are no deficiencies constituting a hazard;
  - operations must be conducted in such a manner and at such speeds as to minimize dynamic effects; and
  - each lift made must be recorded in the monthly and annual inspection documents and considered by the qualified person in determining whether to use the rope again.
14. Safety Devices and Operational Aids

14.1 Certain safety devices are required on all equipment, unless otherwise specified. (29 CFR 1926.1415)

Guide Note
- Verify that all equipment has the following safety devices, unless otherwise specified (29 CFR 1926.1415(a)):  
  - a crane level indicator that is either built into the equipment or is available on the equipment;
    LIMITING NOTE: If a crane-level indicator is not working properly it must be removed, or for a built-in indicator it may be tagged out.
    EXCEPTION: A crane-level indicator is not required on portal cranes, derricks, floating cranes/derricks, and land cranes/derricks on barges, pontoons, vessels, or other means of floatation.
  - boom stops, except for derricks and hydraulic booms;
  - jib stops (if a jib is attached), except for derricks;
  - locks on equipment with foot pedal brakes;
  - an integral holding device/check valve on hydraulic outrigger jacks and hydraulic stabilizer jacks;
  - rail clamps and rail stops on equipment on rails, except for portal cranes; and
  - a horn that is either built into the equipment or is on the equipment and immediately available to the operator.
    LIMITING NOTE: If a horn is not working properly it must be removed, or for a built-in horn it may be tagged out.
- Verify that operations do not begin unless all of the listed devices listed are in proper working order (29 CFR 1926.1415(b)).
- If a device stops working properly during operations, verify that the operator safely stops operations (29 CFR 1926.1415(b)).
- If any of the listed devices are not in proper working order, verify that the equipment is taken out of service, no alternative measures are used, and operations do not resume until the device is working properly again (29 CFR 1926.1415(b)).

14.2 Certain operational aids are required on all equipment, unless otherwise specified. (29 CFR 1926.1416(b) and (c))

Guide Note
- Verify that operations do not begin unless the listed operational aids are in proper working order, except where an operational aid is being repaired and the employer uses the specified temporary alternative measures (29 CFR 1926.1416(b)).
  LIMITING NOTE: If the equipment manufacturer specifies more protective alternative measures, they must be followed.
- Verify that if a listed operational aid stops working properly during operations the operator safely stops operations until the temporary alternative measures (see paragraphs 14.3 and 14.4) are implemented or the device is again working properly (29 CFR 1926.1416(c)).
  LIMITING NOTE: If a replacement part is no longer available, the use of a substitute device that performs the same type of function is permitted and is not considered a modification.

14.3 Category I devices must be repaired no later than seven calendar days after a deficiency occurs. (29 CFR 1926.1416(d))

Guide Note
- Verify that Category I devices (listed in Table 1 of this paragraph) are repaired no later than seven calendar days after a deficiency occurs or seven days after receipt of the parts as long as the employer demonstrates that the necessary parts were ordered within seven calendar days after the deficiency occurred (29 CFR 1926.1416(d)).
Table 1: Category I Devices and Acceptable Temporary Alternative Measures

<table>
<thead>
<tr>
<th>Device</th>
<th>Acceptable Temporary Alternative Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boom hoist limiting device on equipment manufactured after December 16, 1969:</td>
<td>• at least one of the following:</td>
</tr>
<tr>
<td>NOTE: If the equipment was manufactured on or before December 16, 1969 and is not equipped with a boom hoist limiting device, at least one of these temporary alternative measures must be used as a permanent substitute.</td>
<td>- a boom angle indicator;</td>
</tr>
<tr>
<td></td>
<td>- a mark clearly made on the boom hoist cable (so that it can easily be seen by the operator) at a point that will give the operator enough time to stop the hoist to keep the boom within the minimum allowable radius, along with mirrors or remote video cameras and displays if necessary for the operator to see the mark; or</td>
</tr>
<tr>
<td></td>
<td>- a mark clearly made on the boom hoist cable (so that it can easily be seen by a spotter) at a point that will give the spotter enough time to signal the operator and have the operator stop the hoist to keep the boom within the minimum allowable radius.</td>
</tr>
<tr>
<td>Luffing jib limiting device on equipment with a luffing jib:</td>
<td>• at least one of the following:</td>
</tr>
<tr>
<td></td>
<td>- a jib angle indicator;</td>
</tr>
<tr>
<td></td>
<td>- a mark clearly made on the luffing jib cable (so that it can easily be seen by the operator) at a point that will give the operator enough time to stop the jib to keep it within the minimum allowable radius, along with mirrors or remote video cameras and displays if necessary for the operator to see the mark; or</td>
</tr>
<tr>
<td></td>
<td>- a mark clearly made on the luffing jib cable (so that it can easily be seen by a spotter) at a point that will give the spotter enough time to signal the operator and have the operator stop the jib to keep it within the minimum allowable radius.</td>
</tr>
<tr>
<td>Device which automatically prevents damage from contact between the load block, overhaul ball, or similar component, and the boom tip (or fixed upper block or similar component) for all points where two-blocking could occur (anti two-blocking device) on telescopic boom cranes manufactured after February 28, 1992:</td>
<td>• a clear mark on the cable (that can easily be seen by the operator) at a point that will give the operator sufficient time to stop the hoist to prevent two-blocking and using a spotter when extending the boom.</td>
</tr>
<tr>
<td>Automatic anti two-blocking device or one that warns the operator in time for the operator to prevent two-blocking on lattice boom cranes manufactured after February 28, 1992:</td>
<td>• clearly marking the cable (so that it can easily be seen by the operator) at a point that will give the operator sufficient time to stop the hoist to prevent two-blocking, or use of a spotter.</td>
</tr>
</tbody>
</table>

NOTE 1: The requirements for anti two-blocking devices do not apply to lattice boom equipment when used for dragline, clamshell (grapple), magnet, drop ball, container handling, concrete bucket, marine operations that do not involve hoisting personnel, and pile driving work.

NOTE 2: The option for the device to provide warning rather than automatically preventing two-blocking will no longer be acceptable after November 8, 2011.
### Table 1: Category I Devices and Acceptable Temporary Alternative Measures

<table>
<thead>
<tr>
<th>Device</th>
<th>Acceptable Temporary Alternative Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Automatic anti two-blocking device on articulating cranes manufactured after December 31, 1999:</td>
<td>• use of either of the following, as appropriate:</td>
</tr>
<tr>
<td>EXCEPTION: When two-blocking could occur without movement of the load hoist, clearly marking the cable (so that it can easily be seen by the operator) at a point that will give the operator sufficient time to stop the hoist to prevent two-blocking.</td>
<td>– when two-blocking could only occur with movement of the load hoist, clearly marking the cable (so that it can easily be seen by the operator) at a point that will give the operator sufficient time to stop the hoist to prevent two-blocking, or using a spotter; or</td>
</tr>
<tr>
<td>EXCEPTION: When two-blocking could occur without movement of the load hoist, clearly marking the cable (so that it can easily be seen by the operator) at a point that will give the operator sufficient time to stop the hoist to prevent two-blocking.</td>
<td>– when two-blocking could occur without movement of the load hoist, clearly marking the cable (so that it can easily be seen by the operator) at a point that will give the operator sufficient time to stop the hoist to prevent two-blocking.</td>
</tr>
</tbody>
</table>

#### 14.4 Category II devices must be repaired no later than 30 calendar days after a deficiency occurs. (29 CFR 1926.1416(e))

**Guide Note**

- Verify that Category II devices (listed in Table 1 of this paragraph) are repaired no later than 30 calendar days after a deficiency occurs or seven days after receipt of the parts as long as the employer demonstrates that the necessary parts were ordered within seven calendar days after the deficiency occurred (29 CFR 1926.1416(d)).

### Table 1: Category II Devices and Acceptable Temporary Alternative Measures

<table>
<thead>
<tr>
<th>Device</th>
<th>Acceptable Temporary Alternative Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boom angle or radius indicator that is readable from the operator’s station:</td>
<td>• determine the radii or boom angle by measuring with a measuring device.</td>
</tr>
<tr>
<td>EXCEPTION: This requirement does not apply to digger derricks manufactured on or before November 8, 2011 or to articulating cranes.</td>
<td></td>
</tr>
<tr>
<td>Jib angle indicator on equipment with a luffing jib:</td>
<td>• determine the main boom angle and then measure the radii or jib angle with a measuring device.</td>
</tr>
<tr>
<td>EXCEPTION: This requirement does not apply to articulating cranes.</td>
<td></td>
</tr>
<tr>
<td>Boom length indicator on equipment with a telescopic boom, except where the rated capacity is independent of the boom length:</td>
<td>• use of at least one of the following:</td>
</tr>
<tr>
<td>EXCEPTION: This requirement does not apply to articulating cranes.</td>
<td>– marking the boom with measured marks to calculate boom length;</td>
</tr>
<tr>
<td>Load weighing device, load moment (or rated capacity) indicator, or load moment (or rated capacity) limiter on cranes (other articulating cranes) manufactured after March 29, 2003 with a rated capacity over 6,000 pounds:</td>
<td>– calculating boom length from boom angle and radius measurements; or</td>
</tr>
<tr>
<td>EXCEPTION: This requirement does not apply to articulating cranes.</td>
<td>– measuring the boom with a measuring device.</td>
</tr>
<tr>
<td>Load weighing device, load moment (or rated capacity) indicator, or load moment (or rated capacity) limiter on articulating cranes manufactured after November 8, 2011:</td>
<td>• determining the weight of the load from a recognized source such as the load’s manufacturer or by a recognized calculation method (such as calculating a steel beam from measured dimensions and a known weight per foot) and providing the information to the operator prior to the lift.</td>
</tr>
<tr>
<td>Outrigger/stabilizer position (horizontal beam extension) sensor/monitor on equipment with outriggers or stabilizers that is manufactured after November 8, 2011.</td>
<td>• operator must verify that the position of the outriggers or stabilizers is correct (in accordance with manufacturer procedures) before beginning operations requiring outrigger or stabilizer deployment.</td>
</tr>
</tbody>
</table>
### Table 1: Category II Devices and Acceptable Temporary Alternative Measures

<table>
<thead>
<tr>
<th>Device</th>
<th>Acceptable Temporary Alternative Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hoist drum rotation indicator on equipment with a hoist drum not visible from the operator’s station that is manufactured after November 8, 2011:</td>
<td>• mark the drum to indicate the rotation of the drum and install mirrors or remote video cameras and displays if necessary for the operator to see the mark.</td>
</tr>
</tbody>
</table>

NOTE 1: OSHA has clarified that simply marking the outriggers or stabilizers to show if they are fully extended is not an acceptable alternative to the sensor or monitor required in Table I for equipment manufactured after November 8, 2011 (OSHA Interpretation Letter, 3/13/12)

NOTE 2: OSHA has clarified that the drum rotation indicator required in Table I for equipment manufactured after November 8, 2011 must indicate the actual direction of rotation, not simply the direction a control device was set for (OSHA Interpretation Letter, 3/13/12)

### 15. Operation

#### 15.1 Equipment must be operated in accordance with certain requirements. (29 CFR 1926.1417)

**Guide Note**

- Verify that the employer complies with all manufacturer’s procedures for operating the equipment, including its use with attachments (29 CFR 1926.1417(a)).
- Where the manufacturer’s procedures are unavailable, verify that the employer develops and ensures compliance with all procedures necessary for the safe operation of the equipment and attachments (29 CFR 1926.1417(b)(1)).
- Verify that these employer procedures are developed by a qualified person and those related to the capacity of the equipment are developed and signed by a registered professional engineer familiar with the equipment (29 CFR 1926.1417(b)(2) – (3)).
- Verify that the procedures applicable to the operation of the equipment, including rated capacities (load charts), recommended operating speeds, special hazard warnings, instructions and the operator’s manual are readily available in the cab at all times for use by the operator (29 CFR 1926.1417(c)(1)).
- Where rated capacities are available in the cab only in electronic form, verify that in the event of a failure, which makes the rated capacities inaccessible, the operator immediately stops operations or follows safe shutdown procedures until the rated capacities are available in some form (29 CFR 1926.1417(c)(2)).
- Verify that the operator does not engage in any practice or activity, such as the use of cellular phones, that diverts his/her attention while actually engaged in operating the equipment (29 CFR 1926.1417(d)).

**NOTE:** Cell phones may be used for signal communications.

- Verify that the operator confirms that all controls are in the proper starting position and all personnel are in the clear before starting the engine (29 CFR 1926.1417(g)).
- When a local storm warning has been issued, verify that the competent person determines whether it is necessary to implement manufacturer recommendations for securing the equipment (29 CFR 1926.1417(h)).
- If equipment adjustments or repairs are necessary, verify that the following steps are taken (29 CFR 1926.1417(j)):
  - the operator promptly informs the person designated by the employer to receive such information and, where there are successive shifts, the next operator, in writing; and
  - the employer notifies all affected employees of the necessary adjustments or repairs and all alternative measures at the beginning of each shift.
- Verify that safety devices and operational aids are not used as a substitute for the exercise of professional judgment by the operator (29 CFR 1926.1417(k)).
- If the competent person determines that there is a slack rope condition requiring respooling of the rope, verify that the rope is seated on the drum and in the sheaves as the slack is removed before starting the lift (29 CFR 1926.1417(m)).
- Verify that the competent person adjusts the equipment and/or operations to address the effect of wind, ice, snow on equipment stability and rated capacity (29 CFR 1926.1417(n)).
- Verify that the boom or other parts of the equipment do not contact any obstruction (29 CFR 1926.1417(p)).
- Verify that the equipment is not used to drag or pull loads sideways (29 CFR 1926.1417(q)).
- Verify that no loads are lifted over the front area on wheel-mounted equipment, except as permitted by the manufacturer (29 CFR 1926.1417(r)).
Verify that the operator tests the brakes by lifting the load a few inches and applying the brakes each time a load that is 90 percent or more of the maximum line pull is handled (29 CFR 1926.1417(s)).

NOTE: In duty cycle and repetitive lifts where each lift is 90 percent or more of the maximum line pull, this requirement applies to the first lift only.

Verify that neither the load nor the boom is lowered below the point where less than two full wraps of rope remain on their respective drums (29 CFR 1926.1417(t)).

Verify that rotational speed of the equipment is such that the load does not swing out beyond the radius at which it can be controlled (29 CFR 1926.1417(v)).

Verify that a tag or restraint line is used if necessary to prevent hazardous rotation of the load (29 CFR 1926.1417(w)).

Verify that the brakes are adjusted in accordance with manufacturer’s procedures to prevent unintended movement (29 CFR 1926.1417(x)).

Verify that the operator obeys any stop or emergency stop signal, no matter who gives it (29 CFR 1926.1417(y)).

Verify that a locomotive crane is not swung into a position where railway cars on an adjacent track could strike it until it is determined that cars are not being moved on the adjacent track and that proper flag protection has been established (29 CFR 1926.1417(z)).

Verify that equipment other than tower cranes is not operated without the counterweight or ballast in place as specified by the manufacturer and that the maximum counterweight or ballast specified by the manufacturer for the equipment is not exceeded (29 CFR 1926.1417(aa)).

15.2 If equipment will be left unattended, certain precautions must be taken. (29 CFR 1926.1417(e))

Guide Note

Verify that the operator does not leave the controls while the load is suspended unless all of the following requirements are met (29 CFR 1926.1417(e)(1)):
- the operator remains adjacent to the equipment and is not engaged in any other duties;
- the load is to be held suspended for a period of time exceeding normal lifting operations;
- the competent person determines that it is safe to do so and implements measures necessary to restrain the boom hoist and telescoping, load, swing, and outrigger or stabilizer functions; and
- barricades or caution lines and notices are erected to prevent all employees from entering the fall zone.

EXCEPTION: These requirements do not apply to working gear such as slings, spreader bars, ladders, and welding machines where the weight of the working gear is negligible relative to the lifting capacity of the equipment as positioned and the working gear is suspended over an area other than an entrance or exit (29 CFR 1926.1417(e)(2)).

15.3 If equipment will be tagged out, certain requirements must be met. (29 CFR 1926.1417(f))

Guide Note

Where the employer has taken the equipment out of service, verify that a tag is placed in the cab stating that the equipment is out of service and is not to be used (29 CFR 1926.1417(f)(1)).

Where the employer has taken one or more functions out of service, verify that a tag is placed in a conspicuous position stating that the function is out of service and is not to be used (29 CFR 1926.1417(f)(1)).

If the equipment or starting control is tagged out, verify that the operator does not activate the switch or start the equipment until the sign has been removed by a person authorized to do so or until the operator has verified the following (29 CFR 1926.1417(f)(2)(i)):
- no one is servicing, working on, or otherwise in a dangerous position on the machine; and
- the equipment has been repaired and is working properly.

If any other switch or control is tagged out, verify that the operator does not activate that switch or control until the sign has been removed by a person authorized to remove it or until the operator has verified the following (29 CFR 1926.1417(f)(2)(ii)):
- no one is servicing, working on, or otherwise in a dangerous position on the machine; and
- the equipment has been repaired and is working properly.
15.4 The rated capacity must be observed. (29 CFR 1926.1417(o))

Guide Note
- Verify that the equipment is not operated in excess of its rated capacity (29 CFR 1926.1417(o)(1)).
- Verify that the operator is not required to operate the equipment in a manner that would cause the rated capacity to be exceeded (29 CFR 1926.1417(o)(2)).
- Determine that the operator uses at least one of the following methods to verify that the load is within the rated capacity of the equipment (29 CFR 1926.1417(o)(3)).
  - determining the weight of the load from a recognized source such as the load’s manufacturer or by a recognized calculation method (such as calculating a steel beam from measured dimensions and a known per-foot weight), or by other equally reliable means; or
    NOTE: When requested by the operator, this information must be provided to him/her prior to the lift.
  - determining if the load exceeds 75 percent of the maximum rated capacity at the longest radius that will be used during the lift operation by starting to hoist the load and using a load weighing device, load moment indicator, rated capacity indicator, or rated capacity limiter.
    NOTE: If the load does exceed 75 percent of the maximum rated capacity at the longest radius that will be used during the lift operation, the operator must not proceed with the lift until he/she verifies the weight of the load from a recognized source or using recognized calculations.

15.5 Certain requirements must be met when traveling with a load. (29 CFR 1926.1417(u))

Guide Note
- Verify that the equipment does not travel with a load if the practice is prohibited by the manufacturer (29 CFR 1926.1417(u)(1)).
- Where traveling with a load is allowed, verify that the employer ensures the following (29 CFR 1926.1417(u)(2)):
  - a competent person supervises the operation, determines if it is necessary to reduce rated capacity, and makes determinations regarding load position, boom location, ground support, travel route, overhead obstructions, and speed of movement as needed to ensure safety;
  - these determinations of the competent person are implemented; and
  - for equipment with tires, the manufacturer’s specified tire pressure is maintained.

15.6 The operator must have authority to stop operations when there are safety concerns. (29 CFR 1926.1418)

Guide Note
- Verify that the operator has the authority to stop operations and refuses to handle loads whenever there is a concern about safety, until a qualified person has determined that safety has been assured (29 CFR 1926.1418).

