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sufficient extent so that, in conjunction (if necessary) with the use of supporting materials, the equipment manufacturer's specifications for adequate support and degree of level of the equipment are met. The requirement for the ground to be drained does not apply to marshes/wetlands.

(c) The controlling entity must:

(1) Ensure that ground preparations necessary to meet the requirements in paragraph (b) of this section are provided.

(2) Inform the user of the equipment and the operator of the location of hazards beneath the equipment set-up area (such as voids, tanks, utilities) if those hazards are identified in documents (such as site drawings, as-built drawings, and soil analyses) that are in the possession of the controlling entity (whether at the site or off-site) or the hazards are otherwise known to that controlling entity.

(d) If there is no controlling entity for the project, the requirement in paragraph (c)(1) of this section must be met by the employer that has authority at the site to make or arrange for ground preparations needed to meet paragraph (b) of this section.

(e) If the A/D director or the operator determines that ground conditions do not meet the requirements in paragraph (b) of this section, that person's employer must have a discussion with the controlling entity regarding the ground preparations that are needed so that, with the use of suitable supporting materials/devices (if necessary), the requirements in paragraph (b) of this section can be met.

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

§ 1926.1403 Assembly/Disassembly—selection of manufacturer or employer procedures.

When assembling or disassembling equipment (or attachments), the employer must comply with all applicable

manufacturer prohibitions and must comply with either:

(a) Manufacturer procedures applicable to assembly and disassembly, or

(b) Employer procedures for assembly and disassembly. Employer procedures may be used only where the employer can demonstrate that the procedures used meet the requirements in § 1926.1406. NOTE: The employer must follow manufacturer procedures when an employer uses synthetic slings during assembly or disassembly rigging. (See § 1926.1404(r).)

§ 1926.1404 Assembly/Disassembly—general requirements (applies to all assembly and disassembly operations).

(a) *Supervision—competent-qualified person.*

(1) Assembly/disassembly must be directed by a person 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 ("A/D director").

(2) Where the assembly/disassembly is being performed by only one person, that person must meet the criteria for both a competent person and a qualified person. For purposes of this standard, that person is considered the A/D director.

(b) *Knowledge of procedures.* The A/D director must understand the applicable assembly/disassembly procedures.

(c) *Review of procedures.* The A/D director must review the applicable assembly/disassembly procedures immediately prior to the commencement of assembly/disassembly unless the A/D director understands the procedures and has applied them to the same type and configuration of equipment (including accessories, if any).

(d) *Crew instructions.*

(1) Before commencing assembly/disassembly operations, the A/D director must ensure that the crew members understand all of the following:

(i) Their tasks.

(ii) The hazards associated with their tasks.

(iii) The hazardous positions/locations that they need to avoid.

(2) During assembly/disassembly operations, before a crew member takes on a different task, or when adding new personnel during the operations, the

requirements in paragraphs (d)(1)(i) through (d)(1)(iii) of this section must be met.

(e) *Protecting assembly/disassembly crew members out of operator view.*

(1) Before a crew member goes to a location that is out of view of the operator and is either in, on, or under the equipment, or near the equipment (or load) where the crew member could be injured by movement of the equipment (or load), the crew member must inform the operator that he/she is going to that location.

(2) Where the operator knows that a crew member went to a location covered by paragraph (e)(1) of this section, the operator must not move any part of the equipment (or load) until the operator is informed in accordance with a pre-arranged system of communication that the crew member is in a safe position.

(f) *Working under the boom, jib or other components.*

(1) When pins (or similar devices) are being removed, employees must not be under the boom, jib, or other components, except where the requirements of paragraph (f)(2) of this section are met.

(2) *Exception.* Where the employer demonstrates that site constraints require one or more employees to be under the boom, jib, or other components when pins (or similar devices) 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 this subpart for an example.)

(g) *Capacity limits.* During all phases of assembly/disassembly, rated capacity limits for loads imposed on the equipment, equipment components (including rigging), lifting lugs and equipment accessories, must not be exceeded for the equipment being assembled/disassembled.

