

July 2, 2004

NOTE:

[Text in brackets and highlighted] are questions, information, options or new material.

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1400 Scope

(a) This standard applies to power-operated equipment 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; cranes on barges; locomotive cranes; mobile cranes (such as wheel-mounted, rough terrain, all-terrain, commercial truck-mounted, and boom truck cranes); multi-purpose machines when configured to hoist and lower (by means of a winch or hook) and horizontally move a suspended load; industrial (such as carry-deck cranes); dedicated pile drivers; service/mechanic trucks with a hoisting device; a crane on a monorail; tower cranes (such as fixed jib (“hammerhead boom”), luffing boom and self-erecting); pedestal cranes; portal cranes; overhead and gantry cranes; straddle cranes; side-boom tractors; derricks; and variations of such equipment. However, items listed in paragraph (c) are excluded from the scope of this standard.

(b) *Attachments.* This standard applies to equipment included in paragraph (a) 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.

(c) *Exclusions.* This Subpart does not cover:

- (1) Equipment included in paragraph (a) that has been converted or adapted for a non-hoisting/lifting use. Such conversions/adaptations include, but are not limited to, power shovels, excavators and concrete pumps.
- (2) Power shovels, excavators, wheel loaders, backhoes, loader backhoes, track loaders. This machinery is also excluded when used with chains or other rigging to lift suspended loads.
- (3) Automotive wreckers and tow trucks when used to clear wrecks and haul vehicles.
- (4) Service trucks with mobile lifting devices designed specifically for use in the power line and electric service industries, such as digger derricks (radial boom derricks), when used in these industries for auguring holes to set power and utility poles, or handling associated materials to be installed or removed from utility poles.
- (5) Equipment originally designed as vehicle-mounted aerial devices (for lifting personnel) and self-propelled elevating work platforms.

(6) Hydraulic jacking systems [need to resolve “should” issue], including telescopic/hydraulic gantries [We need a picture/drawing of this].

(7) Stacker cranes.

(8) Powered industrial trucks (forklifts).

(9) Mechanic’s truck with a hoisting device when used in activities related to equipment maintenance and repair.

(10) Equipment that hoists by using a come-a-long or chainfall.

(11) Dedicated drilling rigs.

(12) Gin poles used for the erection of communication towers.

(13) Tree trimming and tree removal work.

(14) Anchor handling with a vessel or barge using an affixed A-frame.

(d) *Limited requirements.* The only requirements under this standard that apply to the equipment listed in this paragraph are specified in the designated Sections, as follows:

(1) For equipment with a manufacturer-rated hoisting/lifting capacity of 2000 pounds or less: Section 1413.

(2) For dedicated pile drivers: Section 1440.

(3) For overhead and gantry cranes used in construction that are permanently installed in a facility: Section 1439(a).

(e) The duties of controlling entities under this subpart include, but are not limited to, the duties specified in Sections 1428(c), (e) and 1429(b).

1402 Assembly/Disassembly – Selection of Manufacturer or Employer Procedures

When assembling and disassembling equipment (or attachments), the employer shall comply with either:

(a) all manufacturer procedures applicable to erecting and dismantling, or

(b) employer procedures for erecting and dismantling. Employer procedures may be used instead of manufacturer procedures only where the employer can demonstrate that the procedures used meet the requirements in section 1405.

1403 Assembly/Disassembly – General Requirements (applies to all assembly and disassembly operations)

(a) Supervision – Competent-qualified person.

(1) Assembly/disassembly must be supervised 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 supervisor”).

(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 supervisor.

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

(c) Review of procedures. The A/D supervisor must review the applicable assembly/disassembly procedures immediately prior to the commencement of erecting/dismantling unless the A/D supervisor has applied them to the same type and configuration of equipment (including accessories, if any) so that they are already known and understood.

(d) Crew instructions.

(1) Before commencing assembly/disassembly operations, the A/D supervisor must determine that the crew members understand 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 paragraph (1)(i) through (iii) must be met with respect to the crew member’s understanding regarding that task.

(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 ensure that the operator is informed that he/she is going to that location.

(2) Where the operator knows that a crew member went to a location covered by paragraph (1), the operator shall not move any part of the equipment (or load) until the operator:

(i) Gives a warning that is understood by the crew member as a signal that the equipment (or load) is about to be moved and allows time for the crew member to get to a safe position, or

(ii) 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.* When pins (or similar devices) are being removed, employees must not be under the boom, jib or other components, except where site constraints require them to do so. In such instances, the A/D supervisor 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 ___ for an example].

(g) *Capacity limits.* During all phases of assembly/disassembly, manufacturer recommendations, specifications and limitations for maximum loads imposed on the equipment, equipment components (including rigging), and lifting lugs and equipment accessories must be met for the equipment being assembled/disassembled.

(h) *Addressing specific hazards.* The A/D supervisor supervising the assembly/disassembly operation must address the hazards associated with the operation with methods to protect the employees from them, including, but not limited to, the following:

(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 the requirements in Section 1428).

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

(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 before assembly/disassembly begins in order to prevent exceeding manufacturer instructions, recommendations, specifications and limitations for the assist crane.

(5) *Lattice Boom and jib pick points.* The point(s) of attachment of rigging to a lattice boom (or lattice 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 unless that is unnecessary 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 XX for examples of techniques).

(7) *Stability upon pin removal.* The boom sections, boom suspension systems (such as gantry A-frames and jib struts) or 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.

(9) *Struck by counterweights.* The potential for unexpected movement from inadequately supported counterweights and from hoisting counterweights.

(10) *Boom hoist brake failure.* Where reliance is placed on the boom hoist brake to prevent boom movement during assembly/disassembly, the brake shall be tested to determine if it 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 an assist crane) from a boom hoist brake failure shall be used.