16. Signals

16.1 Signals must meet certain general requirements. (29 CFR 1926.1419 and 29 CFR 1926.1422)

Guide Note
- Verify that a signal person is provided in each of the following situations (29 CFR 1926.1419(a)):
  - when the load travel or the area near or at load placement is not in full view of the operator;
  - when the equipment is traveling, the view in the direction of travel is obstructed; and
  - when either the operator or the person handling the load determines that it is necessary due to site specific safety concerns.
- Verify that signals to operators are by hand, voice, audible, or new signals (29 CFR 1926.1419(b)).
- Verify that the Standard Method in Appendix A of 29 CFR 1926 Subpart CC is used for hand signals (29 CFR 1926.1419(c)(1)).
- Verify that hand signal charts are either posted on the equipment or conspicuously posted in the vicinity of the hoisting operations (29 CFR 1926.1422).
- Where use of the Standard Method for hand signals is infeasible or where an operation or use of an attachment is not covered in the Standard Method, verify that the signal person, operator, and lift director (where there is one) contact each other prior to the operation and agree on the nonstandard hand signals that will be used (29 CFR 1926.1419(c)(2)).
If signals other than hand, voice, or audible signals will be used, verify that the employer demonstrates that (29 CFR 1926.1417(d)):
- the new signals provide communication that is at least as effective as voice, audible, or Standard Method hand signals; or
- the new signals comply with a national consensus standard that provides communication that is at least as effective as voice, audible, or Standard Method hand signals.

Verify that the signals used (hand, voice, audible, or new) and means of transmitting the signals to the operator (such as direct line of sight, video, radio, etc.) are appropriate for the site conditions (29 CFR 1926.1419(e)).

Verify that the ability to transmit signals between the operator and signal person is maintained during operations requiring signals (29 CFR 1926.1419(f)).

If the ability to transmit signals between the operator and signal person is interrupted at any time, verify that the operator safely stops operations requiring signals until communication is reestablished and a proper signal is given and understood (29 CFR 1926.1419(f)).

If the operator becomes aware of a safety problem and needs to communicate with the signal person, verify that he or she safely stops operations and does not resume until the operator and signal person agree that the problem has been resolved (29 CFR 1926.1419(g)).

Verify that only one person at a time gives signals to a crane/derrick the operator, except that anyone who becomes aware of a safety problem must alert the operator or signal person by giving the stop or emergency stop signal (29 CFR 1926.1419(h) and (j)).

Verify that all directions given to the operator by the signal person are given from the operator’s direction perspective (29 CFR 1926.1419(k)).

Where a signal person(s) is in communication with more than one crane/derrick, verify that a system is used for identifying the crane/derrick each signal is for, as follows (29 CFR 1926.1419(m)):
- prior to giving the function/direction of each signal, the signal person must identify the crane/derrick it is for; or
- an equally effective method of identifying which crane/derrick the signal is for must be used.

16.2 Radio, telephone, or other electronic transmission of signals must meet certain requirements. (29 CFR 1926.1420)

Guide Note

- Verify that the device(s) used to transmit signals are tested on site before beginning operations to ensure that the signal transmission is effective, clear, and reliable (29 CFR 1926.1420(a)).
- Verify that signal transmission is through a dedicated channel, except (29 CFR 1926.1420(b)):
  - multiple cranes/derricks and one or more signal persons may share a dedicated channel for the purpose of coordinating operations; and
  - 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.
- Verify that the operator uses a hands-free system (29 CFR 1926.1420(c)).

16.3 Voice signals must meet certain additional requirements. (29 CFR 1926.1421)

Guide Note

- Verify that the operator, signal person, and lift director (if there is one) contact each other and agree on the voice signals that will be used before beginning operations (29 CFR 1926.1421(a)).
- Verify that these workers meet again if another worker is added or substituted, there is confusion about the voice signals, or a voice signal is to be changed (29 CFR 1926.1421(a)).
- Verify that each voice signal contains the following three elements given in the following order (29 CFR 1926.1421(b)):
  - function (such as hoist, boom, etc.), direction;
  - distance and/or speed; and
  - function, stop command.
- Verify that the operator, signal person, and lift director (if there is one) can communicate effectively in the language used (29 CFR 1926.1421(c)).
17. Fall Protection

17.1 Boom walkways must be provided on equipment other than tower cranes in accordance with certain requirements. (29 CFR 1926.1423(b))

Guide Note
- Verify that equipment (other than tower cranes) with lattice booms manufactured after November 8, 2011, is equipped with walkways on the boom(s) if the vertical profile of the boom (from cord centerline to cord centerline) is six feet or more (29 CFR 1926.1423(b)(1)).
- Verify that the walkways are at least 12 inches wide (29 CFR 1926.1423(b)(2)(i)).
- Verify that there are NO guardrails, railings, and other permanent fall protection attachments along walkways on booms supported by pendant ropes or bars if the guardrails/railings/attachments could be snagged by the ropes or bars (29 CFR 1926.1423(b)(2)(ii)(B)).
- Verify that removable (i.e., designed to be installed and removed each time the boom is assembled/disassembled) guardrails, railings, and other permanent fall protection attachments are not used along walkways (29 CFR 1926.1423(b)(2)(ii)(C)).
- If guardrails or railings are used where they are not prohibited, verify that they are no higher than 45 inches (29 CFR 1926.1423(b)(2)(ii)(D)).

NOTE: Guardrails, railings, and other permanent fall protection attachments are not required in any circumstances, but if used may be any height up to 45 inches.

17.2 Steps, handholds, ladders, grabrails, guardrails, and railings must meet certain requirements. (29 CFR 1926.1423(c))

Guide Note
- Verify that the employer maintains originally-equipped steps, handholds, ladders, and guardrails/railings/grabrails in good condition (29 CFR 1926.1423(c)(2)).
- Verify that equipment other than tower cranes manufactured after November 8, 2011, is equipped with devices such as steps, handholds, ladders, and guardrails/railings/grabrails to provide safe access and egress between the ground and the operator work station(s), including the forward and rear positions (29 CFR 1926.1423(c)(3)).
- Verify that these devices meet the following criteria (29 CFR 1926.1423(c)(3)):
  - steps, handholds, ladders, and guardrails/railings/grabrails must meet the criteria of SAE J185 (May 2003) or ISO 11660-2:1994(E) except where infeasible; and
  - 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.
- Verify that tower cranes manufactured after November 8, 2011, are equipped with devices such as steps, handholds, ladders, and guardrails/railings/grabrails to provide safe access and egress between the ground and the cab, machinery platforms, and tower (mast) (29 CFR 1926.1423(c)(4)).
- Verify that these devices meet the following criteria (29 CFR 1926.1423(c)(4)):
  - steps, handholds, ladders, and guardrails/railings/grabrails must meet the criteria of ISO 11660-1:2008(E) and ISO 11660-3:2008(E) or SAE J185 (May 2003) except where infeasible; and
  - 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.

17.3 Personal fall arrest and fall restraint systems must meet certain requirements. (29 CFR 1926.1423(d) – (f))

Guide Note
- Verify that components used in personal fall arrest and fall restraint systems conform to the criteria in 29 CFR 1926.502(d) (except for 29 CFR 1926.502(d)(15) (see Fall Protection (Module M) Rulebook section 3) (29 CFR 1926.1423(d)).
- Verify that either body belts or body harnesses are used in personal fall arrest and fall restraint systems (29 CFR 1926.1423(d)).
- For work other than assembly/disassembly, verify that the employer provides and ensures the use of fall protection equipment for employees who are on a walking/working surface with an unprotected side or edge more than six feet above a lower level as follows (29 CFR 1926.1423(e)):
  - when moving point-to-point on non-lattice booms (whether horizontal or not);
- when moving point-to-point on lattice booms that are not horizontal;
- when moving point-to-point on horizontal lattice booms where the fall distance is 15 feet or more; and
- 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.

EXCEPTION: These requirements do not apply to tower cranes.

- For assembly/disassembly work, verify that the employer provides and ensures 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 (29 CFR 1926.1423(f)).

EXCEPTION: This requirement does not apply to tower cranes.

17.4 Anchorages must meet certain requirements. (29 CFR 1926.1423(g))

Guide Note
- Verify that personal fall arrest systems are anchored to parts of the equipment that appear to be substantial (29 CFR 1926.1423(g)(2)(i)).
- Verify that in addition, a visual inspection (without engineering analysis) by a competent person would lead that person to conclude that the requirements of 29 CFR 1926.502(d)(15) for fall arrest anchorages are apparently being met (see Fall Protection (Module M) Rulebook paragraph 3.3) (29 CFR 1926.1423(g)(2)(ii)).
- Verify that positioning device systems are anchored to parts of the equipment that appear to be substantial (29 CFR 1926.1423(g)(2)(iii)).
- Verify that in addition, a visual inspection (without engineering analysis) by a competent person would lead that person to conclude that the requirements of 29 CFR 1926.502(e)(2) for positioning device anchorages are apparently being met (see Fall Protection (Module M) Rulebook paragraph 4.1) (29 CFR 1926.1423(g)(2)(ii)).
- Verify that attachable anchor devices (portable anchor devices that are attached to the equipment) meet the requirements of 29 CFR 1926.502(d)(15) for fall arrest systems and 29 CFR 1926.502(e)(2) for positioning device systems (29 CFR 1926.1423(g)(2)(iii)).
- Verify that fall restraint systems are anchored to any part of the equipment that is capable of withstanding twice the maximum load that an employee may impose on it during reasonably anticipated conditions of use (29 CFR 1926.1423(g)(3)).

17.5 Fall protection equipment used on tower cranes must meet certain requirements. (29 CFR 1926.1423(h))

Guide Note
- For work other than erecting, climbing, and dismantling, verify that the employer provides and ensures the use of fall protection equipment for employees who are on a walking/working surface with an unprotected side or edge more than six 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 (29 CFR 1926.1423(h)(1)).
- For erecting, climbing, and dismantling work, verify that the employer provides and ensures 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 (29 CFR 1926.1423(h)(2)).

17.6 Anchoring to load lines must be conducted in accordance with certain requirements. (29 CFR 1926.1423(j))

Guide Note
- Verify that a personal fall arrest system is anchored to the crane/derrick’s hook (or other part of the load line) only if all of the following requirements are met (29 CFR 1926.1423(j)):
  - 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 1926.502(d)(15) for fall arrest anchorages (see Fall Protection (Module M) Rulebook paragraph 3.3);
  - the equipment operator must be at the work site and informed that the equipment is being used for this purpose; and
  - no load is suspended from the load line when the personal fall arrest system is anchored to the crane/derrick’s hook (or other part of the load line).
17.7 The employer must train each employee who may be exposed to fall hazards. (29 CFR 1926.1423(k))

Guide Note
- Verify that the employer trains each employee who may be exposed to fall hazards while on or hoisted by cranes or derricks on all of the following topics (29 CFR 1926.1423(k)):
  - the fall protection requirements in this section; and
  - the applicable requirements in 29 CFR 1926.500 and 29 CFR 1926.502 (see Fall Protection (Module M) Rulebook).

18. Work Area Control

18.1 Employees must be protected from “struck by” and “caught between” hazards in the equipment’s swing radius. (29 CFR 1926.1424)

Guide Note
- Verify that employer takes the following steps to prevent employees from entering accessible areas where there is a hazard of injury from the equipment’s rotating superstructure (29 CFR 1926.1424(a)(2)):
  - trains each employee assigned to work on or near the equipment (“authorized personnel”) in how to recognize “struck by” and “caught between” hazard areas posed by the rotating superstructure; and
  - erects and maintains control lines, warning lines, railings, or similar barriers to mark the boundaries of the hazard areas.
  
  NOTE: When the employer can demonstrate that it is not feasible to erect such barriers either on the ground or on the equipment, the hazard areas must be clearly marked by a combination of warning signs (such as “Danger – Swing/Crush Zone”), high visibility markings on the equipment that identify the hazard areas, and training provided so that each employee understands what these markings mean.

- Before an employee goes to a location in the hazard area that is out of view of the operator, verify that the employee, or someone instructed by the employee, ensures that the operator is informed that he/she is going to that location (29 CFR 1926.1424(a)(3)(i)).

- Where the operator knows that an employee went into a hazard zone, verify that he or she does not rotate the superstructure until being informed in accordance with a prearranged system of communication that the employee is in a safe position (29 CFR 1926.1424(a)(3)(ii)).

- Where any part of a crane/derrick is within the working radius of another crane/derrick, verify that the controlling entity institutes a system to coordinate operations. If there is no controlling entity, the employer (if there is only one employer operating the multiple pieces of equipment), or employers, must institute such a system (29 CFR 1926.1424(b)).
  
  NOTE: If there is no controlling entity, the employer (if there is only one employer operating the multiple pieces of equipment), or employers, must institute such a system.

18.2 Employees must be kept clear of the load. (29 CFR 1926.1425)

Guide Note
- Verify that hoisting routes that minimize the exposure of employees to hoisted loads are used, to the extent they are available and consistent with public safety (29 CFR 1926.1425(a)).

- Verify that no employee is allowed within the fall zone while the operator is not moving a suspended load, unless they are engaged in one of the following activities (29 CFR 1926.1425(b)):
  - hooking, unhooking, or guiding a load;
  - the initial attachment of the load to a component or structure; or
  - operating a concrete hopper or concrete bucket.

- If employees are in the fall zone while engaged in one of the allowed activities with the load, verify that the following requirements are met (29 CFR 1926.1425(c)):
  - the materials being hoisted must be rigged to prevent unintentional displacement;
  - hooks with self-closing latches or their equivalent must be used, except that “J” hooks are permitted to be used for setting wooden trusses; and
  - the materials must be rigged by a qualified rigger.

- Verify that only the employees needed to receive a load are allowed within the fall zone when a load is being landed (29 CFR 1926.1425(d)).
During a tilt-up or tilt-down operation, verify that no employee is directly under the load and that the only employees allowed anywhere else in the fall zone are those conducting one of the following operations where the employer can demonstrate it is infeasible for the employee to perform that operation from outside the fall zone (29 CFR 1926.1425(e)):
- physically guiding the load;
- closely monitoring and giving instructions regarding the load’s movement; or
- either detaching the load from, or initially attaching it to, another component or structure (such as making an initial connection or installing bracing).

NOTE: Boom free fall is prohibited when an employee is in the fall zone of the boom or load, and load line free fall is prohibited when an employee is directly under the load.

18.3 Boom free fall is prohibited in certain circumstances, and must meet certain requirements when allowed. (29 CFR 1926.1426(a) – (c))

Guide Note
- Verify that equipment in which the boom is designed to free fall (live boom) is not used in any of the following circumstances (29 CFR 1926.1426(a)(1)):
  - when an employee is in the fall zone of the boom or load;
  - when an employee is being hoisted;
  - when the load or boom is directly over a power line;
  - when the load or boom is over any part of the area to each side of the power line extending the clearance distance in Table 1 of paragraph 7.1;
  - when any part of the area to each side of the power line extending the clearance distance in Table 1 of paragraph 7.1 is within the radius of vertical travel of the boom or the load;
  - when the load is over a shaft, if there are any employees in the shaft;
  - when the load is over a cofferdam, except where there are no employees in the fall zone of the boom or the load; or
  - when lifting operations are taking place in a refinery or tank farm.

- Verify that the use of equipment in which the boom is designed to free fall (live boom) is allowed only in circumstances other than those that are specifically prohibited, AND if the equipment was manufactured before October 31, 1984 or is a floating crane/derrick or a land crane/derrick on a vessel/floatation device (29 CFR 1926.1426(a)(2)).

- Where the use of equipment with a boom that is designed to free fall (live boom) is prohibited, verify that the boom hoist has 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 (29 CFR 1926.1426(b)):
  - friction drums must have the following:
    1) a friction clutch and a braking device, to allow for controlled boom lowering; and
    2) a secondary braking or locking device (such as a secondary friction brake or a ratchet and pawl device) which is manually or automatically engaged, to back up the primary brake while the boom is held.
  - 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 paragraph; and
  - hydraulic boom cylinders must have an integrally mounted holding device.

- Verify that hydraulic telescoping booms have an integrally mounted holding device to prevent the boom from retracting in the event of hydraulic failure (29 CFR 1926.1426(c)).

18.4 Free fall of the load is prohibited in certain circumstances. (29 CFR 1926.1426(d))

Guide Note
- Verify that controlled load lowering is required and free fall of the load line hoist is prohibited in all of the following circumstances (29 CFR 1926.1426(d)):
  - when an employee is in the fall zone of the load;
  - when an employee is being hoisted;
  - when the load is directly over a power line;
  - when the load is over any part of the area to each side of the power line extending the clearance distance in Table 1 of paragraph 7.1;
19. Operator Qualification and Certification

NOTE: Tests required under 29 CFR 1926.1427 may be administered orally, with answers given verbally, where the operator candidate passes a written demonstration of literacy relevant to the work, 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. Tests may be administered in any language the candidate understands, and the operator’s certification documentation must note the language in which the test was given. The employee is only permitted to operate equipment that is furnished with required materials, such as operations manuals and load charts, that are written in the language of the certification. (29 CFR 1926.1427(h)).

19.1 Operators must be properly qualified or certified. (29 CFR 1926.1427(a))

Guide Note

- Verify that each operator is trained, certified/licensed, and evaluated in accordance before operating any equipment (29 CFR 1926.1427(a)).

EXCEPTION 1: An employee who has not been certified/licensed and evaluated to operate assigned equipment may operate the equipment as an operator-in-training under supervision (see paragraph 19.2) (29 CFR 1926.1427(a)(1)).

EXCEPTION 2: Operators of derricks (see section 27 for training information), sideboom cranes (follow the training requirements in section 21), or equipment with a maximum manufacturer-rated hoisting/lifting capacity of 2,000 lb or less (see section 32 for training information) are not required to comply with 29 CFR 1926.1427 (29 CFR 1926.1427(a)(2)).

NOTE: For purposes of 29 CFR 1926.1427, an operator who is an employee of the U.S. military meets the requirements if they have a current operator qualification issued by the U.S. military for operation of the equipment. An employee of the U.S. military is a Federal employee of the Department of Defense or Armed Forces and does not include employees of private contractors. The qualification is not portable, but is considered valid only where the operator is employed by (and operating the equipment for) the employer that issued the qualification, and for the time period stipulated by that employer (29 CFR 1926.1427(a)(3)).

19.2 Operators must receive certain training, and they may operate equipment only in accordance with certain restrictions while they are undergoing training. (29 CFR 1926.1427(b))

Guide Note

- Verify that each operator-in-training is provided, through a combination of formal and practical instruction, with sufficient training to ensure that he or she develops the skills, knowledge, and ability to recognize and avert risk necessary to operate the equipment safely for assigned work (29 CFR 1926.1427(b)).

NOTE: See paragraph 19.7 for a list of the knowledge and skills that must be included in the training.

- Verify that the operator-in-training is continuously monitored by a trainer while operating equipment on site (29 CFR 1926.1427(b)(2)).