(h) *Addressing specific hazards.* The A/D director supervising the assembly/disassembly operation must address the hazards associated with the operation, which include:

(1) *Site and ground bearing conditions.* Site and ground conditions must be adequate for safe assembly/disassembly

operations and to support the equipment during assembly/disassembly (see § 1926.1402 for ground condition requirements).

(2) *Blocking material.* The size, amount, condition and method of stacking the blocking must be sufficient to sustain the loads and maintain stability.

(3) *Proper location of blocking.* When used to support lattice booms or components, blocking must be appropriately placed to:

(i) Protect the structural integrity of the equipment, and

(ii) Prevent dangerous movement and collapse.

(4) *Verifying assist crane loads.* When using an assist crane, the loads that will be imposed on the assist crane at each phase of assembly/disassembly must be verified in accordance with § 1926.1417(o)(3) before assembly/disassembly begins.

(5) *Boom and jib pick points.* The point(s) of attachment of rigging to a boom (or boom sections or jib or jib sections) must be suitable for preventing structural damage and facilitating safe handling of these components.

(6) *Center of gravity.*

(i) The center of gravity of the load must be identified if that is necessary for the method used for maintaining stability.

(ii) Where there is insufficient information to accurately identify the center of gravity, measures designed to prevent unintended dangerous movement resulting from an inaccurate identification of the center of gravity must be used. (See Non-mandatory appendix B of this subpart for an example.)

(7) *Stability upon pin removal.* The boom sections, boom suspension systems (such as gantry A-frames and jib struts), and components must be rigged or supported to maintain stability upon the removal of the pins.

(8) *Snagging.* Suspension ropes and pendants must not be allowed to catch on the boom or jib connection pins or cotter pins (including keepers and locking pins).

(9) *Struck by counterweights.* The potential for unintended movement from

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inadequately supported counterweights and from hoisting counterweights.

(10) *Boom hoist brake failure.* Each time reliance is to be placed on the boom hoist brake to prevent boom movement during assembly/disassembly, the brake must be tested prior to such reliance to determine if it is sufficient to prevent boom movement. If it is not sufficient, a boom hoist pawl, other locking device/back-up braking device, or another method of preventing dangerous movement of the boom (such as blocking or using an assist crane) from a boom hoist brake failure must be used.

(11) *Loss of backward stability.* Backward stability before swinging the upperworks, travel, and when attaching or removing equipment components.

(12) *Wind speed and weather.* The effect of wind speed and weather on the equipment.

(i) [Reserved]

(j) *Cantilevered boom sections.* Manufacturer limitations on the maximum amount of boom supported only by cantilevering must not be exceeded. Where these are unavailable, a registered professional engineer familiar with the type of equipment involved must determine in writing this limitation, which must not be exceeded.

(k) *Weight of components.* The weight of each of the components must be readily available.

(l) [Reserved]

(m) *Components and configuration.*

(1) The selection of components, and configuration of the equipment, that affect the capacity or safe operation of the equipment must be in accordance with:

(i) Manufacturer instructions, prohibitions, limitations, and specifications. Where these are unavailable, a registered professional engineer familiar with the type of equipment involved must approve, in writing, the selection and configuration of components; or

(ii) Approved modifications that meet the requirements of §1926.1434 (Equipment modifications).

(2) *Post-assembly inspection.* Upon completion of assembly, the equipment must be inspected to ensure compliance with paragraph (m)(1) of this sec-

tion (*see* §1926.1412(c) for post-assembly inspection requirements).

(n) [Reserved]

(o) *Shipping pins.* Reusable shipping pins, straps, links, and similar equipment must be removed. Once they are removed they must either be stowed or otherwise stored so that they do not present a falling object hazard.

(p) *Pile driving.* Equipment used for pile driving must not have a jib attached during pile driving operations.

(q) *Outriggers and Stabilizers.* When the load to be handled and the operating radius require the use of outriggers or stabilizers, or at any time when outriggers or stabilizers are used, all of the following requirements must be met (except as otherwise indicated):

(1) The outriggers or stabilizers must be either fully extended or, if manufacturer procedures permit, deployed as specified in the load chart.