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

[Insert illustration (without text) from pg 191 of Ontario Handbook]

(12) *Wind velocity.* Wind velocity must be considered so that the safe assembly/disassembly of the equipment is not compromised.

(i) [Reserved]

(j) *Cantilevered boom sections.* Manufacturer instructions, recommendations and limitations on the maximum amount of boom supported only by cantilevering shall not be exceeded.

(k) *Weight of components.* The weight 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, recommendations, 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 section 1416 Equipment Modifications.

(2) *Post-assembly inspection.* Upon completion of assembly, the equipment must be inspected to ensure compliance with paragraph (1) (see section 1415(b) for post-assembly inspection requirements).

(n) *Manufacturer prohibitions.* The employer must comply with all manufacturer prohibitions.

(o) *Shipping pins.* Reusable shipping pins, straps, links, and similar equipment must be removed and stowed in accordance with manufacturer instructions.

(p) *Pile driving.* Equipment used for pile driving shall not have a jib attached. [Should this be added?]

(q) *Outriggers.* When the load to be handled and the operating radius require the use of outriggers, or at any time when outriggers are used, the following requirements shall be met:

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

(2) The outriggers shall be set to remove the equipment weight from the wheels, except for locomotive cranes (see paragraph (6) for use of outriggers on locomotive cranes).

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

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

(5) Blocking under outrigger floats shall:

- (i) Meet the requirements in paragraph (r).
- (ii) Be placed only under the outer bearing surface of the extended outrigger beam.

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

(r) *Blocking*. When used, blocking shall have:

- (1) Sufficient strength to prevent crushing, bending, or shear failure.
- (2) Sufficient thickness, width, and length to transmit the load to the supporting surface, and to prevent shifting, toppling, or excessive settlement under load on ground that meets the requirements of Section 1428.

1404 Disassembly – Additional requirements for disassembly 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.

[Insert new diagram]

(b) None of the pins (top and 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.

[Insert Diagrams A, B and C].

(c) 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.

[Insert diagrams D and E]

1405 Assembly/Disassembly – Employer Procedures – General Requirements

(a) When using employer procedures instead of manufacturer procedures for assembling or disassembling, the employer shall ensure that the procedures are designed to:

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

(2) Provide adequate support and stability of all parts of the equipment during the assembly/disassembly process.

(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.

(4) Incorporate all manufacturer prohibitions.

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

1406 Operation

(a) The employer shall comply with all manufacturer procedures applicable to the operation of equipment, including its use with attachments.

(b) *Unavailable operation procedures.*

(1) Where the manufacturer procedures are unavailable, the employer shall develop and ensure compliance with all procedures necessary for the safe operation of the equipment and attachments.

(2) Procedures for the operational controls must be developed by a qualified person.

(3) Procedures related to the capacity of the equipment must be developed and signed by a registered professional engineer familiar with the equipment.

(c) *Accessibility of procedures.*

(1) The procedures applicable to the operation of the equipment, including rated load capacities (load charts), recommended operating speeds, special hazard warnings, instructions and operators manual, shall be readily available in the cab at all times for use by the operator. The procedures shall be in a language that the operator is capable of reading or a translator shall be immediately available to the operator.

(2) Where load capacities are available in the cab only in electronic form: in the event of a failure which makes the load capacities inaccessible, the operator must immediately cease operations or follow safe shut-down procedures until the load capacities (in electronic or other form) are available.

(d) The operator shall not engage in any practice that diverts his/her attention while actually engaged in operating the crane, such as the use of cell phones (other than when used for signal communications) or other attention-diverting activities.

(e) *Leaving the equipment unattended.*

(1) The operator shall not leave the controls while the load is suspended, except where the following are met:

(i) The load is to be held suspended for a period of time exceeding normal lifting operations.

(ii) The competent person determines and implements measures necessary to restrain the boom hoist and telescoping, load, swing, and outrigger functions.

(iii) Barricades or caution lines, and notices, are erected to prevent all employees from entering the fall zone. No employees, including those listed in Section 1423 (b)(1)-(3), (d) or (e), shall be permitted in the fall zone.

(2) Before leaving the equipment unattended, the operator shall:

(i) Land all loads (including lifting devices such as a bucket, lifting magnet, or other device).

(ii) Disengage the master clutch.

(iii) Set travel, swing, and boom brakes, and other locking devices unless the manufacturer procedures state otherwise.

(iv) Put controls in the off or neutral position.

(v) Secure the equipment against accidental travel.

(vi) Stop the engine, except where the following requirements are met:

(A) The operator is situated where unauthorized entry onto and into the equipment can be observed.

(B) The equipment is located in an area protected from unauthorized entry.

(3) *Storm warning.* When a local storm warning has been issued, the competent person shall determine whether it is necessary to implement manufacturer recommendations for securing the equipment.

(f) *Tag-out.*

(1) *Tagging out of service equipment/functions.* Where equipment is taken out of service, a tag shall be placed in the cab stating that the equipment is out of service and is not to be used. Where a function(s) has been taken out of service, a tag shall be placed on the control for that function stating that the function is out of service and not to be used.

(2) *Response to do not operate/ tag-out signs.*

(i) If there is a warning (tag-out or maintenance/do not operate) sign on the equipment or starting control, the operator shall not activate the switch or start the equipment until the sign has been removed by a person authorized to remove it, or until the operator has verified that:

(A) No one is servicing, working on, or otherwise in a dangerous position on the machine.

(B) The equipment has been repaired and is working properly.

(ii) If there is a warning (tag-out or maintenance/do not operate) sign on any other switch or control, the operator shall 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 that the requirements in paragraphs (2)(i)(A) and (B) have been met.

(g) Before starting the engine, the operator shall verify that all controls are in the off or neutral position and that all personnel are in the clear.

(h) If power fails during operations, the operator shall:

(1) Set all brakes and locking devices.