- Verify that the employer assigns only those tasks that are within the operator-in-training’s ability, and that no operator-in-training operates equipment in any of the following circumstances, unless he or she is certified in accordance with 29 CFR 1926.1427(c) (see paragraph 19.3) (29 CFR 1926.1427(b)(3)):
  - if any part of the equipment, load line, or load (including rigging and lifting accessories) 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 or cofferdam, or in a tank farm; or
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- in multiple-lift rigging operations, unless the trainer determines that the trainee’s skills are adequate for this high skill work.

- Verify that the operator-in-training is monitored as follows when operating equipment (29 CFR 1926.1427(b)(4)):
  - while operating the equipment, the trainee is continuously monitored by an operator’s trainer who is an employee or agent of the trainee’s employer, and who has the knowledge, training, and experience necessary to direct the operator-in-training on the equipment in use;
  - the trainer does not perform any tasks that detract from his or her ability to monitor the trainee;
  - for equipment other than tower cranes, the trainer and trainee must be in direct line of sight of each other and must communicate verbally or by hand signals; and

  NOTE: For tower cranes, the trainer and the trainee must be in direct communication with each other.
  - the trainee must be monitored by the trainer at all times, except for short breaks where all of the following are met:
    1) the break lasts no longer than 15 minutes and there is no more than one break per hour;
    2) immediately prior to the break the trainer informs the trainee of the specific tasks to perform and limitations to adhere to during the break; and
    3) the specific tasks that the trainee will perform during the break are within the person’s abilities.

- Verify that retraining in relevant topics is provided for each operator when, based on his or her performance or an evaluation of his or her knowledge, there is an indication that retraining is necessary (29 CFR 1926.1427(b)(5)).

19.3 Each operator must be certified or licensed to operate the equipment, in accordance with certain requirements. (29 CFR 1926.1427(c))

**Guide Note**

- When a state or local government issues operator licenses, verify that the operator is licensed by that government entity, if the licensing program meets the following requirements: (29 CFR 1926.1427(c)(1)):
  - the requirements for obtaining the license include an assessment, by written and practical tests, of at least the OSHA-required knowledge and skills (see paragraph 19.7), and this is verified by the government authority that oversees licensing;
  - the testing meets industry-recognized criteria for written testing materials, practical examinations, test administration, grading, facilities/equipment, and personnel, and this is verified by the government authority that oversees licensing;
  - the licensing department/office has testing procedures for re-licensing designed to ensure that the operator continues to meet the requirements for technical knowledge and skills; and
  - licenses are valid for no more than 5 years.

- Where there is no government entity that issues licenses, verify that operators are certified by an accredited testing organization (see paragraph 19.4) or by an audited employer program (see paragraph 19.5) (29 CFR 1926.1427(c)(2)).

- Verify that the employer provides required certification/licensure at no cost to employees (29 CFR 1926.1427(c)(3)).

  NOTE: The government testing entity may also provide training as long as it meets OSHA requirements for both services (29 CFR 1926.1427(c)(4)).

19.4 Certification by accredited crane operator testing organizations must meet certain requirements. (29 CFR 1926.1427(d))

**Guide Note**

- If the employer uses an operator testing organization, verify that the organization is accredited by a nationally recognized accrediting agency and that this accreditation is reviewed by the nationally recognized agency every three years (29 CFR 1926.1427(d)(1)(i) and (d)(1)(v)).

- Verify that the testing organization administers written and practical tests that assess the applicant on at least the OSHA required knowledge and skills (see paragraph 19.7) and provide different levels of certification based on equipment type, or capacity and type (29 CFR 1926.1427(d)(1)(ii)).

- Verify that the organization has procedures for applicants to re-apply and be re-tested in the event they fail a test or are decertified (29 CFR 1926.1427(d)(1)(iii)).

- Verify that the organization has testing procedures for re-qualification designed to ensure that the operator continues to meet the technical knowledge and skills requirements (29 CFR 1926.1427(d)(1)(iv)).
NOTE 1: If no accredited testing agency offers certification examinations for a particular type and/or capacity of equipment, an operator who has been certified for the type/capacity that is most similar to that equipment will be deemed qualified to operate that equipment. The operator’s certificate must state the type of equipment for which the operator is certified (29 CFR 1926.1427(d)(2)).

NOTE 2: Certification by an accredited organization is valid for 5 years and is portable among employers who are required to have operators certified by a testing agency (29 CFR 1926.1427(d)(3) – (4)).

19.5 An employer’s certification of its employees must meet certain requirements. (29 CFR 1926.1427(e))

Guide Note
- Verify that an employer’s certification program includes written and practical tests that are either developed by an accredited testing organization or approved by an auditor in accordance with the following (29 CFR 1926.1427(e)(1)):
  - the auditor is certified to evaluate such tests by an accredited crane operator testing organization;
  - the auditor is not an employee of the employer;
  - the approval is based on the auditor’s determination that the tests meet nationally recognized test development criteria and are valid and reliable in assessing an applicant’s required knowledge and skills; and
  - the audit is conducted in accordance with nationally recognized auditing standards.
- Verify that written and practical tests are administered under circumstances approved by as meeting nationally recognized test administration standards by an auditor who (29 CFR 1926.1427(e)(2)(ii)):
  - is certified to evaluate the administration of tests by an accredited crane operator testing organization;
  - is not an employee of the employer; and
  - conducts the audit in accordance with nationally recognized auditing standards.
- Verify that the employer’s program has testing procedures for re-qualification designed to ensure that the operator continues to meet the technical knowledge and skills requirements and that these procedures are audited in the same manner as the certification tests (29 CFR 1926.1427(e)(4)).
- If the auditor finds a significant deficiency in the employer’s program, verify that (29 CFR 1926.1427(e)(5)):
  - no operator is qualified until the auditor confirms that the deficiency has been corrected;
  - the program is audited again within 180 days of the confirmation that the deficiency was corrected;
  - the auditor files a documented report of the deficiency to the appropriate Regional OSHA Office within 15 days of the determination that there is a deficiency; and
  - records of the audits of the employer’s program are maintained by the auditor for 3 years and are made available to OSHA upon request.

NOTE: Certification under an employer’s program is valid for 5 years and is not portable (it is valid only where the operator is employed by, and operating the equipment for, the employer that issued the certification) (29 CFR 1926.1427(e)(6)).

19.6 The employer must evaluate each operator’s qualifications. (29 CFR 1926.1427(f))

Guide Note
- Verify that the employer ensures that the employer performs evaluations to ensure that each operator is qualified by demonstrating the following (29 CFR 1926.1427(f)(1)):
  - the skills, knowledge, and ability to recognize and avert risk necessary to operate the equipment safely, including those specific to the safety devices, operational aids, software, and the size and configuration of the equipment; and
  - the ability to perform the hoisting activities required for assigned work, including, blind lifts, personnel hoisting, and multi-crane lifts, as applicable.

NOTE: Size and configuration includes, but is not limited to, lifting capacity, boom length, attachments, luffing jib, and counterweight set-up.

NOTE 1: For operators employed prior to December 10, 2018, the employer may rely on its previous assessments in lieu of conducting a new evaluation of that operator’s existing knowledge and skills (29 CFR 1926.1427(f)(2)).

NOTE 2: The definition of “qualified” in 29 CFR 1926.32 does not apply to the requirement for evaluations. Possession of a certificate or degree cannot, by itself, cause a person to be qualified for purposes of these evaluations (29 CFR 1926.1427(f)(3)).
Verify that the evaluation is conducted by an individual who has the knowledge, training, and experience necessary to assess equipment operators (29 CFR 1926.1427(f)(4)).

Verify that the evaluator is an employee or agent of the employer (29 CFR 1926.1427(f)(5)).

NOTE: Employers who assign evaluations to an agent retain the duty to ensure that the requirements are satisfied. Once the evaluation is completed successfully, the employer may allow the operator to operate other equipment that the employer can demonstrate does not require substantially different skills, knowledge, or ability to recognize and avert risk to operate.

Verify that the employer documents the completion of the evaluation, and that the documentation includes the following (29 CFR 1926.1427(f)(6)):

- the operator’s name;
- the evaluator’s name and signature;
- the date; and
- the make, model, and configuration of equipment used in the evaluation.

NOTE: For operators employed prior to December 10, 2018, where the employer has relied on its previous assessments in lieu of conducting a new evaluation, the documentation must reflect the date of the prior determination of the operator's abilities and the make, model and configuration of equipment on which the operator has previously demonstrated competency.

Verify that the employer makes the documentation available at the worksite while the operator is employed there (29 CFR 1926.1427(f)(6)).

When an operator must be retrained under 29 CFR 1926.1427(b)(5) (see paragraph 19.2), verify that the employer also reevaluates the employee related to the subject of the retraining (29 CFR 1926.1427(f)(7)).

19.7 Certification must be based on tests of specific skills and knowledge. (29 CFR 1926.1427(j))

Guide Note

Verify that certifications, whether by an accredited testing organization or the employer, are based on determination through a written test of the following (29 CFR 1926.1427(j)(1)):

- the individual knows the information necessary for safe operation of the specific type of equipment he or she will operate, including all of the following:
  1) the controls and operational/performance characteristics;
  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) technical knowledge of the subject matter criteria listed in Appendix C of 29 CFR 1926 Subpart CC applicable to the specific type of equipment;
  
  NOTE: Use of Appendix C criteria will meet this requirement.
  
  5) technical knowledge applicable to site hazards, site access, and the suitability of the supporting ground and surface to handle expected loads, site hazards, and site access; and
  6) the requirements of 29 CFR 1926 Subpart CC including applicable incorporated materials.

- the individual is able to read and locate relevant information in the equipment manual and other materials containing required information.

Verify that certification is also based on a practical test that determines that the individual has the skills necessary for safe operation of the equipment, including the following (29 CFR 1926.1427(j)(2)):

- the sight and hearing ability to successfully conduct a shift inspection (see paragraph 11.4);
- operational and maneuvering skills;
- application of load chart information; and
- application of safe shut-down and securing procedures.
20. Qualifications of Additional Personnel

20.1 Signal persons must be properly qualified. (29 CFR 1926.1428(a))

**Guide Note**
- Verify that the employer ensures that each signal person meets the qualification requirements in this paragraph prior to giving any signals (29 CFR 1926.1428(a)).
- Verify that the documentation of the signal persons qualifications is one of the following (29 CFR 1926.1428(a)):
  - documentation from a third party qualified evaluator; or
  - assessment by the employer’s qualified assessor.
    NOTE: Assessment by the employer’s qualified assessor is not portable—no other employer may rely on it.
- Verify that the documentation specifies each type of signaling for which the signal person is qualified (e.g., hand signals, radio signals, etc.) and that the employer ensures that the documentation is available at the site while the signal person is employed by the employer (29 CFR 1926.1428(a)(3)).
- If there are any deficiencies in the signal person’s performance, verify that the employer does not allow the individual to continue working as a signal person until he or she has been retrained and reassessed (29 CFR 1926.1428(b)).
- Verify that the signal person has the following qualifications (29 CFR 1926.1428(c)):
  - knowledge and understanding of the type of signals used;
    NOTE: If hand signals are used, the signal person must know and understand the Standard Method for hand signals.
  - competence in the application of the type of signals used;
  - basic understanding of equipment operation and limitations, including the crane dynamics involved in swinging and stopping loads and boom deflection from hoisting loads; and
  - knowledge and understanding of the requirements of section 16 and this paragraph.
- Verify that the signal person has demonstrated his or her qualifications through a practical test and either an oral or written test (29 CFR 1926.1428(c)(5)).

20.2 Maintenance and repair employees must be properly qualified. (29 CFR 1926.1429)

**Guide Note**
- Verify that maintenance, inspection, and repair personnel are allowed to operate equipment only where all of the following requirements are met (29 CFR 1926.1429(a)):
  - the operation is limited to those functions needed to perform maintenance, inspect the equipment, or verify its performance; and
  - the personnel are familiar with the operation, limitations, characteristics, and hazards associated with the type of equipment, or they operate it under the direct supervision of a properly qualified or certified operator.
- Verify that maintenance and repair personnel meet the definition of a qualified person with respect to the equipment and maintenance/repair tasks performed (29 CFR 1926.1429(b)).

NOTE: OSHA has not adopted ASME B 30.5 by reference. Therefore, employers may not rely on the ASME Standard to ensure compliance with 29 CFR 1926.1429, even though its requirements may be similar to those of the OSHA regulation (OSHA Interpretation Letter, 03/13/12).
21. Training

Additional training requirements are specified in this Rulebook as follows:

- Overhead power lines (see paragraph 7.3).
- Signal persons (see paragraph 20.1).
- Operators-in-training (see paragraph 19.6).

21.1 All personnel must be properly trained. (29 CFR 1926.1430)

Guide Note

- Verify that operators of derricks, sideboom cranes, and equipment with a maximum manufacturer-rated hoisting/lifting capacity of 2,000 pounds or less are trained on the safe operation of the equipment they will be using (29 CFR 1926.1430(c)(3)).
- Verify that operators of all covered cranes and derricks are trained in the following additional practices (29 CFR 1926.1430(c)(4)):
  - on friction equipment, 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; and
    NOTE: On other types of equipment with a boom, the same practice is applicable. However, there typically is no means of adjusting the brake, so repair is required if the brake does not hold.
  - where available, the manufacturer’s emergency procedures for halting unintended equipment movement.
- Verify that each competent person and each qualified person is trained regarding the requirements applicable to his or her role (29 CFR 1926.1430(d)).
- Verify that each employee who works with the equipment understands to keep clear of holes, crush/pinch points, and the hazards addressed in paragraph 18.1 (29 CFR 1926.1430(e)).
- Verify that each operator and each additional employee authorized to start/energize equipment or operate equipment controls (e.g., maintenance and repair employees) is trained in the tag-out requirements of 29 CFR 1926.1417(f) and (g) (see paragraph 15.1) (29 CFR 1926.1430(f)).
- Verify that the employer evaluates each employee who requires training to confirm that the employee understands the information provided in the training (29 CFR 1926.1430(g)).
- Verify that the employer provides refresher training in relevant topics for each employee when there is an indication that retraining is necessary, based on the employee’s performance or an evaluation of the employee’s knowledge (29 CFR 1926.1430(g)).
- Verify that all required training is provided at no cost to the employee (29 CFR 1926.1430(g)).

22. Hoisting Personnel

22.1 Certain additional requirements must be met when hoisting one or more employees. (29 CFR 1926.1431(a) and (b))

Guide Note

- Verify that cranes and derricks are not used to hoist employees except where the employer demonstrates that the erection, use, and dismantling of conventional means of reaching the work area (e.g., 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 (29 CFR 1926.1431(a)).
  NOTE: This prohibition does not apply to work covered by 29 CFR 1926 Subpart R (see Steel Erection (Module R)).
- When using equipment to hoist employees, verify that the employees are in a personnel platform that meets the requirements of paragraph 22.3 (29 CFR 1926.1430(b)).
  EXCEPTIONS: A personnel platform is not required for hoisting personnel in the following circumstances, which are addressed separately in this section:
    - into and out of drill shafts that are up to and including eight feet in diameter;
    - in pile driving operations;
    - solely for transfer to or from a marine worksite in a marine-hoisted personnel transfer device; or
    - in storage-tank (steel or concrete), shaft, and chimney operations.
22.2 When hoisting personnel, equipment must meet certain requirements. (29 CFR 1926.1431(c) and (d))

Guide Note
- Verify that the equipment is uniformly level, within one percent of level grade, and located on footing that a qualified person has determined to be sufficiently firm and stable (29 CFR 1926.1431(c)(1)).
- Verify that equipment with outriggers or stabilizers has them all equally extended, in accordance with the manufacturer’s procedures and load charts, and locked (29 CFR 1926.1431(c)(2)).
- When using suspended personnel platforms, verify that the total load including the hook, load line, and rigging does not exceed 50 percent of the rated capacity for the radius and configuration of the equipment, except during proof testing (29 CFR 1926.1431(d)(1)).
- When using boom-attached personnel platforms, verify that the total weight of the loaded platform does not exceed 50 percent of the rated capacity for the radius and configuration of the equipment, except during proof testing (29 CFR 1926.1431(d)(2)).
- When hoisting personnel without a personnel platform, verify that the total load including the hook, load line, rigging, and any other equipment that imposes a load does not exceed 50 percent of the rated capacity for the radius and configuration of the equipment, except during proof testing (29 CFR 1926.1431(d)(3)).
- When the occupied personnel platform is in a stationary working position, verify that 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 are engaged (29 CFR 1926.1431(d)(4)).
- Verify that equipment (except for derricks and articulating cranes) with a variable angle boom is equipped with a boom angle indicator that is readily visible to the operator and a boom hoist limiting device (29 CFR 1926.1431(d)(5)(i)).
- Verify that articulating cranes are equipped with a properly functioning automatic overload protection device (29 CFR 1926.1431(d)(5)(ii)).
- Verify that equipment with a luffing jib is equipped with a jib angle indicator that is readily visible to the operator and a jib hoist limiting device (29 CFR 1926.1431(d)(5)(iii)).
- Verify that an anti two-block device that prevents damage/failure at all points where two-blocking could occur is used (29 CFR 1926.1431(d)(5)(v)).

EXCEPTION: An anti two-block device is not required in pile driving operations.
- Verify that the load line hoist drum has a system, other than the load line hoist brake, which regulates the lowering rate of speed of the hoist mechanism and that this system or device is used when hoisting personnel (29 CFR 1926.1431(d)(5)(vi)).
- Verify that personnel hoisting operations do not begin unless the required devices are in proper working order (29 CFR 1926.1431(d)(5)(vii)).
- If a device stops working properly during personnel hoisting operations, verify that the operator stops operations, does not attempt to use any alternative measures and does not resume until the device is working properly (29 CFR 1926.1431(d)(5)(viii)).

22.3 Personnel platforms must meet certain requirements. (29 CFR 1926.1431(e))

Guide Note
- Verify that the personnel platform and attachment/suspension system used for hoisting personnel is designed by a qualified person familiar with structural design (29 CFR 1926.1431(e)(1)).
- Verify that the system used to connect the personnel platform to the equipment allows the platform to remain within 10° of level, regardless of boom angle (29 CFR 1926.1431(e)(2)).
- Verify that the suspension system is designed to minimize tipping of the platform due to movement of employees on the platform (29 CFR 1926.1431(e)(3)).
- Verify that the personnel platform itself (excluding the guardrail system and personal fall arrest system anchorages) is capable of supporting its own weight and at least five times the maximum intended load without failure (29 CFR 1926.1431(e)(4)).
- Verify that all welding of the platform and its components is performed by a certified welder familiar with the weld grades, types, and material specified in the platform design (29 CFR 1926.1431(e)(5)).
- Verify that the platform must be equipped with a guardrail system and is enclosed at least from the toeboard to mid-rail with either solid construction material or expanded metal having openings no greater than 1/2 inch (1.27cm) (29 CFR 1926.1431(e)(6)).
NOTE: The guardrail system and anchor points must meet the requirements of 29 CFR 1926 Subpart M (see Fall Protection (Module M) Rulebook, paragraphs 2.2 – 2.5 and 3.3).