(2) The outriggers must be set to remove the equipment weight from the wheels, except for locomotive cranes (*see* paragraph (q)(6) of this section for use of outriggers on locomotive cranes). This provision does not apply to stabilizers.

(3) When outrigger floats are used, they must be attached to the outriggers. When stabilizer floats are used, they must be attached to the stabilizers.

(4) Each outrigger or stabilizer must be visible to the operator or to a signal person during extension and setting.

(5) Outrigger and stabilizer blocking must:

(i) Meet the requirements in paragraphs (h)(2) and (h)(3) of this section.

(ii) 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.

(6) For locomotive cranes, when using outriggers or stabilizers to handle loads, the manufacturer's procedures must be followed. When lifting loads without using outriggers or stabilizers, the manufacturer's procedures must be met regarding truck wedges or screws.

(r) *Rigging.* In addition to following the requirements in 29 CFR 1926.251 and other requirements in this and other

standards applicable to rigging, when rigging is used for assembly/disassembly, the employer must ensure that:

(1) The rigging work is done by a qualified rigger.

(2) Synthetic slings are protected from: Abrasive, sharp or acute edges, and configurations that could cause a reduction of the sling's rated capacity, such as distortion or localized compression. NOTE: Requirements for the protection of wire rope slings are contained in 29 CFR 1926.251(c)(9).

(3) When synthetic slings are used, the synthetic sling manufacturer's instructions, limitations, specifications and recommendations must be followed.

§ 1926.1405 Disassembly—additional requirements for dismantling of booms and jibs (applies to both the use of manufacturer procedures and employer procedures).

Dismantling (including dismantling for changing the length of) booms and jibs.

(a) None of the pins in the pendants are to be removed (partly or completely) when the pendants are in tension.

(b) None of the pins (top or bottom) on boom sections located between the pendant attachment points and the crane/derrick body are to be removed (partly or completely) when the pendants are in tension.

(c) None of the pins (top or bottom) on boom sections located between the uppermost boom section and the crane/derrick body are to be removed (partly or completely) when the boom is being supported by the uppermost boom section resting on the ground (or other support).

(d) None of the top pins on boom sections located on the cantilevered portion of the boom being removed (the portion being removed ahead of the pendant attachment points) are to be removed (partly or completely) until the cantilevered section to be removed is fully supported.

§ 1926.1406 Assembly/Disassembly—employer procedures—general requirements.

(a) When using employer procedures instead of manufacturer procedures for

assembly/disassembly, the employer must ensure that the procedures:

(1) Prevent unintended dangerous movement, and prevent collapse, of any part of the equipment.

(2) Provide adequate support and stability of all parts of the equipment.

(3) Position employees involved in the assembly/disassembly operation so that their exposure to unintended movement or collapse of part or all of the equipment is minimized.

(b) *Qualified person.* Employer procedures must be developed by a qualified person.

§ 1926.1407 Power line safety (up to 350 kV)—assembly and disassembly.

(a) Before assembling or disassembling equipment, the employer must determine if any part of the equipment, load line, or load (including rigging and lifting accessories) could get, in the direction or area of assembly/disassembly, closer than 20 feet to a power line during the assembly/disassembly process. If so, the employer must meet the requirements in Option (1), Option (2), or Option (3) of this section, as follows:

(1) *Option (1)—Deenergize and ground.* Confirm from the utility owner/operator that the power line has been deenergized and visibly grounded at the worksite.

(2) *Option (2)—20 foot clearance.* 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 (b) of this section.

(3) *Option (3)—Table A clearance.*

(i) Determine the line's voltage and the minimum clearance distance permitted under Table A (*see* § 1926.1408).

(ii) Determine if any part of the equipment, load line, or load (including rigging and lifting accessories), could get closer than the minimum clearance distance to the power line permitted under Table A (*see* § 1926.1408). If so, then the employer must follow the requirements in paragraph (b) of this section to ensure that no part of the equipment, load line, or load (including rigging and lifting accessories), gets closer to the line than the minimum clearance distance.