(2) Move all clutches or other power controls to the off or neutral position.

(3) Land the suspended load under brake control (if able to) unless it is safer not to do so.

(i) [Reserved]

(j) The operator shall be familiar with the equipment and its proper operation. If adjustments or repairs are necessary, the operator shall promptly inform the person designated by the employer to receive such information and, where there are successive shifts, to the next operator.

(k) Safety devices and operational aids shall not be used as a substitute for the exercise of professional judgement by the operator.

(l) [Reserved]

(m) If there is a slack rope condition, it shall be verified (before starting to lift) that the rope is seated on the drum and in the sheaves as the slack is removed.

(n) The competent person shall consider the effect of wind on equipment stability and rated capacity.

(o) *Compliance with rated capacity.*

(1) The equipment shall not be operated in excess of its rated capacity, except when performing load tests in accordance with this Subpart.

(2) The operator shall not be requested or instructed to operate the equipment in a manner that would violate paragraph (a).

(3) *Load weight.*

(i) The weight of the load shall be determined from a reliable source (such as the load's manufacturer), by a reliable calculation method (such as calculating a steel beam from measured dimensions and a known per foot weight), or by other equally reliable means. (NOTE: use of a device listed in Section 14XX (e)(4), 1437(d)(5) or 1438(f)(3), is not a substitute for making this determination). In addition, when requested by the operator, this information shall be provided to the operator prior to the lift.

(ii) The operator shall verify that the load is within the rated capacity of the equipment.

(p) The boom or other parts of the equipment shall not contact any obstruction.

(q) Side loading of booms shall be limited to freely suspended loads. The equipment shall not be used to drag loads sideways.

(r) On wheel-mounted equipment, no loads shall be lifted over the front area, except as permitted by the manufacturer.

(s) The operator shall test the brakes each time a load approaching that is 90% of the rated capacity or more is handled by lifting the load a few inches and applying the brakes. In duty cycle and repetitive lifts where each lift is 90% of the rated capacity or more, this requirement applies to the first lift but not to successive lifts. [Is this an appropriate addition?]

(t) Neither the load nor the boom shall be lowered below the point where less than two full wraps of rope remain on their respective drums.

(u) *Travelling with a load.*

(1) Travelling with a load is prohibited if the practice is prohibited by the manufacturer.

(2) Where travelling with a load, the employer shall ensure that:

(i) A competent person supervises the operation, determines if it is necessary to reduce crane ratings, and makes determinations regarding load position, boom location, ground support, travel route, and speed of movement necessary to ensure safety.

(ii) The determinations of the competent person required in paragraph (i) are implemented.

(iii) Tire pressure specified by the manufacturer is maintained.

(v) Rotational speed shall be such that the load does not swing out beyond the radius at which it can be controlled. A tag or restraint line shall be used if necessary to prevent rotation of the load that would be hazardous.

(w) The boom hoist brake shall be maintained in accordance with manufacturer procedures to prevent unintended movement.

(x) The operator shall obey a stop (or emergency stop) signal, irrespective of who gives it.

(y) *Swinging locomotive cranes.* A locomotive crane shall not be swung into a position where it is reasonably foreseeable that 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.

(z) *Counterweight/ballast.*

(1) Equipment shall not be operated without the counterweight or ballast in place as specified by the manufacturer, including during equipment assembly/disassembly, operations, or any other instance specified by the manufacturer.

(2) The maximum counterweight or ballast approved by the manufacturer for the equipment shall not be exceeded.

1407 Authority to stop operation

Whenever there is a concern as to safety, the operator shall have the authority to stop and refuse to handle loads until a qualified person has determined that safety has been assured.

1408 Signals – General Requirements

- (a) A signal person must be provided in each of the following situations:
- (1) The point of operation, meaning the load travel or the area near or at load placement, is not in full view of the operator.
 - (2) When the equipment is travelling, the view in the direction of travel is obstructed.
 - (3) Due to site specific safety concerns, either the operator or the person handling the load determines that it is necessary.
- (b) *Types of signals.* Signals to crane operators must be by hand, voice, audible, or new signals.
- (c) *Hand signals.*
- (1) When using hand signals, the Standard Method must be used (see Appendix __). *Exception:* 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, Non-standard hand signals may be used [See Appendix A for examples] in accordance with paragraph (2). The following requirements apply to the use of non-standard hand signals:
 - (2) *Non-standard hand signals.* When using non-standard hand signals, the signal person, crane operator, and lift supervisor (where there is one) shall contact each other prior to the operation and agree on the non-standard hand signals that will be used.
- (d) *New signals.* Signals other than hand, voice or audible signals may be used where the employer demonstrates that:
- (1) The new signals provide at least equally effective communication as voice, audible, or Standard Method hand signals, or
 - (2) There is an industry consensus standard for the new signals.
- (e) *Suitability.* 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.), must be appropriate for the site conditions.
- (f) During crane operations requiring signals, the ability to transmit signals between the crane operator and signal person shall be maintained. If that ability is interrupted at any time, the operator shall safely stop operations requiring signals until it is reestablished and a proper signal is given and understood.

(g) If the operator becomes aware of a problem and needs to communicate with the signal person, the operator must safely stop operations. Operations shall not resume until the operator and signal person agree that the problem has been resolved.

(h) Only one person gives signals to a crane/derrick at a time, except in circumstances covered by paragraph (j).

(i) [Reserved].

(j) Anyone who becomes aware of a problem must alert the operator or signal person by giving the stop or emergency stop signal. (NOTE: 1406(o) requires the operator to obey a stop or emergency stop signal).

(k) All directions given to the crane operator by the signal person shall be given from the operator's direction perspective.

(l) [Reserved].