- Verify that a grab rail is installed inside the entire perimeter of the personnel platform except for access gates/doors (29 CFR 1926.1431(e)(7)).
- If access gates or doors of any type are installed, verify that they are equipped with a device that prevents accidental opening and do not swing outward (29 CFR 1926.1431(e)(8)).

NOTE: The gate/door may swing outward if it is infeasible for it to swing inward and allow safe entry for the platform occupant due to the size of the platform, such as on a one-person platform.

- Verify that headroom is sufficient for employees to stand upright on the platform (29 CFR 1926.1431(e)(9)).
- When employees are exposed to falling objects, verify that the platform is provided with overhead protection (such as wire mesh that has up to 1/2inch openings) that does not obscure the view of the operator or platform occupants unless full protection is necessary, and that employees wear hard hats (29 CFR 1926.1431(e)(10)).
- Verify that all edges that employees may contact are smooth enough to prevent injury (29 CFR 1926.1431(e)(11)).
- Verify that the weight of the platform and its rated capacity are conspicuously posted on the platform with a plate or other permanent marking (29 CFR 1926.1431(e)(12)).

22.4 Personnel platforms must be properly loaded. (29 CFR 1926.1431(f))

Guide Note

- Verify that personnel platforms are not loaded in excess of their rated capacity (29 CFR 1926.1431(f)(1)).
- Verify that personnel platforms are used only for employees, their tools, and the materials necessary to do their work and are not used to hoist materials or tools when not hoisting personnel (29 CFR 1926.1431(f)(2)).

EXCEPTION: Properly secured and distributed materials and tools that will be used for the lift with personnel may be in the platform for trial lifts.

- Verify that materials and tools are secured to prevent displacement and evenly distributed within the confines of the platform while it is suspended (29 CFR 1926.1431(f)(3)).
- Verify that the number of employees on the platform does not exceed the maximum number it was designed to hold or the number required to perform the work, whichever is less (29 CFR 1926.1431(f)(4)).

22.5 Attachments and rigging must meet certain requirements. (29 CFR 1926.1431(g))

Guide Note

- Verify that hooks used in the connection between the hoist line and the personnel platform (including those on overhaul ball assemblies, lower load blocks, bridle legs, or other attachment assemblies or components) can be closed and locked to eliminate the throat opening, and are kept closed and locked when attached (29 CFR 1926.1431(g)(1)(i)).
- Verify that only alloy anchor shackles are used in place of hooks and that the shackles either have a bolt, nut and retaining pin, in place or are screw-type, with the screw pin secured from accidental removal (29 CFR 1926.1431(g)(1)(ii)).
- If other detachable devices are used, verify that they are of a type that can be closed and locked to the same extent as the allowed hooks and shackles, and that they are kept closed and locked when attached (29 CFR 1926.1431(g)(1)(iii)).
- When a rope bridle is used to suspend the personnel platform, verify that each bridle leg is connected to a master link or shackle in a manner that ensures that the load is evenly divided among the bridle legs (29 CFR 1926.1431(g)(2)).
- Verify that each piece of rigging hardware (including wire rope, shackles, rings, master links, and other rigging hardware) and each hook is capable of supporting at least five times the maximum intended load applied or transmitted to that component without failure (29 CFR 1926.1431(g)(3)).
- Where rotation resistant rope is used, verify that the slings are capable of supporting at least ten times the maximum intended load without failure (29 CFR 1926.1431(g)(3)).
- Verify that eyes in wire rope slings are fabricated with thimbles (29 CFR 1926.1431(g)(4)).
- Verify that bridles and associated rigging for suspending the personnel platform are used only for the platform and the necessary employees, their tools, and materials necessary to do their work and have not previously been used for any purpose other than hoisting personnel (29 CFR 1926.1431(g)(5)).
22.6 Trial lifts and inspections must be conducted in accordance with certain requirements. (29 CFR 1926.1431(h))

Guide Note

- Verify that a trial lift is conducted, with the unoccupied personnel platform loaded at least to the anticipated liftweight, and is made from ground level (or other location where employees will enter the platform) at each location at which the platform is to be hoisted and positioned (29 CFR 1926.1431(h)(1)).
- Where there is more than one location to be reached from a single set-up position, verify that either individual trial lifts are conducted for each location or a single trial lift is conducted in which the platform is moved sequentially to each location, matching the method that will be used to hoist the personnel (29 CFR 1926.1431(h)(1)).
- Verify that the trial lift is conducted before each shift in which personnel will be hoisted and repeated prior to hoisting employees in each of the following circumstances (29 CFR 1926.1431(h)(2)):
  - when the equipment is moved and set up in a new location or returned to a previously used location; and
  - when the lift route is changed, unless the competent person determines that the new route presents no new factors affecting safety.
- Verify that the competent person determines the following (29 CFR 1926.1431(h)(3)):
  - safety devices and operational aids required by this section are activated and functioning properly and other safety devices and operational aids meet the requirements of 29 CFR 1926.1415 and 29 CFR 1926.1416 (see section 14);
  - nothing interferes with the equipment or the personnel platform in the course of the trial lift;
  - the lift will not exceed 50 percent of the equipment’s rated capacity at any time during the lift; and
  - the load radius to be used during the lift has been accurately determined.
- Verify that immediately after the trial lift the competent person does the following (29 CFR 1926.1431(h)(4)):
  - conducts a visual inspection of the equipment, base support or ground, and personnel platform to determine whether the trial lift has shown any defect or problem or produced any adverse effect; and
  - confirms that the test weight has been removed when the trial lift process is complete.
- Verify that the following inspection occurs following the trial lift and prior to each lift with personnel (29 CFR 1926.1431(h)(5)):
  - the platform is hoisted a few inches with the personnel and materials/tools on board and inspected by a competent person to ensure that it is secure and properly balanced; and
  - a competent person determines the following conditions exist before the lift of personnel proceeds:
    1) hoist ropes are free of deficiencies (see section 12);
    2) multiple part lines are not twisted around each other;
    3) the primary attachment is centered over the platform; and
    4) if the load rope is slack, the hoisting system is inspected to ensure that all ropes are properly seated on drums and in sheaves.
- If any condition is found during the trial lift and subsequent inspection(s) that fails to meet a requirement of 29 CFR Subpart CC or otherwise creates a safety hazard, verify that it is corrected before hoisting personnel (29 CFR 1926.1431(h)(6)).

22.7 Proof testing must be conducted in accordance with certain requirements. (29 CFR 1926.1431(j))

Guide Note

- Verify that after any modification or repair to a personnel platform it is proof tested to 125 percent of its rated capacity prior to hoisting any personnel (29 CFR 1926.1431(j)(1)).

  NOTE: The proof test may be done concurrently with the trial lift.
- Verify that the proof test consists of lowering the platform by controlled load lowering, braking, and holding the platform in a suspended position for a minimum of five minutes with the test load evenly distributed (29 CFR 1926.1431(j)(2)).
- Verify that after proof testing, a competent person inspects the platform and rigging to determine if the test has been passed and that if any deficiencies are found that pose a safety hazard, the platform and rigging are not used to hoist personnel unless the deficiencies are corrected, the test is repeated, and a competent person determines that the test has been passed (29 CFR 1926.1431(j)(3)).
- Verify that personnel hoisting is not conducted until the competent person determines that the platform and rigging have successfully passed the proof test (29 CFR 1926.1431(j)(4)).
22.8 Certain work practices must be observed when hoisting personnel. (29 CFR 1926.1431(k))

**Guide Note**

- Verify that the personnel platform is hoisted in a slow, controlled, cautious manner, with no sudden movements of the equipment or the platform (29 CFR 1926.1431(k)(1)).
- Verify that personnel on the platform do the following (29 CFR 1926.1431(k)(2)):
  - keep all parts of the body inside the platform during raising, lowering, and horizontal movement except when necessary to position the platform or while performing the duties of a signal person;
  - 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; and
  - not pull the platform out of plumb in relation to the hoisting equipment.
- Verify that before employees exit or enter a hoisted personnel platform that is not landed the platform is secured to the structure where the work is to be performed, unless the employer can demonstrate that securing to the structure would create a greater hazard (29 CFR 1926.1431(k)(3)).
- If the platform is tied to the structure, verify that the operator does not move the platform before receiving confirmation that it is freely suspended (29 CFR 1926.1431(k)(4)).
- Verify that tag lines are used when necessary to control the platform (29 CFR 1926.1431(k)(5)).
- If the platform is not equipped with controls, verify that the equipment operator remains at the equipment controls, on site, and in view of the equipment at all times while the platform is occupied (29 CFR 1926.1431(k)(6)).
- If the platform is equipped with controls, verify that the following requirements are met at all times while the platform is occupied (29 CFR 1926.1431(k)(7)):
  - the occupant using the controls in the platform is a qualified person with respect to the controls, including the safe limitations of the equipment and hazards associated with its operation;
  - the equipment operator is at a set of equipment controls that include boom and swing functions of the equipment and is on site and in view of the equipment; and
  - the platform operating manual is in the platform or on the equipment.
- When wind speed (sustained or gusts) exceeds 20 mph at the personnel platform, verify that a qualified person determines if it is safe to lift personnel and if not, that the lifting operation does not begin (or, if already in progress, is terminated) (29 CFR 1926.1431(k)(8)(i)).
- If there are any other dangerous weather conditions, or other impending or existing danger, verify that a qualified person determines if it is safe to lift personnel and if not, that the lifting operation does not begin (or, if already in progress, is terminated) (29 CFR 1926.1431(k)(8)(ii)).
- Verify that employees being hoisted remain in direct communication with the signal person (where used) or the operator (29 CFR 1926.1431(k)(9)).
- Verify that employees on the platform are provided with a personal fall arrest system that is attached to a structural member within the personnel platform, and that they know how to use it (29 CFR 1926.1431(k)(10)).

**NOTE 1:** See Personal Protective and Life Saving Equipment (Module E) Rulebook, section 9 for requirements when working over water.

**NOTE 2:** The fall arrest system must meet the requirements of 29 CFR 1926.502 (see Fall Protection (Module M) Rulebook, section 2).

- Verify that no lifts are made on any other of the equipment’s load lines while personnel are being hoisted, except in pile driving operations (29 CFR 1926.1431(k)(11)(i)).
- Verify that employees are hoisted on factory-produced boom-mounted personnel platforms that incorporate a winch as original equipment only where the load on the winch line does not exceed 500 pounds and does not exceed the rated capacity of the winch and platform (29 CFR 1926.1431(k)(11)(ii)).
- Verify that employees are not hoisted on equipment other than derricks while it is traveling, except for the following (29 CFR 1926.1431(k)(12)(i)):
  - equipment that travels on fixed rails; or
  - where the employer demonstrates that there is no less hazardous way to perform the work.

**NOTE:** This exception does not apply to rubber-tired equipment.

- Where employees are hoisted while the equipment is traveling, verify that all of the following criteria are met (29 CFR 1926.1431(k)(12)(ii)):
  - equipment travel must be restricted to a fixed track or runway;
  - where a runway is used, it must be a firm, level surface designed, prepared, and designated as a path of travel for the weight and configuration of the equipment being used to lift and travel with the personnel platform;
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- equipment travel must be limited to boom length;
- the boom must be parallel to the direction of travel, except where it is safer to do otherwise; and
- a complete trial run must be performed to test the route of travel before employees are allowed to occupy the platform.

NOTE: This trial run may be performed at the same time as the trial lift.

- Verify that derricks do not travel while personnel are hoisted (29 CFR 1926.1431(k)(13)).

22.9 A meeting must be held prior to hoisting personnel. (29 CFR 1926.1431(m))

Guide Note
- Verify that a pre-lift meeting is held to review the applicable requirements of this section and the procedures that will be followed (29 CFR 1926.1431(m)(1)).
- Verify that the meeting is 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 (29 CFR 1926.1431(m)(2)).
- Verify that the meeting is held prior to the trial lift at each new work location and repeated for any employees newly assigned to the operation (29 CFR 1926.1431(m)(3)).

22.10 Special precautions must be taken when hoisting personnel near power lines, in drill shafts, or in pile driving operations. (29 CFR 1926.1431(n), (o) and (p))

Guide Note
- Verify that personnel are not hoisted 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 (29 CFR 1926.1431(n)).

EXCEPTION: This prohibition does not apply to work on power transmission and distribution systems.

- When hoisting employees into and out of drill shafts that are eight feet in diameter or less, or in pile driving operations, verify that the employee is in either a personnel platform or on a boatswain’s chair (29 CFR 1926.1431(o) and (p)).

NOTE: If using a boatswain’s chair, the following requirements of this section apply: 29 CFR 1926.1431(a), (c), (d)(1), (d)(3), (d)(4), (e)(1), (e)(2), (e)(3), (f)(1), (f)(2)(i), (f)(3)(i), (g), (h), (k)(1), (k)(6), (k)(8), (k)(9), (k)(11)(i), (m), and (n). The words “boatswain’s chair” would be substituted for the words “platform” or “personnel platform.”

- If a boatswain’s chair is used, verify that the following additional requirements are also met (29 CFR 1926.1431(o)(3) and (p)(4)):
  - a signal person must be stationed at the shaft opening;
  - the employee must be hoisted in a slow, controlled descent and ascent;
  - the employee must use personal fall protection equipment, including a full body harness, attached independent of the crane/derrick;

NOTE: The fall protection equipment must meet the applicable requirements in 29 CFR 1926.502 (see Fall Protection (Module M) Rulebook, section 2).
  - the boatswain’s chair must be capable of supporting its own weight and at least five times the maximum intended load without failure; and
  - no more than one person may be hoisted at a time.

- For lattice boom cranes used in pile driving operations, verify that either the cable is clearly marked (so that it can easily be seen by the operator) at a point that will give the operator sufficient time to stop the hoist to prevent two-blocking, or a spotter is used who is in direct communication with the operator to inform the operator when this point is reached (29 CFR 1926.1431(p)(2)).

- For telescopic boom cranes used in pile driving operations, verify that the cable is clearly marked (so that it can easily be seen by the operator) at a point that will give the operator sufficient time to stop the hoist to prevent two-blocking, and a spotter is used who is in direct communication with the operator to inform the operator when this point is reached (29 CFR 1926.1431(p)(2)).

22.11 Special precautions must be taken when hoisting personnel for marine transfer. (29 CFR 1926.1431(r))

Guide Note
- When hoisting employees solely for transfer to or from a marine worksite, verify that the employee is in either a personnel platform or on a boatswain’s chair (29 CFR 1926.1431(r)(1)).
NOTE: If using a marine-hoisted personnel transfer device, the following requirements of this section apply: 29 CFR 1926.1431(a), (c)(2), (d)(1), (d)(3), (d)(4), (e)(1) – (e)(5), (e)(12), (f)(1), (g), (h), (j), (k)(1), (k)(8), (k)(9), (k)(10)(ii), (k)(11)(i), (k)(12), (m), and (n). The words “marine-hoisted personnel transfer device” would be substituted for the words “platform” or “personnel platform.”

- If a marine-hoisted personnel transfer device is used, verify that the following additional requirements are also met (29 CFR 1926.1431(r)(3)):
  - the transfer device must be used only for transferring workers;
  - the number of workers occupying the transfer device must not exceed the maximum number it was designed to hold; and
  - each employee must wear a U.S. Coast Guard personal floatation device approved for industrial use.

22.12 Special precautions must be taken when hoisting personnel for storage-tank (steel or concrete), shaft, and chimney operations. (29 CFR 1926.1431(s))

Guide Note
- Verify that the employee is in a personnel platform unless the employer can demonstrate that use of a personnel platform is infeasible, in which case a boatswain’s chair must be used (29 CFR 1926.1431(s)(1)).
- If a boatswain’s chair is used, verify that the requirements detailed in paragraph 22.10 are met (29 CFR 1926.1431(s)(3)).

NOTE: When hoisting personnel for storage-tank (steel or concrete), shaft, and chimney operations, if there is no adequate structure for attachment of personal fall arrest equipment as required in 29 CFR 1926.502(d)(15), the attachment must be to the lower load block or overhaul ball.

23. Multiple Crane and Derrick Lifts

23.1 Certain additional requirements must be met when more than one crane/derrick will be supporting the load. (29 CFR 1926.1432)

Guide Note
- Before beginning a crane/derrick operation in which more than one crane/derrick will be supporting the load, verify that the operation has a plan developed by a qualified person to meet the requirements of 29 CFR 1926 Subpart CC (29 CFR 1926.1432(a)).
- Where the qualified person determines that engineering expertise is needed for the planning, verify that the employer provides it (29 CFR 1926.1432(a)(3)).
- Verify that the lift is directed by both a competent and a qualified person who reviews the plan in a meeting with all workers who will be involved with the operation (29 CFR 1926.1432(b)).