(m) *Communication with multiple cranes/derricks.* Where a signal person(s) is in communication with more than one crane/derrick, a system for identifying the crane/derrick each signal is for must be used, as follows:

(i) for each signal, prior to giving the function/direction, the signal person shall identify the crane/derrick the signal is for, or

(ii) an equally effective method of identifying which crane/derrick the signal is for must be used.

1409 Radio, telephone or other electronic transmission of signals.

(1) The device(s) used to transmit signals shall be tested on site before beginning operations to ensure that the signal transmission is clear and reliable.

(2) Signal transmission must be through a dedicated channel. *Exception:* Multiple cranes/derricks and one or more signal persons may share a dedicated channel for the purpose of coordinating operations.

(3) The operator's reception of signals must be by a hands-free system.

1410 Voice signals – additional requirements

(1) Prior to beginning operations, the crane operator, signal person and lift supervisor (if there is one), shall contact each other and agree on the signals that will be used. Once the signals are agreed upon, these workers need not meet again to discuss

signals unless another worker is substituted, there is confusion about the signals, or a signal is to be changed.

(2) Each voice signal shall contain the following three elements, given in the following order: function (such as hoist, boom, etc.), direction; distance and/or speed; function, stop command.

1411 Hand signal chart. Hand signal charts must be either posted on the equipment or readily available at the site.

1412 Signal Person Qualifications

(a) The employer of the signal person shall ensure that each signal person meets the Qualification Requirements (paragraph (c)) prior to giving any signals. This requirement shall be met by using either Option (1) or Option (2).

(1) *Option (1) – Third party qualified evaluator.* The signal person has documentation from a third party qualified evaluator showing that the signal person meets the Qualification Requirements (see paragraph (c)).

(2) *Option (2) – Employer’s qualified evaluator.* The employer has its qualified evaluator assess the individual and determine that the individual meets the Qualification requirements (see paragraph (c)). An assessment by an employer’s qualified evaluator under this Option is not portable – other employers are not permitted to use it to meet the requirements of this Section.

(3) The documentation for whichever Option is used shall be available while the signal person is employed by the employer.

(b) If subsequent actions by the signal person indicate that the individual may not meet the Qualification Requirements (see paragraph (c)), the employer must not allow the individual to continue working as a signal person until re-training is provided and a re-assessment is made in accordance with paragraph (a) that confirms that the individual meets the Qualification Requirements.

(c) *Qualification Requirements.* Each signal person must:

(1) Know and understand the type of signals used. If hand signals are used, the signal person must know and understand the Standard Method for hand signals.

(2) Be competent in the application of the type of signals used.

(3) Have a basic understanding of crane operation and limitations, including the crane dynamics involved in swinging and stopping loads and boom deflection from hoisting loads.

(4) Know and understand the relevant requirements of sections 1408 – 1412 [signaling sections].

(5) Demonstrate that he/she meets the requirements in paragraph (1) – (4) through a verbal or written test, and through a practical test.

1413 Requirements for equipment with a manufacturer-rated hoisting/lifting capacity of 2000 pounds or less. [New]

For equipment with a maximum manufacturer-rated hoisting/lifting capacity of 2000 pounds or less:

(a) The following sections of this Subpart apply: 1400 (Scope); 1407 (Authority to Stop Operation); 1408 – 1411 (Signals)[but not signal qualifications]; 1416 (Equipment Modifications); 1418 – 1421 (Wire Rope); 1424 (Fall Protection); 1428 (Ground conditions); 1430 – 14XX (Power line safety); 1431 (Derricks) [needs to be considered by derricks work group]; 1433 (Floating Cranes & Cranes on Barges); 1435 (Free Fall/Power Down); 1436 (Multiple Crane Lifts); 1437 (Tower Cranes); 1439 (Overhead & Gantry Cranes); 1440 (Definitions).

(b) *Assembly/disassembly.*

(1) Sections 1402 (Assembly/ Disassembly – Selection of Manufacturer or Employer Procedures) and 1405 (Assembly/ Disassembly – Employer Procedures) apply.

(2) *Components and Configuration.*

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

(A) Manufacturer instructions, recommendations, 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

(B) Approved modifications that meet the requirements of section 1416 Equipment Modifications.

(ii) *Post-assembly inspection.* Upon completion of assembly, the equipment must be inspected to ensure compliance with paragraph (2)(i) (see section 1415(b) for post-assembly inspection requirements).

(3) *Manufacturer prohibitions.* The employer must comply with all manufacturer prohibitions.

(c) *Operation – Procedures*

(1) The employer shall comply with all manufacturer procedures applicable to the operation of equipment, including its use with attachments.

(2) *Unavailable operation procedures.*

(i) Where the manufacturer procedures are unavailable, the employer shall develop and ensure compliance with all procedures necessary for the safe operation of the equipment and attachments.

(ii) Procedures for the operational controls must be developed by a qualified person.

(iii) Procedures related to the capacity of the equipment must be developed and signed by a registered professional engineer familiar with the equipment.

(3) *Accessibility.*

(i) The load capacity chart shall be available to the operator at the control station.

(ii) Procedures applicable to the operation of the equipment, recommended operating speeds, special hazard warnings, instructions and operators manual, shall be readily available for use by the operator.

(iii) Where load capacities are available at the control station only in electronic form: in the event of a failure which makes the load capacities inaccessible, the operator must immediately cease operations or follow safe shut-down procedures until the load capacities (in electronic or other form) are available.

(d) *Safety devices and operational aids.*

(1) Originally-equipped safety devices and operational aids shall be maintained in accordance with manufacturer procedures.

(2) *Anti-two blocking.* The equipment shall have either an anti-two block device that meets the requirements of 14XX (d)(3), or shall be designed so that, in the event of a two-block situation, no damage will occur and there will be no load failure (such as where the power unit will stall in the event of a two-block).

(e) *Operator qualifications.* The employer shall ensure that, prior to operating the equipment, the operator is trained on the safe operation of the type of equipment the operator will be using.

(f) *Signal person qualifications.* The employer shall ensure that signal persons are trained in the proper use of signals applicable to the use of the equipment.

(g) *Keeping clear of the load.* Section 1423 applies, except for paragraph (c)(3) [qualified rigger].

(h) *Inspections.* The equipment shall be inspected in accordance with manufacturer procedures.

(i) [Reserved]

(j) *Hoisting personnel.* Hoisting personnel using equipment covered by this section is prohibited.

(k) *Design.* The equipment shall be designed by a qualified engineer.

1414 Safety Devices

(a) *Safety devices.* The following safety devices are required on all equipment covered by this Subpart, unless otherwise specified:

(1) *Crane level indicator.*

(i) The equipment shall have a crane level indicator that is either built into the equipment or is available on the equipment.

(ii) If a built-in crane level indicator is not working properly, it shall be tagged-out or removed.

(iii) This requirement does not apply to portal cranes, derricks, floating cranes/derricks and cranes/derricks on barges, pontoons, vessels or other means of floatation.

(2) Boom stops, except for derricks and hydraulic booms.

(3) Jib stops (if a jib is attached), except for derricks.

(4) Equipment with foot pedal brakes shall have locks, except for portal cranes and floating cranes.

(5) Hydraulic outrigger jacks shall have an integral holding device/check valve.

(6) Equipment on rails shall have rail clamps and rail stops, except for portal cranes.

(b) *Proper operation required.* Operations shall not begin unless the devices listed in this section are in proper working order. If a device stops working properly during operations, the operator shall safely stop operations. Operations shall not resume until the device is again working properly. Alternative measures are not permitted to be used.

14XX Operational Aids

(a) The devices listed in this section (“operational aids”) are required on all equipment covered by this Subpart, unless otherwise specified.

(b) Operations shall not begin unless the operational aids are in proper working order, except where the employer meets the specified temporary alternative measures. More protective alternative measures specified by the crane/derrick manufacturer, if any, shall be followed.

(c) If an operational aid stops working properly during operations, the operator shall safely stop operations until the temporary alternative measures are implemented or the device is again working properly. 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 Section 1416.

(d) *Category I operational aids and alternative measures.* Operational aids listed in this paragraph that are not working properly shall be repaired no later than 7 days after the deficiency occurs. *Exception:* If the employer documents that it has ordered the necessary parts within 7 days of the occurrence of the deficiency, the repair shall be completed within 7 days of receipt of the parts.

(1) *Boom hoist limiting device.*

(i) For equipment manufactured after December 16, 1969, a boom hoist limiting device is required. *Temporary alternative measures (use at least one):*

(A) Use a boom angle indicator.

(B) Clearly mark the boom hoist 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 keep the boom within the minimum allowable radius. In addition, install mirrors or remote video cameras and displays if necessary for the operator to see the mark.

(C) Clearly mark the boom hoist cable (so that it can easily be seen by a spotter) at a point that will give the spotter sufficient time to signal the operator and have the operator stop the hoist to keep the boom within the minimum allowable radius.

(ii) If the equipment was manufactured on or before December 16, 1969, and was not originally equipped with a boom hoist limiting device, at least one of the measures in paragraphs (A)-(C) shall be used, on a permanent basis.

(2) *Luffing jib limiting device.*

(i) Equipment with a luffing jib shall have a luffing jib limiting device. Temporary alternative measures are the same as in paragraph (1)(i), except to limit the movement of the luffing jib.

(3) *Anti two-blocking device.*

(i) Telescopic boom cranes manufactured after February 28, 1992, shall be equipped with a 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). The device(s) must prevent such damage at all points where two-blocking could occur. *Temporary alternative measures:* Clearly mark 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, and use a spotter.

(ii) *Lattice boom cranes.*

(A) Lattice boom cranes manufactured after Feb 28, 1992, shall be equipped with a device that either automatically prevents damage and load failure from contact between the load block, overhaul ball, or similar component, and the boom tip (or fixed upper block or similar component), or warns the operator in time for the operator to prevent two-blocking. The device(s) must prevent such damage/failure or provide adequate warning for all points where two-blocking could occur.

(B) Lattice boom cranes, and derricks, manufactured one year after the effective date of this standard shall be equipped with a device which automatically prevents damage and load failure from contact between the load block, overhaul ball, or similar component, and the boom tip (or fixed upper block or similar component). The device(s) must prevent such damage/failure at all points where two-blocking could occur.

(C) *Exception.* The requirements in subparagraphs (A) and (B) do not apply to such lattice boom equipment when used for dragline, clamshell (grapple), magnet, drop ball, container handling, concrete bucket, marine operations, and pile driving work. [Where the exception applies, should you have to do the measures in (D) permanently?]

(D) *Temporary alternative measures.* Clearly mark 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 a spotter.

(e) *Category II operational aids and alternative measures.* Operational aids listed in this paragraph that are not working properly shall be repaired no later than 30 days after the deficiency occurs. *Exception:* If the employer documents that it has ordered the necessary parts within 7 days of the occurrence of the deficiency, and the part is not received in time to complete the repair in 30 days, the repair shall be completed within 7 days of receipt of the parts.

(1) *Boom angle or radius indicator.* The equipment shall have a boom angle or radius indicator readable from the operator's station. *Temporary alternative measures:* Radii or boom angle shall be determined by measuring the radii or boom angle with a measuring device.

(2) *Jib angle indicator if the equipment has a luffing jib.* *Temporary alternative measures:* Radii or jib angle shall be determined by ascertaining the main boom angle and then measuring the radii or jib angle with a measuring device.

(3) *Boom length indicator visible to the operator if the equipment has a telescopic boom, except where the load rating is independent of the boom length.* *Temporary alternative measures:* One of the following methods shall be used:

- (i) Mark the boom with measured marks to calculate boom length; or
- (ii) Calculate boom length from boom angle and radius measurements; or
- (iii) Measure the boom with a measuring device.