NOTE: The requirements for being both “competent” and “qualified” may be met by one person or multiple people.
24. Equipment with a Capacity of More than 2,000 Pounds

24.1 Equipment that has a manufacturer-rated hoisting/lifting capacity of more than 2,000 pounds must be properly designed, constructed and tested. (29 CFR 1926.1433)

Guide Note

- Verify that crawler, truck, and locomotive cranes manufactured prior to November 8, 2010, meet the applicable requirements for design, construction, and testing in ANSI B30.5-1968, the requirements in 29 CFR 1926.1433(b), or the applicable DIN standards that were in effect at the time of manufacture, including for prototype testing (29 CFR 1926.1433(a) and (c)).
- Verify that mobile (including crawler and truck) and locomotive cranes manufactured on or after November 8, 2010, meet the applicable listed portions of ASME B30.5-2004 (29 CFR 1926.1433(b)).
- Verify that mobile (including crawler and truck) and locomotive cranes manufactured on or after November 8, 2010, meet one of the following options for prototype testing (29 CFR 1926.1433(c)):
  - for equipment with cantilevered booms (such as hydraulic boom cranes):
    1) all the tests listed in SAE J1063 (November 1993) Table 1 must be performed to load all critical structural elements to their respective limits and all the strength margins in Table 2 must be met; or
    2) the testing and verification requirements of BS EN 13000:2004 must be met and additionally the analysis methodology (computer modeling) must demonstrate that all load cases listed in SAE J1063 (November 1993) meet the strength margins listed in Table 2.
    NOTE: If using this second option, the physical testing requirements under SAE J1063 (November 1993) must be met unless the reliability of the analysis methodology (computer modeling) has been demonstrated by a documented history of verification through strain gauge measuring or strain gauge measuring in combination with other physical testing.
  - for equipment with pendant-supported lattice booms:
    1) all the tests listed in SAE J987 (June 2003) Table 1 must be performed to load all critical structural elements to their respective limits and all the strength margins in Table 2 must be met; or
    2) the testing and verification requirements of BS EN 13000:2004 must be met and additionally the analysis methodology (computer modeling) must demonstrate that all load cases listed in SAE J1063 (November 1993) meet the strength margins listed in Table 2.
    NOTE: If using this second option, the physical testing requirements under SAE J987 (June 2003) must be met unless the reliability of the analysis methodology (computer modeling) has been demonstrated by a documented history of verification through strain gauge measuring or strain gauge measuring in combination with other physical testing.
- Verify that all equipment has at least the following information available in the cab (29 CFR 1926.1433(d)(1)):
  - a complete range of the manufacturer’s equipment rated capacities, as follows:
    1) at all manufacturer-approved operating radii, boom angles, work areas, boom lengths and configurations, and jib lengths and angles (or offset); and
    2) alternate ratings for use and nonuse of option equipment which affects rated capacities, such as outriggers, stabilizers, and extra counterweights.
  - a work area chart for which capacities are listed in the load chart;
  - 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; and
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- hydraulic relief valve settings specified by the manufacturer.
- Verify that load hooks (including latched and unlatched types), ball assemblies, and load blocks are 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 (29 CFR 1926.1433(d)(2)).
- Verify that hook and ball assemblies and load blocks are marked with their rated capacity and weight (29 CFR 1926.1433(d)(3)).
- Verify that hooks are equipped with latches, unless 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 those necessary for the hooking or unhooking of the load (29 CFR 1926.1433(d)(4)).
- Verify that all posted warnings required by 29 CFR 1926 Subpart CC, and those originally supplied by the manufacturer, are maintained in legible condition (29 CFR 1926.1433(d)(5)).
- Verify that a fire extinguisher is accessible on the equipment (29 CFR 1926.1433(d)(6)).
- Verify that belts, gears, shafts, pulleys, sprockets, spindles, drums, fly wheels, chains, and other parts or components that reciprocate, rotate, or otherwise move are guarded where contact by employees (except for maintenance and repair employees) is possible in the performance of normal duties (29 CFR 1926.1433(d)(8)).
- Verify that all exhaust pipes, turbochargers, and charge air coolers are insulated or guarded where contact by employees (except for maintenance and repair employees) is possible in the performance of normal duties (29 CFR 1926.1433(d)(9)).
- Verify that hydraulic and pneumatic lines are protected from damage to the extent feasible (29 CFR 1926.1433(d)(10)).
- Verify that the equipment is designed so that exhaust fumes are not discharged in the cab and are discharged in a direction away from the operator (29 CFR 1926.1433(d)(11)).
- Where friction mechanisms (such as brakes and clutches) are used to control the boom hoist or load line hoist, verify they are of a size and thermal capacity sufficient to control all rated loads with the minimum recommended reeving and adjustable to permit compensation for lining wear to maintain proper operation (29 CFR 1926.1433(d)(12)).
- Verify that hydraulic drums have an integrally mounted holding device or internal static brake to prevent load hoist movement in the event of hydraulic failure (29 CFR 1926.1433(d)(12)).

24.2 Equipment with a cab must meet certain requirements. (29 CFR 1926.1433(d)(7))

Guide Note

- Verify that cabs are designed with a form of adjustable ventilation and method for clearing the windshield for maintaining visibility and air circulation. (29 CFR 1926.1433(d)(7)(i)).
  
  NOTE: Examples of means for adjustable ventilation include an air conditioner or a window that can be opened and examples of means for maintaining visibility include a heater (for preventing windshield icing), defroster, fan, and windshield wiper.
- Verify that swinging and sliding cab doors are designed to prevent inadvertent opening or closing while traveling or operating the machine (29 CFR 1926.1433(d)(7)(ii)).
- Verify that swinging doors adjacent to the operator open outward and sliding operator doors open rearward (29 CFR 1926.1433(d)(7)(iii)).
- Verify that the cab has windows in front and on both sides of the operator and that forward vertical visibility is sufficient to give the operator a view of the boom point at all times (29 CFR 1926.1433(d)(7)(iii)(A)).
- If windows have sections designed to be opened or readily removed, verify that they can be secured to prevent inadvertent closure (29 CFR 1926.1433(d)(7)(iii)(B)).
- Verify that windows are made of safety glass or material with similar optical and safety properties that does not introduce visible distortion or otherwise obscure visibility in a way that would interfere with the safe operation of the equipment (29 CFR 1926.1433(d)(7)(iii)(C)).
- Verify that a clear passageway is provided from the operator’s station to an exit door on the operator’s side (29 CFR 1926.1433(d)(7)(iv)).
- Verify that areas of the cab roof that serve as a workstation for rigging, maintenance, or other equipment-related tasks are capable of supporting 250 pounds without permanent distortion (29 CFR 1926.1433(d)(7)(v)).
# 25. Equipment Modifications

*The provisions in this section do not apply to modifications made or approved by the U.S. military.*

## 25.1 Modifications or additions which affect the capacity or safe operation of the equipment are prohibited with limited exceptions. (29 CFR 1926.1434)

### Guide Note

- Verify that modifications or additions which affect the capacity or safe operation of the equipment are not made except in the following circumstances (29 CFR 1926.1434(a)):
  - The manufacturer approves the modifications/additions in writing. The load charts, procedures, instruction manuals, and instruction plates/tags/decals are modified as necessary to accord with the modification/addition, and the original safety factor of the equipment is not reduced.
  - If the employer requests the manufacturer’s approval but the manufacturer either declines to review the request, fails to acknowledge it or begin the review within 30 days, or does not complete the review within 120 days, a registered professional engineer who is a qualified person with respect to the equipment involved may approve the modification/addition and specify the equipment configurations to which that approval applies. The load charts, procedures, instruction manuals, and instruction plates/tags/decals must be modified as necessary to accord with the modification/addition, and the original safety factor of the equipment must not be reduced.
  - If the manufacturer is unavailable, a registered professional engineer who is a qualified person with respect to the equipment involved may approve the modification/addition and specify the equipment configurations to which that approval applies. The load charts, procedures, instruction manuals, and instruction plates/tags/decals must be modified as necessary to accord with the modification/addition, and the original safety factor of the equipment must not be reduced.
  - If the equipment is designed for marine work sites and contains major structural components from more than one manufacturer, a registered professional engineer who is a qualified person with respect to the equipment involved may approve the modification/addition and specify the equipment configurations to which that approval applies. The load charts, procedures, instruction manuals, and instruction plates/tags/decals must be modified as necessary to accord with the modification/addition, and the original safety factor of the equipment must not be reduced.

- If the manufacturer reviews the technical safety merits of the proposed modification/addition, rejects the proposal, and explains the reasons for the rejection in a written response, verify that the modification/addition is not made (29 CFR 1926.1434(b)).

NOTE: If the manufacturer rejects the proposal but does not explain the reasons in writing, the employer may treat this as if the manufacturer had refused to review the proposal and a qualified registered professional engineer may approve the proposal.
26. Tower Cranes

This section contains supplemental requirements for tower cranes. All sections of 29 CFR 1926 Subpart CC apply to tower cranes unless otherwise specified. 29 CFR 1926.1415 and 29 CFR 1926.1416 do not apply to tower cranes. 29 CFR 1926.1412 (see section 11) applies to tower cranes, except that the term “assembly” is replaced by “erection.” In the following sections, the words “erecting, climbing, and dismantling,” would be substituted for the words “assembly/disassembly,” and the word “dismantling” would be substituted for the word “disassembly”:

- 29 CFR 1926.1403 (see section 2);
- 29 CFR 1926.1404 (see section 3);
- 29 CFR 1926.1405 (see section 4); and
- 29 CFR 1926.1406 (see section 5).

26.1 Tower cranes must meet certain additional requirements. (29 CFR 1926.1435(a) – (c))

Guide Note

- In addition to the requirements in 29 CFR 1926.1404(e) (see paragraph 3.2), verify that employees are not in or under the tower, jib, or rotating portion of self-erecting tower cranes during erecting, climbing, and dismantling operations until the crane is secured in a locked position and the competent person in charge indicates it is safe to enter this area, unless the manufacturer’s instructions direct otherwise and only the necessary personnel are permitted in this area (29 CFR 1926.1435(b)(2)).
- Verify that tower crane foundations and structural supports (including both the portions of the structure used for support and the means of attachment) are designed by the manufacturer or a registered professional engineer (29 CFR 1926.1435(b)(3)).
- In addition to the requirements of 29 CFR 1926.1404(h)(1) – (9) (see paragraph 3.4), verify that the A/D director addresses the following (29 CFR 1926.1435(b)(4)):
  - a determination that tower crane foundations and structural supports are installed in accordance with their design;
  - backward stability before swinging self-erecting cranes or cranes on traveling or static undercarriages; and
  - verification that wind does not exceed the speed recommended by the manufacturer or, where manufacturer does not specify this information, the speed determined by a qualified person.
- Verify that towers are erected to the manufacturer’s plumb tolerance and verified by a qualified person (29 CFR 1926.1435(b)(5)).
  NOTE: Where the manufacturer does not specify plumb tolerance, the crane tower must be plumb to a tolerance of at least 1:500 (approximately one inch in 40 feet).
- On jobsites where more than one fixed jib (hammerhead) tower crane is installed, verify that the cranes are located such that no crane can come in contact with the structure of another crane (29 CFR 1926.1435(b)(6)).
  NOTE: Cranes are permitted to pass over one another.
- Prior to and during all climbing procedures (including inside climbing and top climbing), verify that the employer complies with all manufacturer prohibitions and has 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 (29 CFR 1926.1435(b)(7)).
- Verify that equipment is not 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 (29 CFR 1926.1435(b)(8)(i)).
- Verify that the maximum counterweight and/or ballast specified by the manufacturer or registered professional engineer familiar with the equipment is not exceeded (29 CFR 1926.1435(b)(8)(ii)).
- Verify that the size and location of signs installed on tower cranes is in accordance with manufacturer’s specifications (29 CFR 1926.1435(c)).
  NOTE: Where manufacturer’s specifications are unavailable, a registered professional engineer familiar with the type of equipment involved must approve the size and location of any signs in writing.
26.2 Tower cranes must have certain safety devices. (29 CFR 1926.1435(d))

Guide Note
- Verify that all tower cranes have the following safety devices unless otherwise specified (29 CFR 1926.1435(d)(2)):
  - 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;
  - hoist brake, swing brake, trolley brake, and rail travel brake, all of which must automatically set in the event of pressure loss or power failure;
  - deadman control or forced neutral return control (hand) levers;
  - emergency stop switch at the operator’s station; and
  - trolley end stops must be provided at both ends of travel of the trolley.
- Verify that operations do not begin unless the listed devices are in proper working order (29 CFR 1926.1435(d)(3)).
- If a device stops working properly during operations, verify that the operator safely stops operations and does not take any alternative measures (29 CFR 1926.1435(d)(3)).
- Verify that the equipment is taken out of service and that operations do not resume until the device is working properly again (29 CFR 1926.1435(d)(3)).

26.3 Tower cranes must have certain operational aids. (29 CFR 1926.1435(e))

Guide Note
- Verify that all tower cranes have the listed safety devices unless otherwise specified (29 CFR 1926.1435(e)(2)).
- Verify that operations do not begin unless the operational aids are in proper working order, except where the employer meets the specified temporary alternative measures (29 CFR 1926.1435(e)(3)).
  NOTE: If the tower crane manufacturer specifies more protective alternative measures, these must be followed.
- If a device stops working properly during operations, verify that the operator safely stops operations until the temporary alternative measures are implemented or the device is again working properly (29 CFR 1926.1435(e)(4)).
  NOTE: If a replacement part is no longer available, the use of a substitute device that performs the same type of function is permitted and is not considered a modification under 29 CFR 1926.1434.

26.4 Category I devices must repaired no later than seven calendar days after a deficiency occurs (29 CFR 1926.1435(e)(5))

Guide Note
- Verify that Category I devices (listed in Table 1 of this paragraph) are repaired no later than seven calendar days after a deficiency occurs or seven days after receipt of the parts as long as the employer demonstrates that the necessary parts were ordered within seven calendar days after the deficiency occurred (29 CFR 1926.1435(e)(5)).
### Table 1: Category I Devices and Acceptable Temporary Alternative Measures

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<th>Device</th>
<th>Acceptable Temporary Alternative Measures</th>
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| Trolley travel limiting device to prevent the trolley from running into the trolley end stops: | • one of the following:  
  - the trolley rope must be marked (so it can be seen by the operator) at a point that will give the operator sufficient time to stop the trolley prior to the end stops; or  
  - a spotter who is in direct communication with the operator must be used when operations are conducted within 10 feet of the outer or inner trolley end stops. |
| Boom hoist limiting device to limit the range of the boom at the minimum and maximum radius: | • one of the following:  
  - the cable must be marked (so it can be seen by the operator) at a point that will give the operator sufficient time to stop the boom hoist within the minimum and maximum boom radius; or  
  - a spotter who is in direct communication with the operator must be used when operations are conducted within 10 feet of the outer or inner trolley end stops. |
| Device which automatically prevents damage from contact between the load block, overhaul ball, or similar component, and the boom tip (or fixed upper block or similar component) for all points where two-blocking could occur (anti two-blocking device): | • one of the following:  
  - the cable must be marked (so it can be seen by the operator) at a point that will give the operator sufficient time to stop the boom hoist to prevent two-blocking; or  
  - a spotter who is in direct communication with the operator must be used when operations are conducted within 10 feet of the outer or inner trolley end stops. |
| Device which prevents the last two wraps of hoist cable from being spooled off the drum on tower cranes manufactured after November 8, 2011: | • one of the following:  
  - the cable must be marked (so it can be seen by the operator) at a point that will give the operator sufficient time to stop the boom hoist prior to last two wraps of hoist cable being spooled off the drum; or  
  - a spotter who is in direct communication with the operator must be used when operations are conducted within 10 feet of the outer or inner trolley end stops. |
| Load limiting device which prevents moment overloading:                 | • posting a notice in the cab of the crane notifying the operator that the load hoist deceleration device is malfunctioning and instructing the operator to take special care to reduce the load speed when approaching the upper limits. |
| Hoist pull limiting device to limit the capacity of the hoist to prevent overloading, including each individual gear ratio if equipped with a multiple speed hoist transmission: | • the operator must ensure that the weight of the load does not exceed the capacity of the hoist (including for each individual gear ratio if equipped with a multiple speed hoist transmission). |
### Table 1: Category I Devices and Acceptable Temporary Alternative Measures

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<thead>
<tr>
<th>Device</th>
<th>Acceptable Temporary Alternative Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rail travel limiting device to limit the travel distance in each direction to prevent the travel bogies from running into the end stops or buffers:</td>
<td>• use of a spotter who is in direct communication with the operator when operations are conducted within 10 feet of either end of the travel rail end stops and who informs the operator of the distance of the travel bogies from the end stops or buffers.</td>
</tr>
<tr>
<td>Boom hoist drum positive locking device and control that will enable the operator to positively lock the boom hoist drum from the cab:</td>
<td>• manually setting the device when required if an electric, hydraulic, or automatic control is not functioning.</td>
</tr>
</tbody>
</table>

26.5 Category II devices must repaired no later than 30 calendar days after a deficiency occurs. (29 CFR 1926.1435(e)(6))

**Guide Note**

- Verify that Category II devices (listed in Table 1 of this paragraph) are repaired no later than 30 calendar days after a deficiency occurs or seven days after receipt of the parts as long as the employer demonstrates that the necessary parts were ordered within seven calendar days after the deficiency occurred (29 CFR 1926.1435(e)(6)).

### Table 1: Category II Devices and Acceptable Temporary Alternative Measures

<table>
<thead>
<tr>
<th>Device</th>
<th>Acceptable Temporary Alternative Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boom angle indicator readable from the operator’s station on luffing boom tower cranes:</td>
<td>• determine the boom angle by measuring with a measuring device.</td>
</tr>
<tr>
<td>Hook radius indicator readable from the operator’s station on hammerhead tower cranes manufactured after November 8, 2011:</td>
<td>• determine the radii or with a measuring device.</td>
</tr>
<tr>
<td>Trolley travel deceleration device to automatically reduce the trolley speed in both directions before it reaches the end limits:</td>
<td>• posting a notice in the cab of the crane notifying the operator that the trolley travel deceleration device is malfunctioning and instructing the operator to take special care to reduce the trolley speed when approaching the trolley end limits.</td>
</tr>
<tr>
<td>Boom hoist deceleration device to automatically reduce the boom speed before it reaches the minimum or maximum radius limit:</td>
<td>• posting a notice in the cab of the crane notifying the operator that the boom hoist deceleration device is malfunctioning and instructing the operator to take special care to reduce the boom speed when approaching the minimum or maximum radius limits.</td>
</tr>
<tr>
<td>Load hoist deceleration device to automatically reduce the load speed before the hoist reaches the upper limit:</td>
<td>• posting a notice in the cab of the crane notifying the operator that the load hoist deceleration device is malfunctioning and instructing the operator to take special care to reduce the load speed when approaching the upper limits.</td>
</tr>
<tr>
<td>Device to display the wind speed mounted above the upper rotating structure on tower cranes: NOTE: On self erecting cranes, the wind speed device must be mounted at or above the jib level.</td>
<td>• use of wind speed information from a properly functioning indicating device on another tower crane on the same site, or estimation of wind speed by a qualified person.</td>
</tr>
</tbody>
</table>
Table 1: Category II Devices and Acceptable Temporary Alternative Measures

<table>
<thead>
<tr>
<th>Device</th>
<th>Acceptable Temporary Alternative Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Load indicating device that displays the magnitude of the load on the</td>
<td>• determining the weight of the load from a recognized source (such as the manufacturer of the load) or</td>
</tr>
<tr>
<td>hook on cranes manufactured after November 8, 2011:</td>
<td>by a recognized calculation method (such as calculating a steel beam from measured dimensions and a known</td>
</tr>
<tr>
<td>NOTE: Displays that are part of load moment limiting devices that</td>
<td>weight per foot) and providing the information to the operator prior to the lift.</td>
</tr>
<tr>
<td>display the load on the hook meet this requirement.</td>
<td></td>
</tr>
</tbody>
</table>

26.6 Tower cranes must be inspected. (29 CFR 1926.1435(f))

Guide Note

- Verify that before each crane component is erected it is inspected by a qualified person for damage or excessive wear as follows (29 CFR 1926.1435(f)(2)):
  - special attention must be paid 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; and
  - 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.

- Verify that in addition to the requirements of 29 CFR 1926.1412(c) (see paragraph 11.3), the following post-erection requirements are met (29 CFR 1926.1435(f)(3)):
  - a load test must be conducted using certified weights or scaled weights using a certified scale with a current certificate of calibration; and
  - a load hoist deceleration device to automatically reduce the load speed before the hoist reaches the upper limit.

- Verify that in addition to the requirements of 29 CFR 1926.1412(e) (see paragraph 11.6) the following items are included in monthly inspections (29 CFR 1926.1435(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 supports; and
  - the uppermost tie-in, braces, floor supports, and floor wedges where the tower crane is supported by the structure, for loose or dislodged components.