(4) *Load weight/capacity devices.*

(i) Equipment (other than derricks) manufactured after March 29, 2003 with a rated capacity over 6,000 pounds shall have at least one of the following: load weighing device, load moment indicator, rated capacity indicator, or rated capacity limiter. *Temporary alternative measures:* The weight of the load shall be determined from a reliable source (such as the load's manufacturer), by a reliable calculation method (such as calculating a steel beam from measured dimensions and a known per foot weight), or by other equally reliable means. This information shall be provided to the operator prior to the lift. [None; Moved to Operation section]. No alternative measure is required. (NOTE: in all cases, irrespective of the presence or absence of a properly functioning load related operational aid, the determination of load

weight through the measures specified in Section 1406(o)(3)(load weight) is required).

(ii) Derricks shall be equipped in accordance with the requirements of Section 1438(f)(3).

(5) The following devices are required on equipment manufactured after January 1, 2008:

(i) Outrigger position (horizontal beam extension) sensor/monitor if the equipment has outriggers. *Temporary alternative measures:* the operator shall verify that the position of the outriggers is correct (in accordance with manufacturer procedures) before beginning operations requiring outrigger deployment.

(ii) Hoist drum rotation indicator if the drum is not visible from the operator's station. *Temporary alternative measures:* Mark the drum. In addition, install mirrors or remote video cameras and displays if necessary for the operator to see the mark.

1415 Inspections [Revisions completed]

(a) *Modified equipment.*

(1) Equipment that has had modifications or additions which affect the capacity or safe operation of the equipment shall be inspected by a qualified person after such modifications/additions have been completed, prior to initial use. The inspection shall meet the following requirements:

(i) The inspection shall assure that the modifications have been done in accordance with the approval obtained pursuant to Section 1416 (Equipment Modifications).

(ii) The inspection shall include functional testing.

(2) Equipment shall not be used until an inspection under this paragraph demonstrates that the modification/addition meets the applicable equipment criteria.

(c) *Repaired/adjusted equipment.*

(1) Equipment that has had a repair or adjustment that relates to safe operation (such as: a repair or adjustment to a safety device or operator aid, or to a critical part of a control system, power plant, braking system, load-sustaining structural components, load hook, or in-use operating mechanism), shall be inspected by a qualified person

after such a repair or adjustment has been completed, prior to initial use. The inspection shall meet the following requirements:

- (i) The qualified person shall determine if the repair/adjustment meets manufacturer equipment criteria (where applicable and available).
- (ii) Where manufacturer equipment criteria are unavailable or inapplicable, the qualified person shall:
 - (A) Determine if a registered professional engineer (RPE) is needed to develop criteria for the repair/adjustment. If an RPE is not needed, the employer shall ensure that the criteria are developed by the qualified person. If an RPE is needed, the employer shall ensure that they are developed by an RPE.
 - (B) Determine if the repair/adjustment meets the criteria developed in accordance with subparagraph (A).
- (iii) The inspection shall include functional testing.

(4) Equipment shall not be used until an inspection under this paragraph demonstrates that the repair/adjustment meets the applicable equipment criteria.

(d) *Post-assembly.*

- (1) Upon completion of assembly, the equipment shall be inspected by a qualified person to assure that it is configured in accordance with manufacturer equipment criteria.
- (2) Where manufacturer equipment criteria are unavailable, a qualified person shall:
 - (i) Determine if a registered professional engineer (RPE) familiar with the type of equipment involved is needed to develop criteria for the equipment configuration. If an RPE is not needed, the employer shall ensure that the criteria are developed by the qualified person. If an RPE is needed, the employer shall ensure that they are developed by an RPE.
 - (ii) Determine if the equipment meets the criteria developed in accordance with subparagraph (i).
- (3) Equipment shall not be used until an inspection under this paragraph demonstrates that the equipment is configured in accordance with the applicable criteria.

(e) *Each Shift.* [Navy is suggesting that we change this to Daily]

(1) A competent person shall begin a visual inspection prior to each shift, which shall be completed before or during that shift. The inspection shall consist of observation for apparent deficiencies. Disassembly is not required as part of this inspection unless the results of the visual inspection or trial operation indicate that further investigation necessitating disassembly is needed. Determinations made in conducting the inspection shall be reassessed in light of observations made during operation. At a minimum the inspection shall include the following:

- (i) Control mechanisms for maladjustments interfering with proper operation.
- (ii) Control and drive mechanisms for apparent excessive wear of components and contamination by lubricants, water or other foreign matter.
- (iii) Air, hydraulic, and other pressurized lines for deterioration or leakage, particularly those which flex in normal operation.
- (iv) Hydraulic system for proper fluid level.
- (v) Hooks and latches for deformation, cracks, excessive wear, or damage such as from chemicals or heat.
- (vi) Wire rope reeving for compliance with the manufacturer's specifications.
- (vii) Wire rope, in accordance with section 1419__ [shift inspection].
- (viii) Electrical apparatus for malfunctioning, signs of apparent excessive deterioration, dirt or moisture accumulation.
- (ix) Tires (when in use) for proper inflation and condition.
- (x) Ground conditions around the equipment for proper support, including ground settling under and around outriggers and supporting foundations, ground water accumulation, or similar conditions.
- (xi) The equipment for level position, both pre-shift and after each move and setup.
- (xii) Operator cab windows for significant cracks, breaks, or other deficiencies that would hamper the operator's view.
- (xiii) Rails, rail stops, rail clamps and supporting surfaces when the equipment has rail travelling.
- (xiv) Safety devices and operational aids for proper operation.

(2) If any deficiency in (i) through (xiii) (or in additional inspection items required to be checked for specific types of equipment in accordance with other Sections of this standard) is identified, an immediate determination shall be made by the competent person as to whether the deficiency constitutes a hazard. If the deficiency is determined to constitute a hazard, the equipment shall be removed from service until it has been corrected.

(3) If any deficiency in (xiv)(safety devices/operational aids) is identified, the corrective action specified in section 1414 shall be taken prior to using the equipment.

(f) *Monthly.*

(1) Each month the equipment is in service it shall be inspected in accordance with paragraph 1415(e) (shift inspections).

(2) Equipment shall not be used until an inspection under this paragraph demonstrates that no corrective action under paragraphs (e)(2) and (3) is required.

(3) *Documentation.*

(i) The following information shall be documented:

(A) The items checked and the results of the inspection.

(B) The name and signature of the person who conducted the inspection and the date.

(ii) This document shall be retained for a minimum of three months.

(g) *Annual/comprehensive.*

(1) At least every 12 months the equipment shall be inspected by a qualified person in accordance with paragraph 1415(e) (shift inspections).

(2) In addition, at least every 12 months, the equipment shall be inspected by a qualified person for the following:

(i) Equipment structure (including the boom and, if equipped, the jib):

(A) Structural members: deformed, cracked, or significantly corroded.

(B) Bolts, rivets and other fasteners: loose, failed or significantly corroded.

(C) Welds for cracks.

- (ii) Sheaves and drums for cracks or significant wear.
- (iii) Parts such as pins, bearings, shafts, gears, rollers and locking devices for distortion, cracks or significant wear.
- (iv) Brake and clutch system parts, linings, pawls and ratchets for excessive wear.
- (v) Safety devices and operational aids for proper operation (including significant inaccuracies).
- (vi) Gasoline, diesel, electric, or other power plants for safety-related problems (such as leaking exhaust and emergency shut-down feature), condition and proper operation.
- (vii) Chains and chain drive sprockets for excessive wear of sprockets and excessive chain stretch.
- (viii) Travel steering, brakes, and locking devices, for proper operation.
- (ix) Tires for damage or excessive wear.
- (x) Hydraulic, pneumatic and other pressurized hoses, fittings and tubing, as follows:
 - (A) Flexible hose or its junction with the fittings for indications of leaks.
 - (B) Threaded or clamped joints for leaks.
 - (C) Outer covering of the hose for blistering, abnormal deformation or other signs of failure/impending failure.
 - (D) Outer surface of a hose, rigid tube, or fitting for indications of excessive abrasion or scrubbing.
- (xi) Hydraulic and pneumatic pumps and motors, as follows:
 - (A) Performance indicators: unusual noises or vibration, low operating speed, excessive heating of the fluid, low pressure.
 - (B) Loose bolts or fasteners.
 - (C) Shaft seals and joints between pump sections for leaks.
- (xiv) Hydraulic and pneumatic valves, as follows:

- (A) Spools: sticking, improper return to neutral, and leaks.
 - (B) Leaks.
 - (C) Valve housing cracks.
 - (D) Relief valves: failure to reach correct pressure (if there is a manufacturer procedure for checking pressure, it must be followed).
- (xv) Hydraulic and pneumatic cylinders, as follows:
- (A) Drifting caused by fluid leaking across the piston.
 - (B) Rod seals and welded joints for leaks.
 - (D) Cylinder rods for scores, nicks, or dents.
 - (E) Case (barrel) for significant dents.
 - (F) Rod eyes and connecting joints: loose or deformed.
- (xvi) Outrigger pads/floats and slider pads for excessive wear or cracks.
- (xvii) Electrical components and wiring for cracked or split insulation and loose or corroded terminations.
- (xviii) Warning labels and decals required under this standard: missing or unreadable.
- (xix) Operator seat: missing or unusable.
- (xx) Originally equipped steps, ladders, handrails, guards: missing.
- (xxi) Steps, ladders, handrails, guards: in unusable/unsafe condition.
- (xxii) Additional inspection items for _____ [crane category]
[Derricks and floating cranes]
- (3) This inspection shall include functional testing to determine that the equipment as configured in the inspection is functioning properly.
- (4) If any deficiency is identified, an immediate determination shall be made by the qualified person as to whether the deficiency constitutes a hazard or, though not yet a hazard, needs to be monitored in the monthly inspections.

(5) If the qualified person determines that a deficiency is a hazard, the equipment shall be removed from service until it has been corrected.

(6) If the qualified person determines that, though not presently a hazard, the deficiency needs to be monitored, the employer shall ensure that the deficiency is checked in the monthly inspections.

(7) *Documentation of annual/comprehensive inspection.* The following information shall be documented:

(i) The items checked and the results of the inspection.

(ii) The name and signature of the person who conducted the inspection and the date.

(iii) This document shall be retained for a minimum of 12 months.

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

(1) Inspect the equipment for structural damage.

(2) Determine whether any items/conditions listed in paragraph (g) need to be inspected; if so, the qualified person shall inspect those items/conditions.

(3) If a deficiency is found, the employer shall follow the requirements in paragraphs (g)(4)-(6).

(i) [Reserved]

(j) *Equipment not in regular use.* Equipment that has been idle for 3 months or more shall be inspected by a qualified person in accordance with the requirements of paragraph (f)(Monthly) before initial use.

(k) Any part of a manufacturer's procedures regarding inspections that is more comprehensive or has a more frequent schedule than the requirements of this section shall be followed. Additional documentation requirements by the manufacturer are not required.

1416 Equipment Modifications

(a) Modifications or additions which affect the capacity or safe operation of the equipment are prohibited except where the requirements of paragraph (1), (2), or (3) are met.

(1) *Manufacturer review and approval.* The manufacturer approves the modifications/additions in writing.