- Verify that in addition to the items that must be inspected annually under 29 CFR 1926.1412(f) (see paragraph 11.7), all turntable and tower bolts are inspected for proper condition and torque.
27. Derricks

This section contains supplemental requirements for derricks, whether temporarily or permanently mounted. All other sections of 29 CFR 1926 Subpart CC apply to derricks unless otherwise specified. 29 CFR 1926.1416 (see paragraphs 14.2 – 14.4) applies, except for 29 CFR 1926.1416(d)(1) (boom hoist limiting device), 29 CFR 1926.1416(e)(1) (boom angle or radius indicator), and 29 CFR 1926.1416(e)(4) (load weighing and similar devices). 29 CFR 1926.1417 (see section 15) applies except for 29 CFR 1926.1417(c) (accessibility of procedures).

A derrick is powered equipment consisting of a mast or equivalent member that is held at or near the end by guys or braces, with or without a boom, and its hoisting mechanism. The mast/equivalent member and/or the load is moved by the hoisting mechanism (typically base-mounted) and operating ropes. Derricks include: A-frame, basket, breast, Chicago boom, gin pole (except gin poles used for erection of communication towers), guy, shearleg, stiffleg, and variations of such equipment.

27.1 Load charts for derricks must meet certain additional requirements. (29 CFR 1926.1436(b))

**Guide Note**
- Verify that derrick load charts contain at least the following information (29 CFR 1926.1436(b)(2)):
  - 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; and
  - size and construction of rope.

  NOTE: Information about the size and construction of rope may be in the operating manual instead of the load chart.

- For permanently installed derricks with fixed lengths of boom, guy, and mast, verify that a load chart is posted where it is visible to personnel responsible for the operation of the equipment (29 CFR 1926.1436(b)(3)).
- For derricks that are not permanently installed, verify that the load chart is readily available to the personnel responsible for the operation of the equipment at the job site (29 CFR 1926.1436(b)(3)).

27.2 Derricks must be properly constructed. (29 CFR 1926.1436(c))

**Guide Note**
- Verify that all derricks are constructed to meet all stresses imposed on members and components when installed and operated in accordance with the manufacturer’s or builder’s procedures and within its rated capacity (29 CFR 1926.1436(c)(1)(i)).
- Verify that welding of load-sustaining members on all derricks conforms to the practices recommended in ANSI/AWS D14.3-94 or AWS D1.1/D1.1M:2002 (29 CFR 1926.1436(c)(1)(ii)).
- Verify that guy derricks meet the following requirements (29 CFR 1926.1436(c)(2)):
  - there must be at least six guys, with equal spacing, except where a qualified person or derrick manufacturer approves variations and revises the rated capacity to compensate for such variations;
  - before using a guy derrick, the employer must have information about the number of guys, the spacing around the mast and the size, grade, and construction of rope to be used for each guy from either the manufacturer or from a qualified person, when not available from the manufacturer;
  - for guy derricks manufactured after December 18, 1970, the employer must also have information about the amount of initial sag or tension and the amount of tension in guy line rope at anchor;
  - the mast base must permit the mast to rotate freely with allowance for slight tilting of the mast caused by guy slack; and
  - the mast cap must permit the mast to rotate freely, withstand tilting and cramping caused by the guy loads, be secured to the mast to prevent disengagement during erection and be provided with means for attaching guy ropes.
- Verify that stiffleg derricks meet the following requirements (29 CFR 1926.1436(c)(3)):
  - the mast must be supported in the vertical position by at least two stifflegs with one end of each connected to the top of the mast and the other end securely anchored;
Cranes and Derricks in Construction Rulebook

- the stifflegs must be capable of withstanding the loads imposed at any point of operation within the load chart range;
- the mast base must permit the mast to rotate freely when necessary and permit deflection of the mast without binding;
- the mast must be prevented from lifting out of its socket when the mast is in tension; and
- the stiffleg connecting member at the top of the mast must permit the mast to rotate freely when necessary, withstand the loads imposed by the action of the stifflegs, and be secured so as to oppose separating forces.

- Verify that gin pole derricks meet the following requirements (29 CFR 1926.1436(c)(4)).
  - guy lines must be sized and spaced so as to make the gin pole stable in both boomed and vertical positions;
    NOTE: Where the size and/or spacing of guy lines does not result in the gin pole being stable in both boomed and vertical positions, the employer must ensure that the derrick is not used in an unstable position.
  - the base of the gin pole must permit movement of the pole when necessary; and
  - the gin pole must be anchored at the base against any horizontal forces that may be present.

- Verify that the fittings for stepping the boom and for attaching the topping lift on Chicago boom derricks are arranged to do the following (29 CFR 1926.1436(c)(5)):
  - permit the derrick to swing at all permitted operating radii and mounting heights between fittings;
  - accommodate attachment to the upright member of the host structure;
  - withstand the forces applied when configured and operated in accordance with the manufacturer’s or builder’s procedures and within its rated capacity; and
  - prevent the boom or topping lift from lifting out under tensile forces.

27.3 Derricks must be properly anchored and guyed. (29 CFR 1926.1436(d))

Guide Note

- Verify that load anchoring data developed by the manufacturer or a qualified person is used (29 CFR 1926.1436(d)(1)).
- Verify that guy derricks meet the following requirements (29 CFR 1926.1436(d)(2)):
  - the mast base must be anchored;
  - the guys must be secured to the ground or other firm anchorage; and
  - the anchorage and guying must be designed to withstand maximum horizontal and vertical forces encountered when operating within rated capacity with the specified guy slope and spacing.
- Verify that stiffleg derricks meet the following requirements (29 CFR 1926.1436(c)(3)):
  - the mast base and stifflegs must be anchored; and
  - the mast base and stifflegs must be designed to withstand maximum horizontal and vertical forces encountered when operating within rated capacity with the specified stiffleg spacing and slope.

27.4 Swingers and hoists must meet certain requirements. (29 CFR 1926.1436(e))

Guide Note

- Verify that the boom, swinger mechanisms, and hoists are suitable for the derrick work intended and anchored to prevent displacement from the imposed loads (29 CFR 1926.1436(e)(1)).
- Verify that base mounted drum hoists meet the requirements in the listed sections of ASME B30.7-2001 (29 CFR 1926.1436(e)(2)(i)).
- Verify that the employer ensures that new hoists are load tested to between 110 percent and 125 percent of rated capacity, unless otherwise recommended by the manufacturer (29 CFR 1926.1436(e)(2)(ii)).
  NOTE: Manufacturer testing meets this requirement.
- If a hoist has had repairs, modifications, or additions affecting its capacity or safe operation, verify that it is evaluated by a qualified person to determine if a new load test is necessary and if so, that the test is performed (29 CFR 1926.1436(e)(2)(iii)).
- Verify that required load testing is conducted as follows (29 CFR 1926.1436(e)(2)(iv)):
  - hoist the test load a vertical distance sufficient to assure that the load is supported by the hoist and held by the hoist brake(s);
  - lower the test load then stop and hold it with the brake(s); and
  - do not use the hoist until a competent person determines that the test has been passed.
27.5 Certain additional operational aids are required. (29 CFR 1926.1436(f))

**Guide Note**
- Verify that in addition to the requirements in 29 CFR 1926.1416 (see paragraphs 14.2 – 14.4), derricks have the following operational aids (29 CFR 1926.1436(f)(2)):
  - if the derrick does not have a functioning boom angle indicator, either:
    1) the boom hoist cable must be marked with caution and stop marks that correspond to maximum and minimum allowable boom angles and are in view of the operator or a spotter who is in direct communication with the operator; or
    2) 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 must be used.
  - derricks manufactured after November 8, 2011, with a maximum rated capacity over 6,000 pounds must have one or more load weighing devices, load moment indicators, rated capacity indicators, or rated capacity limiters.

NOTE 1: If the load weight/capacity device is not working properly it must be repaired no later than 30 days after the deficiency occurs unless the employer documents that the necessary parts were ordered within seven days of the occurrence of the deficiency but the part was not received in time, in which case the repair must be completed within seven days of receipt of the parts.

NOTE 2: The only acceptable temporary alternative measure is determining the weight of the load from a recognized source (such as the manufacturer of the load) or by a recognized calculation method (such as calculating a steel beam from measured dimensions and a known weight per foot) and providing the information to the operator prior to the lift.

27.6 New or reinstalled derricks must be inspected and tested after assembly. (29 CFR 1926.1436(g) and (h))

**Guide Note**
- Verify that anchorages, including the structure to which the derrick is attached (if applicable), are approved by a qualified person (29 CFR 1926.1436(g)(1)(i)).
- If using a rock or hairpin anchorage, verify that the qualified person determines if any special testing of the anchorage is needed and if so, that it is tested accordingly (29 CFR 1926.1436(g)(1)(ii)).
- Prior to initial use, verify that new or reinstalled derricks are tested by a competent person with no hook load to verify proper operation, as follows (29 CFR 1926.1436(g)(2)):
  - 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); and
  - actuating locking, limiting, and indicating devices (if provided).
- Prior to initial use, verify that new or reinstalled derricks are load tested by a competent person as follows (29 CFR 1926.1436(g)(3)):
  - test loads must be between 100 percent and 110 percent of the rated capacity unless otherwise recommended by the manufacturer or qualified person, but in no event may the test load be less than the maximum anticipated load;
  - 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; and
  - lowering, stopping, and holding the load with the brake(s).
- Verify the derrick is not used unless the competent person determines that the test has been passed (29 CFR 1926.1436(g)(3)(iii)).
- Verify that required tests are documented as follows (29 CFR 1926.1436(g)(3)(iii)):
  - documents must contain the date, test results, and the name of the tester;
  - documents must be retained until the derrick is retested or dismantled, whichever occurs first; and
  - documents must be available, during the applicable document retention period, to all persons who conduct inspections.
**If a derrick has had repairs, modifications, or additions affecting the derrick’s capacity or safe operation, verify that it is evaluated by a qualified person to determine if a load test is necessary and if so, that the load test is conducted (29 CFR 1926.1436(h)).**

**27.7 Certain general requirements must be met. (29 CFR 1926.1436(j) – (q))**

**Guide Note**

- If power fails during operations, verify that the derrick operator safely stops operations including setting all brakes or locking devices and moving all clutch and other power controls to the off position (29 CFR 1926.1436(j)).
- Verify that ropes are not handled on a winch head without the knowledge of the operator (29 CFR 1926.1436(k)(1)).
- Verify that the operator is within reach of the power unit control lever (29 CFR 1926.1436(k)(2)).
- When the boom is being held in a fixed position, verify that dogs, pawls, or other positive holding mechanisms on the boom hoist are engaged (29 CFR 1926.1436(m)(1)).
- When equipment is taken out of service for 30 days or more, verify the boom is secured by one of the following methods (29 CFR 1926.1436(m)(2)):
  - laid down;
  - secured to a stationary member, as nearly under the head as possible, by attachment of a sling to the load block;
  - for guy derricks, lifted to a vertical position and secured to the mast; or
  - for stiffleg derricks, secured against the stiffleg.
- Verify that the process of jumping the derrick is supervised by the A/D director (29 CFR 1926.1436(n)).
- Verify that derrick operations are supervised by a competent person (29 CFR 1926.1436(o)).
- In addition to the requirements in 29 CFR 1926.1412 (see section 11), verify that the following items are also included in the inspections (29 CFR 1926.1436(p)):
  - guys must be inspected daily for proper tension;
  - gudgeon pins must be inspected annually for cracks, wear, and distortion; and
  - foundation supports must be inspected annually for continued ability to sustain the imposed loads.
- Verify that the employer trains each operator of a derrick on the safe operation of equipment the individual will operate (29 CFR 1926.1436(q)).

**NOTE:** The requirements of 29 CFR 1926.1427 (operator qualification and certification) do not apply.

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**28. Floating Cranes/Derricks and Land Cranes/Derricks on Barges**

*This section contains supplemental requirements for floating cranes/derricks and land cranes/derricks on barges, pontoons, vessels, or other means of flotation (i.e., vessel/flotation device). The requirements of this section do not apply when using jacked barges when the jacks are deployed to the river, lake, or sea bed and the barge is fully supported by the jacks. 29 CFR 1926.1416(e)(4) (see paragraph 14.4) does not apply to dragline, clamshell (grapple), magnet, drop ball, container handling, concrete bucket, and pile driving work performed under this section. An anti two-block device (see paragraph 14.3) is required only when hoisting personnel or hoisting over an occupied cofferdam or shaft. 29 CFR 1926.1424 (see paragraph 18.1) applies, except for 29 CFR 1926.1424(a)(2)(ii). 29 CFR 1926.1425 (keeping clear of the load) does not apply.*

**28.1 Certain additional work area controls must be implemented. (29 CFR 1926.1437(c)(2))**

**Guide Note**

- Verify that in addition to the controls required in paragraph 18.1, the employer does one of the following (29 CFR 1926.1436(b)(2)):
  - erects and maintains control lines, warning lines, railings, or similar barriers to mark the boundaries of the hazard areas; or
  - clearly marks the hazard areas by a combination of warning signs (such as “Danger – Swing/Crush Zone”) and high visibility markings on the equipment that identify the hazard areas and trains each employee to understand what these markings mean.
28.2 Certain additional safety devices are required. (29 CFR 1926.1437(e))

**Guide Note**
- Verify that addition to the safety devices required in paragraph 14.1, the equipment has the following (29 CFR 1926.1437(e)):
  - a barge, pontoon, vessel, or other means of floatation list and trim device located in the cab or, when there is no cab, at the operator’s station;
  - positive equipment house lock; and;
  - a wind speed and direction indicator, if a competent person determines that wind is a factor that needs to be considered.

28.3 Operating procedures must be accessible. (29 CFR 1926.1437(g))

**Guide Note**
- If the equipment has a cab, verify that procedures applicable to the operation of the equipment, including rated capacities (load charts), recommended operating speeds, special hazard warnings, instructions, and the operator’s manual are readily available in the cab at all times for use by the operator (29 CFR 1926.1437(g)).
- Where rated capacities are available in the cab only in electronic form, verify that in the event of a failure which makes the rated capacities inaccessible the operator immediately stops operations or follows safe shutdown procedures until the rated capacities are available in some form (29 CFR 1926.1437(g)).
- If the equipment does not have a cab, verify the following (29 CFR 1926.1437(g)(1) and (2)):
  - rated capacities (load charts) are posted at the operator’s station;
  - if the operator’s station is moveable (such as with pendant-controlled equipment), the load charts are posted on the equipment; and
  - procedures applicable to the operation of the equipment (other than load charts), recommended operating speeds, special hazard warnings, instructions, and operators manual, are readily available on board the vessel/flotation device.

28.4 Certain additional inspections must be conducted. (29 CFR 1926.1437(h))

**Guide Note**
- Verify that the inspections required in section 11 are conducted (29 CFR 1926.1437(h)).
- Verify that each shift inspection includes checking the means used to secure/attach the equipment to the vessel/flotation device for proper condition including wear, corrosion, loose, or missing fasteners, defective welds, and (when applicable) insufficient tension (29 CFR 1926.1437(h)(1)).
- Verify that each monthly inspection includes checking the following (29 CFR 1926.1437(h)(2)):
  - the means used to secure/attach the equipment to the vessel/flotation device for proper condition including wear, corrosion, loose, or missing fasteners, defective welds, and insufficient tension (when applicable);
  - that the vessel/flotation device is not taking on water;
  - that the deckload is properly secured;
  - that the vessel/flotation device is watertight based on the condition of the chain lockers, storage, fuel compartments, and hatches; and
  - that the firefighting and lifesaving equipment is in place and functional.
- Verify that shift and monthly inspections are conducted by a competent person and that if any deficiencies are found, the following actions are taken (29 CFR 1926.1437(h)(3)):
  - an immediate determination is made by a qualified person as to whether the deficiency constitutes a hazard; and
  - if the deficiency is determined to constitute a hazard, the vessel/flotation device is removed from service until the deficiency has been corrected.
- Verify that each annual inspection includes checking the following (29 CFR 1926.1437(h)(4)):
  - The external portion of the barge, pontoons, vessel, or other means of flotation used;  
    **NOTE:** This inspection must be conducted by a qualified person who has expertise with respect to vessels/flotation devices and that the inspection must include the following items:
    1) The items identified in 29 CFR 1926.1437(h)(1) and (h)(2) for shift and monthly inspections;
    2) cleats, bitts, chocks, fenders, capstans, ladders, and stanchions for significant corrosion, wear, deterioration, or deformation that could impair the function of these items;
    3) external evidence of leaks and structural damage;
NOTE: Evidence of leaks and damage below the waterline may be determined through internal inspection of the vessel/flotation device

4) four-corner draft readings; and
5) firefighting equipment for serviceability.

- rescue skiffs, lifelines, work vests, life preservers, and ring buoys for proper condition;
- documents must be available, during the applicable document retention period, to all persons who conduct inspections.

- Verify that annual inspections are conducted by a competent person and that if any deficiencies are found, the following actions are taken (29 CFR 1926.1437(h)(4)(iii)):
  - an immediate determination is made by a qualified person as to whether the deficiency constitutes a hazard;
  - if the deficiency is determined to constitute a hazard, the vessel/flotation device is removed from service until the deficiency has been corrected; and
  - if the qualified person determines that, though not presently a hazard, the deficiency needs to be monitored, the deficiency is checked in the monthly inspections.

- Verify that internal vessel/flotation device inspections are conducted every four years as follows (29 CFR 1926.1437(h)(5)):
  - the means used to secure/attach the equipment to the vessel/flotation device for proper condition including wear, corrosion, loose, or missing fasteners, defective welds, and (when applicable) insufficient tension;
  - a marine engineer, marine architect, licensed surveyor, or other qualified person who has expertise with respect to vessels/flotation devices surveys the internal portion of the barge, pontoons, vessel, or other means of flotation;
  - if the surveyor identifies a deficiency, an immediate determination is made by the surveyor as to whether the deficiency constitutes a hazard or, though not yet a hazard, needs to be monitored in the monthly or annual inspections, as appropriate;
  - if the surveyor determines that the deficiency constitutes a hazard, the vessel/flotation device is removed from service until it has been corrected; and
  - if the surveyor determines that, though not presently a hazard, the deficiency needs to be monitored, the deficiency is checked in the monthly or annual inspections, as appropriate.

- Verify that documentation of inspections is retained in accordance with the respective requirements of 29 CFR 1926.1412(e)(3) (see paragraph 11.6) and 29 CFR 1926.1412(f)(7) (see paragraph 11.7) (29 CFR 1926.1437(h)(6)).
- Verify that documentation of four-year inspections is retained in accordance with the requirements of 29 CFR 1926.1412(f)(7) except that it must be kept for four years (29 CFR 1926.1437(h)(6)).
- Verify that all documentation is made available to all persons who conduct inspections during the applicable document retention period (29 CFR 1926.1437(h)(6)).

28.5 Certain precautions must be taken when working with a diver in the water. (29 CFR 1926.1437(j))

Guide Note

- If a crane/derrick is used to get one or more divers into and out of the water, verify that the equipment is not be used for any other purpose until all divers are back on board 29 CFR 1926.1437(j)(1)).
- Verify that the operator remains at the controls of the crane/derrick at all times while the diver is in the water (29 CFR 1926.1437(j)(2)).
- Verify that in addition to the signaling requirements described in section 16, either a clear line of sight is maintained between the operator and tender or the signals between the operator and tender are transmitted electronically (29 CFR 1926.1437(j)(3)).
- Verify that the means used to secure the crane/derrick to the vessel/flotation device (see paragraph 28.8) does not allow any amount of shifting in any direction (29 CFR 1926.1437(j)(4)).

28.6 Equipment must be properly designed and used. (29 CFR 1926.1437(k))

Guide Note

- Verify that the barge, pontoons, vessel, or other means of flotation are capable of withstanding imposed environmental, operational, and in-transit loads when used in accordance with the manufacturer’s specifications and limitations 29 CFR 1926.1437(k)(1)).
- Verify that the manufacturer’s specifications and limitations are not exceeded (29 CFR 1926.1437(k)(2)).
If the manufacturer’s specifications and limitations are unavailable, verify that specifications and limitations are established by a qualified person and that they are not exceeded (29 CFR 1926.1437(k)(3)).

28.7 Equipment designed for marine use by permanent attachment to barges, pontoons, vessels, or other means of flotation must meet certain additional requirements. (29 CFR 1926.1437(m))

Guide Note
- Verify that the employer does not exceed the manufacturer’s load charts applicable to operations on water and complies with all parameters and limitations (such as dynamic and environmental parameters) applicable to the use of the charts (29 CFR 1926.1437(m)(1)(i)).
- Verify that the load charts take into consideration a minimum wind speed of 40 miles per hour (29 CFR 1926.1437(m)(1)(ii)).
- Verify that the requirements for maximum allowable list and maximum allowable trim specified in Table 1 of this paragraph are met (29 CFR 1926.1437(m)(2)).
- Verify that the equipment is stable under the conditions specified in Tables 2 and 3 of this paragraph (29 CFR 1926.1437(m)(3)).

<table>
<thead>
<tr>
<th>Table 1: Maximum Allowable List and Trim</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated Capacity</td>
</tr>
<tr>
<td>-----------------------------------------</td>
</tr>
<tr>
<td><strong>Equipment Designed for Marine Use by Permanent Attachment (Other than Derricks)</strong></td>
</tr>
<tr>
<td>25 tons or less</td>
</tr>
<tr>
<td>over 25 tons</td>
</tr>
<tr>
<td><strong>Derricks Designed for Marine Use by Permanent Attachment</strong></td>
</tr>
<tr>
<td>any rated capacity</td>
</tr>
</tbody>
</table>

Source: 29 CFR 1926.1437 Table M1

<table>
<thead>
<tr>
<th>Table 2: Stability Requirements for Floating Cranes and Derricks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operated at</td>
</tr>
<tr>
<td>----------------------------</td>
</tr>
<tr>
<td>rated capacity</td>
</tr>
<tr>
<td>rated capacity plus 25%</td>
</tr>
<tr>
<td>high boom, no load</td>
</tr>
</tbody>
</table>

Source: 29 CFR 1926.1437 Table M2

<table>
<thead>
<tr>
<th>Table 3: Stability Requirements for Backward Stability of the Boom</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated Capacity</td>
</tr>
<tr>
<td>----------------</td>
</tr>
<tr>
<td>high boom, no load, full back list (least stable condition)</td>
</tr>
</tbody>
</table>

Source: 29 CFR 1926.1437 Table M3

- If the equipment is employer-made, verify it is not used unless the employer has documents which are signed by a registered professional engineer who is a qualified person with respect to the design of this type of equipment (including the means of flotation) and which demonstrate that the load charts and applicable parameters for use meet the requirements of this paragraph (29 CFR 1926.1437(m)(4)).
- Verify that the barge, pontoons, vessel, or other means of flotation used meet the following requirements (29 CFR 1926.1437(m)(5)):
  - are structurally sufficient to withstand the static and dynamic loads of the crane/derrick when operating at the crane/derrick’s maximum rated capacity with all planned and actual deck loads and ballasted compartments;
  - have a subdivided hull with one or more longitudinal watertight bulkheads for reducing the free-surface effect; and
  - have access to void compartments to allow for inspection and pumping.
28.8 Land cranes/derricks used on barges, pontoons, vessels, or other means of flotation must meet certain additional requirements. (29 CFR 1926.1437(n))

Guide Note

- When land cranes are used on flotation devices, verify that the rated capacity of the equipment (including but not limited to modification of load charts) applicable for use on land is reduced as follows (29 CFR 1926.1437(n)(1)):
  - to account for increased loading from list, trim, wave action, and wind;
  - to account for increased loading from list, trim, wave action, and wind; and
  - to meet additional requirements in this paragraph.

- Verify that the maximum allowable list and trim do not exceed the least of the following (29 CFR 1926.1437(n)(3)):
  - five degrees; or
  - the amount specified by the crane/derrick manufacturer or by the qualified person if the information is not available from the manufacturer.

- Verify that the maximum allowable list and trim is such that the following conditions are met (29 CFR 1926.1437(n)(4)):
  - all deck surfaces of the barge, pontoons, vessel, or other means of flotation used are above water; and
  - the entire bottom area of the barge, pontoons, vessel, or other means of flotation used is submerged.

- Verify that physical attachment, corralling, rails system, and centerline cable system meet one of the options (29 CFR 1926.1437(n)(5)(i) – (iv)):
  - the crane/derrick is physically attached to the flotation device by crossed-cable systems attached to the crane/derrick and vessel/flotation device, bolting or welding the crane/derrick to the vessel/flotation device, strapping the crane/derrick to the vessel/flotation device with chains, or other methods of physical attachment;
  - the crane/derrick is prevented from shifting by installing barricade restraints that do not allow the equipment to shift by any amount of shifting in any direction;
  - the crane/derrick is prevented from shifting by being mounted on a rail system that uses rail clamps and rail stops, unless the system is designed to prevent movement during operation by other means; or
  - the crane/derrick is prevented from shifting by being mounted to a wire rope system that meets the following requirements:
    1) the wire rope and attachments are of sufficient size and strength to support the side load of crane/derrick;
    2) the wire rope is attached physically to the vessel/flotation device;
    3) the wire rope is attached to the crane/derrick undercarriage by appropriate methods such as shackles or sheaves and the method used allows the crew to secure the crane/derrick from movement during operation and to move the crane/derrick longitudinally along the vessel/flotation device for repositioning;
    4) means are installed to prevent the crane/derrick from passing the forward or aft end of the wire rope attachments; and
    5) the crane/derrick is secured from movement during operation.

- Verify that the physical attachment, corralling, rails system, or centerline cable system used is designed by a marine engineer, registered professional engineer familiar with floating crane/derrick design, or qualified person familiar with floating crane/derrick design (29 CFR 1926.1437(n)(5)(v)).

EXCEPTION: The employer may use plans and procedures rather than one of the four specified options for physically preventing shifting with mobile auxiliary cranes used on the deck of a floating crane/derrick. The plans and procedures must meet all of the following (29 CFR 1926.1437(n)(6)):

  - a written plan must be developed and signed by a marine engineer or registered professional engineer familiar with floating crane/derrick design;
  - the plan must be designed so that the applicable requirements of this section are met despite the position, travel, operation, and lack of physical attachment (or corralling, use of rails, or cable system) of the mobile auxiliary crane;
  - the plan must specify the areas of the deck where the mobile auxiliary crane is permitted to be positioned, travel, and operate, and the parameters and limitations of such movements and operation;
  - the deck is marked to identify the permitted areas for positioning, travel, and operation;
  - the plan must specify the dynamic and environmental conditions that must be present; and
  - if the specified dynamic and environmental conditions are exceeded, the mobile auxiliary crane must be attached physically or corralled in accordance with one of the four required options.
Cranes and Derricks in Construction Rulebook

29. Overhead and Gantry Cranes

This section applies to the following equipment when used in construction and not permanently installed in a facility: overhead and gantry cranes, overhead/bridge cranes, semigantry, cantilever gantry, wall cranes, storage bridge cranes, launching gantry cranes, and similar equipment having the same fundamental characteristics, irrespective of whether it travels on tracks, wheels, or other means.

This section does not apply to the following equipment when used in construction and permanently installed in a facility: overhead and gantry cranes, including semigantry, cantilever gantry, wall cranes, storage bridge cranes, and others having the same fundamental characteristics. In such circumstances, the requirements of 29 CFR 1910.179 (except for 29 CFR 1910.179(b)(1)) apply.

29.1 Overhead and gantry cranes must meet certain requirements. (29 CFR 1926.1438(b)(2))

Guide Note

• Verify that covered overhead and gantry cranes used in construction meet the requirements of the following sections of 29 CFR 1926 Subpart CC (29 CFR 1926.1438(b)(2)(i)):
  – 29 CFR 1926.1400 – 1414 (see sections 1 – 13);
  – 29 CFR 1926.1417 – 1425 (see section 15 through paragraph 18.2);
  – 29 CFR 1926.1426(d) (see paragraph 18.4);
  – 29 CFR 1926.1427 – 1434 (see paragraphs 19 – 25);
  – 29 CFR 1926.1437 (see section 28);
  – 29 CFR 1926.1439 (see section 30); and
  – 29 CFR 1926.1441 (see section 32).

• Verify that covered overhead and gantry cranes used in construction meet the requirements of the following sections of 29 CFR 1910.179 (29 CFR 1926.1438(b)(2)(ii)):
  – the definitions in 29 CFR 1910.179(a) except for “hoist” and “load”; for those words, the definitions in 29 CFR 1926.1401 apply;
  – the following paragraphs: 29 CFR 1910.179(b)(5), (b)(6), (b)(7), (e)(1), (e)(3), (e)(5), (e)(6), (f)(1), (f)(4), (g), (h)(1), (h)(3), (k), and (n); and

30. Dedicated Pile Drivers

30.1 Dedicated pile drivers must meet certain requirements. (29 CFR 1926.1439)

Guide Note

• Verify that dedicated pile drivers meet the requirements of 29 CFR 1926 Subpart CC, with the following exceptions (29 CFR 1926.1439):
  – 29 CFR 1926.1416(d)(3) (anti two-blocking device) does not apply;
  – 29 CFR 1926.1416(e)(4) (see paragraph 14.4) applies only to dedicated pile drivers manufactured after November 8, 2011; and
  – in 29 CFR 1926.1433, only paragraphs 29 CFR 1926.1433(d) and (e) apply to dedicated pile drivers (see section 24).
31. Sideboom Cranes

31.1 Sideboom cranes must meet certain requirements. (29 CFR 1926.1440)

Guide Note
- Verify that sideboom cranes meet the requirements of 29 CFR 1926 Subpart CC, with the following exceptions (29 CFR 1926.1440(a) and (b)):
  - 29 CFR 1926.1402 (see section 1);
  - 29 CFR 1926.1415 (see paragraph 14.1);
  - 29 CFR 1926.1416 (see paragraphs 14.2 – 14.4);
  - 29 CFR 1926.1427 (see section 19);
    - in 29 CFR 1926.1426, paragraph 29 CFR 1926.1426(a)(2)(i) does not apply (see paragraph 18.3);
  NOTE: Sideboom cranes in which the boom is designed to free fall (live boom) are permitted only if manufactured prior to November 8, 2010.
- Verify that sideboom cranes meet the listed requirements of ASME B30.14-2004 (29 CFR 1926.1440(c)).

32. Equipment with a Rated Capacity of 2,000 Pounds or Less

32.1 Equipment with a rated hoisting/lifting capacity of 2,000 pounds or less must meet certain requirements. (29 CFR 1926.1441(a) and (k))

Guide Note
- Verify that equipment with a rated capacity of 2,000 pounds or less meets the requirements of the following sections of 29 CFR 1926 Subpart CC (29 CFR 1926.1441(a)):
  - 29 CFR 1926.1402 (see section 1);
  - 29 CFR 1926.1403 (see section 2);
  - 29 CFR 1926.1406 (see section 5);
  - 29 CFR 1926.1407 – 1411 (see sections 6 – 10);
  - 29 CFR 1926.1412(c) (see paragraph 11.3);
  - 29 CFR 1926.1413 – 1414 (see sections 12 – 13);
  - 29 CFR 1926.1418 (see paragraph 15.6);
  - 29 CFR 1926.1419 – 1422 (see section 16);
  - 29 CFR 1926.1423 (see section 17);
  - 29 CFR 1926.1425, except for paragraph 29 CFR 1926.1425(c)(3) (see paragraph 18.2);
  - 29 CFR 1926.1426 (see paragraphs 18.3 and 18.4);
  - 29 CFR 1926.1432 (see section 23); and
- Verify that the equipment is designed by a qualified engineer (29 CFR 1926.1441(k)).

32.2 Assembly/disassembly must meet certain additional requirements. (29 CFR 1926.1441(b))

Guide Note
- Verify that in addition to the requirements of 29 CFR 1926.1403 and 1406 (see sections 2 and 5), the following requirements are met for assembly/disassembly (29 CFR 1926.1441(b)):
  - selection of components and configuration of the equipment that affect the capacity or safe operation of the equipment must comply with one of the following:
    1) manufacturer’s instructions, recommendations, limitations, and specifications;
    2) where manufacturer’s information is not available, equivalent information with the written approval of a registered professional engineer familiar with the type of equipment involved; or
    3) approved modifications that meet the requirements of 29 CFR 1926.1434 (see section 25).
  - when assembly is completed, the equipment must be inspected to ensure that the components and configuration meet requirements; and
  - the employer must comply with applicable manufacturer prohibitions.
32.3 Operating procedures must meet certain additional requirements. (29 CFR 1926.1441(c))

Guide Note
- Verify that the employer complies with all manufacturer procedures applicable to the operational functions of the equipment, including its use with attachments (29 CFR 1926.1441(c)(1)).
- Where the manufacturer’s procedures are not available, verify that the employer does the following (29 CFR 1926.1441(c)(2)):
  - develops and ensures compliance with all procedures necessary for the safe operation of the equipment and attachments;
  - ensures that procedures for the operational controls are developed by a qualified person; and
  - ensures that procedures related to the capacity of the equipment are developed and signed by a registered professional engineer familiar with the equipment.
- Verify that the load chart is available to the operator at the control station (29 CFR 1926.1441(c)(3)).
- Verify that the operator’s manual, procedures applicable to the operation of the equipment, recommended operating speeds, special hazard warnings, and instructions are readily available to the operator (29 CFR 1926.1441(c)(3)(ii)).
- When rated capacities are available at the control station only in electronic form and a failure occurs that makes the rated capacities inaccessible, verify that the operator immediately ceases operations or follows safe shut-down procedures until the rated capacities are available (in any form) (29 CFR 1926.1441(c)(3)(iii)).

32.4 Safety devices must meet certain additional requirements. (29 CFR 1926.1441(d))

Guide Note
- Verify that safety devices and operational aids that are part of the original equipment are maintained in accordance with the manufacturer’s procedures (29 CFR 1926.1441(d)(1)).
- Verify that equipment manufactured after November 8, 2010, either has an anti two-block device that meets the requirements of 29 CFR 1926.1416(d)(3) (see paragraph 14.3) or is designed so that no damage or load failure will occur in the event of a two-block situation (e.g., by using a power unit that stalls in response to a twoblock situation) (29 CFR 1926.1441(d)(2)).

32.5 Certain additional actions are required. (29 CFR 1926.1441(h) and (j))

Guide Note
- Verify that the equipment is inspected in accordance with the manufacturer’s procedures (29 CFR 1926.1441(h)).
- Verify that equipment covered by this section is not used to hoist personnel (29 CFR 1926.1441(j)).
CRANES AND DERRICKS IN CONSTRUCTION

PART 4: SCORING SHEET

<table>
<thead>
<tr>
<th>SITE:</th>
<th>DATE:</th>
</tr>
</thead>
</table>

### 1. Ground Conditions

<table>
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<tr>
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<tr>
<td>1.2</td>
<td></td>
<td>☐</td>
<td>☐</td>
</tr>
</tbody>
</table>

1.1 Cranes and derricks must not be assembled or used unless certain ground conditions are met. (29 CFR 1926.1402(b) and (e))

1.2 The controlling entity must take certain actions. (29 CFR 1926.1402(c) and (d))

### 2. Assembly and Disassembly – Selection of Manufacturer or Employer Procedures

<table>
<thead>
<tr>
<th></th>
<th>N/A</th>
<th>Complies</th>
<th>Does not comply</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.1</td>
<td></td>
<td>☐</td>
<td>☐</td>
</tr>
</tbody>
</table>

2.1 The employer must follow proper procedures for assembly/disassembly. (29 CFR 1926.1403)

### 3. Assembly and Disassembly – General Requirements

<table>
<thead>
<tr>
<th></th>
<th>N/A</th>
<th>Complies</th>
<th>Does not comply</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.1</td>
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</tr>
<tr>
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<tr>
<td>3.3</td>
<td></td>
<td>☐</td>
<td>☐</td>
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<tr>
<td>3.4</td>
<td></td>
<td>☐</td>
<td>☐</td>
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<tr>
<td>3.5</td>
<td></td>
<td>☐</td>
<td>☐</td>
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<tr>
<td>3.6</td>
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<td>☐</td>
</tr>
<tr>
<td>3.7</td>
<td></td>
<td>☐</td>
<td>☐</td>
</tr>
</tbody>
</table>

3.1 Assembly and disassembly must be overseen by an assembly/disassembly (A/D) director. (29 CFR 1926.1404(a) – (d))

3.2 Crew members must be protected during assembly/disassembly. (29 CFR 1926.1404(e) – (f))

3.3 Capacity limits must be observed during assembly/disassembly. (29 CFR 1926.1404(g), (j) and (k))

3.4 The A/D director must address the hazards associated with the operation. (29 CFR 1926.1404(h), (o) and (p))

3.5 Equipment components must be properly selected, configured, and inspected. (29 CFR 1926.1404(m))

3.6 Outriggers and stabilizers must be used in accordance with certain requirements. (29 CFR 1926.1404(q))

3.7 Rigging used for assembly/disassembly must meet certain requirements. (29 CFR 1926.1404(r))

### 4. Disassembly – Additional Requirements for Dismantling of Booms and Jibs

<table>
<thead>
<tr>
<th></th>
<th>N/A</th>
<th>Complies</th>
<th>Does not comply</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.1</td>
<td></td>
<td>☐</td>
<td>☐</td>
</tr>
</tbody>
</table>

4.1 Dismantling of booms and jibs, including when done for changing the length of the equipment, must meet certain requirements. (29 CFR 1926.1405)
### 5. Assembly and Disassembly – Employer Procedures – General Requirements

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Complies</th>
<th>Does not comply</th>
</tr>
</thead>
<tbody>
<tr>
<td>Employer procedures used instead of the manufacturer’s procedures for assembly/disassembly must meet certain requirements. (29 CFR 1926.1406)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### 6. Power Line Safety (up to 350 kV) – Assembly and Disassembly

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Complies</th>
<th>Does not comply</th>
</tr>
</thead>
<tbody>
<tr>
<td>Certain precautions must be taken during assembly/disassembly of equipment in proximity to power lines. (29 CFR 1926.1407(a) and (c) – (g))</td>
<td></td>
<td></td>
</tr>
<tr>
<td>If equipment can get closer than 20 feet or alternate minimum clearance distances to energized power lines during assembly/disassembly, encroachment precautions must be taken. (29 CFR 1926.1407)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### 7. Power Line Safety (up to 350 kV) – Equipment Operations

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Complies</th>
<th>Does not comply</th>
</tr>
</thead>
<tbody>
<tr>
<td>Certain precautions must be taken during operation of equipment in proximity to power lines. (29 CFR 1926.1408(a), (c), (d), (e), (f), and (h))</td>
<td></td>
<td></td>
</tr>
<tr>
<td>If equipment can get closer than 20 feet or alternate minimum clearance distances to energized power lines during operation in the work zone, encroachment precautions must be taken. (29 CFR 1926.1408)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operators, crew members, and dedicated spotters must be properly trained. (29 CFR 1926.1408(g))</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### 8. Power Line Safety (over 350 kV)

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Complies</th>
<th>Does not comply</th>
</tr>
</thead>
<tbody>
<tr>
<td>Certain precautions must be taken during assembly/disassembly and operation of equipment in proximity to power lines over 350 kV. (29 CFR 1926.1409)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### 9. Power Line Safety (all voltages) – Equipment Operations

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Complies</th>
<th>Does not comply</th>
</tr>
</thead>
<tbody>
<tr>
<td>Equipment operations in which any part of the equipment, load line, or load (including rigging and lifting accessories) is closer to an energized power line than the minimum approach distance under Table 1 in paragraph 7.1 is prohibited, unless certain conditions are all met. (29 CFR 1926.1410)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### 10. Power Line Safety – Traveling

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Complies</th>
<th>Does not comply</th>
</tr>
</thead>
<tbody>
<tr>
<td>Certain precautions must be taken when traveling under or near power lines with no load. (29 CFR 1926.1411)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## 11. Inspections

<table>
<thead>
<tr>
<th></th>
<th>N/A</th>
<th>Complies</th>
<th>Does not comply</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.1</td>
<td>Modified equipment must be inspected in accordance with certain requirements. (29 CFR 1926.1412(a))</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>11.2</td>
<td>Repaired or adjusted equipment must be inspected in accordance with certain requirements. (29 CFR 1926.1412(b))</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>11.3</td>
<td>Post-assembly inspections must be conducted in accordance with certain requirements. (29 CFR 1926.1412(c))</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>11.4</td>
<td>Inspections must be conducted in accordance with certain requirements prior to each shift that the equipment will be used. (29 CFR 1926.1412(d))</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>11.5</td>
<td>Certain monthly inspections must be conducted. (29 CFR 1926.1412(e))</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>11.6</td>
<td>Comprehensive inspections must be conducted annually. (29 CFR 1926.1412(f))</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>11.7</td>
<td>Additional inspections must be conducted when the severity of use/conditions is such that there is a reasonable probability of damage or excessive wear. (29 CFR 1926.1412(g))</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>11.8</td>
<td>Equipment that has been idle for three months or more must be inspected. (29 CFR 1926.1412(h))</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>11.9</td>
<td>Certain additional requirements must be met. (29 CFR 1926.1412(j) and (k))</td>
<td>☐</td>
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</tr>
</tbody>
</table>

## 12. Wire Rope – Inspection

<table>
<thead>
<tr>
<th></th>
<th>N/A</th>
<th>Complies</th>
<th>Does not comply</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.1</td>
<td>Inspections must be conducted in accordance with certain requirements prior to each shift when wire ropes will be used. (29 CFR 1926.1413(a))</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>12.2</td>
<td>If deficiencies are found during the shift inspections, certain actions must be taken. (29 CFR 1926.1413(a)(4))</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>12.3</td>
<td>Certain monthly inspections must be conducted. (29 CFR 1926.1413(b))</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>12.4</td>
<td>Comprehensive inspections must be conducted annually. (29 CFR 1926.1413(c))</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>12.5</td>
<td>Certain additional requirements must be met. (29 CFR 1926.1413(d) and (e))</td>
<td>☐</td>
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</tr>
</tbody>
</table>

## 13. Wire Rope – Selection and Installation Criteria

<table>
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<th>N/A</th>
<th>Complies</th>
<th>Does not comply</th>
</tr>
</thead>
<tbody>
<tr>
<td>13.1</td>
<td>Wire rope must be selected and installed in accordance with certain requirements. (29 CFR 1926.1414(a) – (c) and (f) – (h))</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>13.2</td>
<td>Wire rope used in boom hoist reeving must meet certain requirements. (29 CFR 1926.1414(d) and (e)(4))</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>13.3</td>
<td>Rotation-resistant rope must meet certain requirements. (29 CFR 1926.1414(e))</td>
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</tbody>
</table>

## 14. Safety Devices and Operational Aids

<table>
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<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>14.1</td>
<td>Certain safety devices are required on all equipment, unless otherwise specified. (29 CFR 1926.1415)</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>14.2</td>
<td>Certain operational aids are required on all equipment, unless otherwise specified. (29 CFR 1926.1416(b) and (c))</td>
<td>☐</td>
<td>☐</td>
</tr>
</tbody>
</table>
14.3 Category I devices must be repaired no later than seven calendar days after a deficiency occurs. (29 CFR 1926.1416(d))

14.4 Category II devices must be repaired no later than 30 calendar days after a deficiency occurs. (29 CFR 1926.1416(e))

15. Operation

<table>
<thead>
<tr>
<th></th>
<th>N/A</th>
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<th>Does not comply</th>
</tr>
</thead>
<tbody>
<tr>
<td>15.1</td>
<td>Equipment must be operated in accordance with certain requirements. (29 CFR 1926.1417)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>15.2</td>
<td>If equipment will be left unattended, certain precautions must be taken. (29 CFR 1926.1417(e))</td>
<td></td>
<td></td>
</tr>
<tr>
<td>15.3</td>
<td>If equipment will be tagged out, certain requirements must be met. (29 CFR 1926.1417(f))</td>
<td></td>
<td></td>
</tr>
<tr>
<td>15.4</td>
<td>The rated capacity must be observed. (29 CFR 1926.1417(o))</td>
<td></td>
<td></td>
</tr>
<tr>
<td>15.5</td>
<td>Certain requirements must be met when traveling with a load. (29 CFR 1926.1417(u))</td>
<td></td>
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</tr>
<tr>
<td>15.6</td>
<td>The operator must have authority to stop operations when there are safety concerns. (29 CFR 1926.1418)</td>
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</table>

16. Signals

<table>
<thead>
<tr>
<th></th>
<th>N/A</th>
<th>Complies</th>
<th>Does not comply</th>
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<tbody>
<tr>
<td>16.1</td>
<td>Signals must meet certain general requirements. (29 CFR 1926.1419 and 29 CFR 1926.1422)</td>
<td></td>
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</tr>
<tr>
<td>16.2</td>
<td>Radio, telephone, or other electronic transmission of signals must meet certain requirements. (29 CFR 1926.1420)</td>
<td></td>
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</tr>
<tr>
<td>16.3</td>
<td>Voice signals must meet certain additional requirements. (29 CFR 1926.1421)</td>
<td></td>
<td></td>
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</table>

17. Fall Protection

<table>
<thead>
<tr>
<th></th>
<th>N/A</th>
<th>Complies</th>
<th>Does not comply</th>
</tr>
</thead>
<tbody>
<tr>
<td>17.1</td>
<td>Boom walkways must be provided on equipment other than tower cranes in accordance with certain requirements. (29 CFR 1926.1423(b))</td>
<td></td>
<td></td>
</tr>
<tr>
<td>17.2</td>
<td>Steps, handholds, ladders, grabrails, guardrails, and railings must meet certain requirements. (29 CFR 1926.1423(c))</td>
<td></td>
<td></td>
</tr>
<tr>
<td>17.3</td>
<td>Personal fall arrest and fall restraint systems must meet certain requirements. (29 CFR 1926.1423(d) – (f))</td>
<td></td>
<td></td>
</tr>
<tr>
<td>17.4</td>
<td>Anchorages must meet certain requirements. (29 CFR 1926.1423(g))</td>
<td></td>
<td></td>
</tr>
<tr>
<td>17.5</td>
<td>Fall protection equipment used on tower cranes must meet certain requirements. (29 CFR 1926.1423(h))</td>
<td></td>
<td></td>
</tr>
<tr>
<td>17.6</td>
<td>Anchoring to load lines must be conducted in accordance with certain requirements. (29 CFR 1926.1423(j))</td>
<td></td>
<td></td>
</tr>
<tr>
<td>17.7</td>
<td>The employer must train each employee who may be exposed to fall hazards. (29 CFR 1926.1423(k))</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### 18. Work Area Control

<table>
<thead>
<tr>
<th></th>
<th>N/A</th>
<th>Complies</th>
<th>Does not comply</th>
</tr>
</thead>
<tbody>
<tr>
<td>18.1</td>
<td>Employees must be protected from “struck by” and “caught between” hazards in the equipment’s swing radius. (29 CFR 1926.1424)</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>18.2</td>
<td>Employees must be kept clear of the load. (29 CFR 1926.1425)</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>18.3</td>
<td>Boom free fall is prohibited in certain circumstances, and must meet certain requirements when allowed. (29 CFR 1926.1426(a) – (c))</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>18.4</td>
<td>Free fall of the load is prohibited in certain circumstances. (29 CFR 1926.1426(d))</td>
<td>☐</td>
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</table>

### 19. Operator Qualification and Certification

<table>
<thead>
<tr>
<th></th>
<th>N/A</th>
<th>Complies</th>
<th>Does not comply</th>
</tr>
</thead>
<tbody>
<tr>
<td>19.1</td>
<td>Operators must be properly qualified or certified. (29 CFR 1926.1427(a))</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>19.2</td>
<td>Operators must receive certain training, and they may operate equipment only in accordance with certain restrictions while they are undergoing training. (29 CFR 1926.1427(b))</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>19.3</td>
<td>Each operator must be certified or licensed to operate the equipment, in accordance with certain requirements. (29 CFR 1926.1427(c))</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>19.4</td>
<td>Certification by accredited crane operator testing organizations must meet certain requirements. (29 CFR 1926.1427(d))</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>19.5</td>
<td>An employer’s certification of its employees must meet certain requirements. (29 CFR 1926.1427(e))</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>19.6</td>
<td>The employer must evaluate each operator’s qualifications. (29 CFR 1926.1427(f))</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>19.7</td>
<td>Certification must be based on tests of specific skills and knowledge. (29 CFR 1926.1427(j))</td>
<td>☐</td>
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</table>

### 20. Qualifications of Additional Personnel

<table>
<thead>
<tr>
<th></th>
<th>N/A</th>
<th>Complies</th>
<th>Does not comply</th>
</tr>
</thead>
<tbody>
<tr>
<td>20.1</td>
<td>Signal persons must be properly qualified. (29 CFR 1926.1428(a))</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>20.2</td>
<td>Maintenance and repair employees must be properly qualified. (29 CFR 1926.1429)</td>
<td>☐</td>
<td>☐</td>
</tr>
</tbody>
</table>

### 21. Training

<table>
<thead>
<tr>
<th></th>
<th>N/A</th>
<th>Complies</th>
<th>Does not comply</th>
</tr>
</thead>
<tbody>
<tr>
<td>21.1</td>
<td>All personnel must be properly trained. (29 CFR 1926.1430)</td>
<td>☐</td>
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</table>

### 22. Hoisting Personnel

<table>
<thead>
<tr>
<th></th>
<th>N/A</th>
<th>Complies</th>
<th>Does not comply</th>
</tr>
</thead>
<tbody>
<tr>
<td>22.1</td>
<td>Certain additional requirements must be met when hoisting one or more employees. (29 CFR 1926.1431(a) and (b))</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>22.2</td>
<td>When hoisting personnel, equipment must meet certain requirements. (29 CFR 1926.1431(c) and (d))</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>22.3</td>
<td>Personnel platforms must meet certain requirements. (29 CFR 1926.1431(e))</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>22.4</td>
<td>Personnel platforms must be properly loaded. (29 CFR 1926.1431(f))</td>
<td>☐</td>
<td>☐</td>
</tr>
</tbody>
</table>
## Cranes and Derricks in Construction Scoresheet

### 22. Attachments and rigging must meet certain requirements. (29 CFR 1926.1431(g))

### 23. Trial lifts and inspections must be conducted in accordance with certain requirements. (29 CFR 1926.1431(h))

### 24. Proof testing must be conducted in accordance with certain requirements. (29 CFR 1926.1431(i))

### 25. Certain work practices must be observed when hoisting personnel. (29 CFR 1926.1431(j))

### 26. A meeting must be held prior to hoisting personnel. (29 CFR 1926.1431(k))

### 27. Special precautions must be taken when hoisting personnel near power lines, in drill shafts, or in pile driving operations. (29 CFR 1926.1431(n), (o) and (p))

### 28. Proof testing must be conducted in accordance with certain requirements. (29 CFR 1926.1431(q))

### 29. Certain work practices must be observed when hoisting personnel. (29 CFR 1926.1431(r))

### 30. Special precautions must be taken when hoisting personnel for marine transfer. (29 CFR 1926.1431(s))

### 31. Special precautions must be taken when hoisting personnel for storage-tank (steel or concrete), shaft, and chimney operations. (29 CFR 1926.1431(t))

### 23. Multiple Crane and Derrick Lifts

#### 23.1 Certain additional requirements must be met when more than one crane/derrick will be supporting the load. (29 CFR 1926.1432)

### 24. Equipment with a Capacity of More than 2,000 Pounds

#### 24.1 Equipment that has a manufacturer-rated hoisting/lifting capacity of more than 2,000 pounds must be properly designed, constructed and tested. (29 CFR 1926.1433)

#### 24.2 Equipment with a cab must meet certain requirements. (29 CFR 1926.1433(d)(7))

### 25. Equipment Modifications

#### 25.1 Modifications or additions which affect the capacity or safe operation of the equipment are prohibited with limited exceptions. (29 CFR 1926.1434)

### 26. Tower Cranes

#### 26.1 Tower cranes must meet certain additional requirements. (29 CFR 1926.1435(a) – (c))

#### 26.2 Tower cranes must have certain safety devices. (29 CFR 1926.1435(d))

#### 26.3 Tower cranes must have certain operational aids. (29 CFR 1926.1435(e))

#### 26.4 Category I devices must repaired no later than seven calendar days after a deficiency occurs. (29 CFR 1926.1435(e)(5))

#### 26.5 Category II devices must repaired no later than 30 calendar days after a deficiency occurs. (29 CFR 1926.1435(e)(6))

#### 26.6 Tower cranes must be inspected. (29 CFR 1926.1435(f))
### 27. Derricks

<table>
<thead>
<tr>
<th></th>
<th></th>
<th>N/A</th>
<th>Complies</th>
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</tr>
</thead>
<tbody>
<tr>
<td>27.1</td>
<td>Load charts for derricks must meet certain additional requirements. (29 CFR 1926.1436(b))</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>27.2</td>
<td>Derricks must be properly constructed. (29 CFR 1926.1436(c))</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>27.3</td>
<td>Derricks must be properly anchored and guyed. (29 CFR 1926.1436(d))</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>27.4</td>
<td>Swingers and hoists must meet certain requirements. (29 CFR 1926.1436(e))</td>
<td></td>
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<td></td>
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<tr>
<td>27.5</td>
<td>Certain additional operational aids are required. (29 CFR 1926.1436(f))</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>27.6</td>
<td>New or reinstalled derricks must be inspected and tested after assembly. (29 CFR 1926.1436(g) and (h))</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>27.7</td>
<td>Certain general requirements must be met. (29 CFR 1926.1436(j) – (q))</td>
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</tbody>
</table>

### 28. Floating Cranes/Derricks and Land Cranes/Derricks on Barges

<table>
<thead>
<tr>
<th></th>
<th></th>
<th>N/A</th>
<th>Complies</th>
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</tr>
</thead>
<tbody>
<tr>
<td>28.1</td>
<td>Certain additional work area controls must be implemented. (29 CFR 1926.1437(c)(2))</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>28.2</td>
<td>Certain additional safety devices are required. (29 CFR 1926.1437(e))</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>28.3</td>
<td>Operating procedures must be accessible. (29 CFR 1926.1437(g))</td>
<td></td>
<td></td>
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<tr>
<td>28.4</td>
<td>Certain additional inspections must be conducted. (29 CFR 1926.1437(h))</td>
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<tr>
<td>28.5</td>
<td>Certain precautions must be taken when working with a diver in the water. (29 CFR 1926.1437(j))</td>
<td></td>
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</tr>
<tr>
<td>28.6</td>
<td>Equipment must be properly designed and used. (29 CFR 1926.1437(k))</td>
<td></td>
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</tr>
<tr>
<td>28.7</td>
<td>Equipment designed for marine use by permanent attachment to barges, pontoons, vessels, or other means of flotation must meet certain additional requirements. (29 CFR 1926.1437(m))</td>
<td></td>
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<tr>
<td>28.8</td>
<td>Land cranes/derricks used on barges, pontoons, vessels, or other means of flotation must meet certain additional requirements. (29 CFR 1926.1437(n))</td>
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</table>

### 29. Overhead and Gantry Cranes

<table>
<thead>
<tr>
<th></th>
<th></th>
<th>N/A</th>
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<tbody>
<tr>
<td>29.1</td>
<td>Overhead and gantry cranes must meet certain requirements. (29 CFR 1926.1438(b)(2))</td>
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### 30. Dedicated Pile Drivers

<table>
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<tr>
<th></th>
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<th>Does not comply</th>
</tr>
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<tbody>
<tr>
<td>30.1</td>
<td>Dedicated pile drivers must meet certain requirements. (29 CFR 1926.1439)</td>
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### 31. Sideboom Cranes

<table>
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<tr>
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<th></th>
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<tbody>
<tr>
<td>31.1</td>
<td>Sideboom cranes must meet certain requirements. (29 CFR 1926.1440)</td>
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</table>
### Cranes and Derricks in Construction Scoresheet

<table>
<thead>
<tr>
<th>32.</th>
<th>Equipment with a Rated Capacity of 2,000 Pounds or Less</th>
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<th>Does not comply</th>
</tr>
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<tbody>
<tr>
<td>32.1</td>
<td>Equipment with a rated hoisting/lifting capacity of 2,000 pounds or less must meet certain requirements. (29 CFR 1926.1441(a) and (k))</td>
<td>☐</td>
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<td>☐</td>
</tr>
<tr>
<td>32.2</td>
<td>Assembly/disassembly must meet certain additional requirements. (29 CFR 1926.1441(b))</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>32.3</td>
<td>Operating procedures must meet certain additional requirements. (29 CFR 1926.1441(c))</td>
<td>☐</td>
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<td>☐</td>
</tr>
<tr>
<td>32.4</td>
<td>Safety devices must meet certain additional requirements. (29 CFR 1926.1441(d))</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>32.5</td>
<td>Certain additional actions are required. (29 CFR 1926.1441(h) and (j))</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
</tbody>
</table>

END OF SCORESHEET