(2) *Manufacturer refusal to review request.* The manufacturer is provided a detailed description of the proposed modification, is asked to approve the modification/addition, but it declines to review the technical merits of the proposal or fails, within 30 days, to acknowledge the request or initiate the review, and all of the following are met:

(i) A registered professional engineer who is a qualified person with respect to the equipment involved:

(A) Approves the modification/addition and specifies the equipment configurations to which that approval applies, and

(B) Modifies load charts, procedures, instruction manuals and instruction plates/tags/decals as necessary to accord with the modification/addition.

(ii) The original safety factor of the equipment is not reduced.

(3) *Unavailable manufacturer.* The manufacturer is unavailable and the requirements of paragraph (2)(i) and (2)(ii) are met.

(b) Modifications or additions which affect the capacity or safe operation of the equipment are prohibited where the manufacturer, after a review of the technical safety merits of the proposed modification/addition, rejects the proposal and explains the reasons for the rejection in a written response.

(c) The provisions in paragraphs (a) and (b) do not apply to modifications made or approved by the U.S. military.

1417 Training [New]

The employer shall provide training as follows:

(a) *Overhead powerlines.* Employees specified in Section 14XX(g)(Power line safety; training) shall be trained in accordance with the requirements of that paragraph.

(b) *Signal persons.* Signal persons who do not meet the requirements of Section 1412(c) shall be trained in the areas addressed in that paragraph.

(c) *Operators.*

(1) Operators who are not certified under Section 1422 shall be trained in the areas addressed in Section 1422 (c). Retraining shall be provided if necessary for re-certification or if the operator does not pass a certification test.

(2) In addition to training required by Section 1422 (c), operators shall be trained in the following practices:

(i) 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. On other types of equipment, the same practice is applicable, except that typically there is no means of adjusting the brake; if the brake does not hold, a repair is necessary.

(ii) Where reliance is placed on the boom hoist brake to prevent boom movement, test the brake 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 an assist crane) from a boom hoist brake failure shall be used.

(iii) The manufacturer's emergency procedures for halting a running boom and a running load line. In the event these are unavailable, the operator shall be trained in employer procedures.

(d) *Competent persons and qualified persons.* Competent persons and qualified persons shall be trained regarding the requirements of this Subpart applicable to their respective roles.

(e) *Crush/pinch points.* Employees who work with the equipment shall be instructed to keep limbs out of holes and crush/pinch points.

(f) *Tag-out.* Operators and other employees authorized to start/energize equipment or operate equipment controls (such as maintenance and repair workers), shall be trained in the tag-out procedures in Section 1406(f).

(g) *Training administration.*

(1) The employer shall ensure that employees required to be trained under this Subpart are evaluated to confirm that they understand the information provided in the training.

(2) Refresher training in relevant topics shall be provided when, based on the conduct of the employee or an evaluation of the employee's knowledge, there is an indication that retraining is necessary.

1418 Wire Rope – Inspection

(a) *Shift Inspection.*

(1) A competent person shall begin a visual inspection prior to each shift, which shall be completed before or during that shift. The inspection shall consist of observation of wire ropes (running and standing) that are reasonably likely to be in use during the shift for apparent deficiencies, including those listed in paragraph (2). Untwisting (opening) of wire rope or booming down is not required as part of this inspection.

(2) *Apparent deficiencies.*

(i) *Category I.* Apparent deficiencies in this category include the following:

(A) 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.

(B) Significant corrosion.

(C) Electric arc (from a source other than power lines) or heat damage.

(D) Improperly applied end connections.

(E) Significantly corroded, cracked, bent, or worn end connections (such as from severe service).

(ii) *Category II.* Apparent deficiencies in this category are:

(A) Broken strands.

(B) Visible broken wires, as follows:

(1) In running wire ropes: six randomly distributed broken wires in one lay or three broken wires in one strand in one lay, where a lay is the length along the rope in which one strand makes a complete revolution around the rope.

[illustration?]

(2) In rotation resistant ropes: two randomly distributed broken wires in six rope diameters or four randomly distributed broken wires in 30 rope diameters.

(3) In pendants or standing wire ropes: more than two broken wires in one lay located in rope beyond end connections and/or more than one broken wire in a lay located at an end connection.

(C) A diameter reduction of more than 5% from nominal diameter.

(iii) *Category III.* Apparent deficiencies in this category include the following:

(A) In rotation resistant wire rope, core protrusion or other distortion indicating core failure.

(B) Electrical contact with a power line.

(C) A broken strand.

(3) *Critical Review Items.* The competent person shall give particular attention to:

(i) Rotation resistant wire rope in use.

(ii) Wire rope being used for boom hoists and luffing hoists, particularly at reverse bends [see diagram in Appendix ___].

(iii) Wire rope at flange points, crossover points and repetitive pickup points on drums.

(iv) Wire rope adjacent to end connections.

(v) Wire rope at equalizer sheaves.

(4) *Removal from service.*

(i) If a deficiency in Category I is identified, an immediate determination shall be made by the competent person as to whether the deficiency constitutes a hazard. If the deficiency is determined to constitute a hazard, operations involving use of the wire rope in question shall be prohibited until:

(A) The wire rope is replaced, or

(B) If the deficiency (other than power line contact) is localized, the problem is corrected by severing the wire rope in two; the undamaged portion may continue to be used. Joining lengths of wire rope by splicing is prohibited. Repair of wire rope that contacted an energized power line is also prohibited.

(ii) If a deficiency in Category II is identified, the employer shall comply with *Option A or Option B*, as follows:

(A) *Option A.* Consider the deficiency to constitute a hazard where it meets the wire rope manufacturer's established criterion for removal from service or meets a different criterion that the wire rope manufacturer has approved in writing for that specific wire rope. If

the deficiency is considered a hazard, operations involving use of the wire rope in question shall be prohibited until the wire rope is replaced or the damage is removed in accordance with paragraph (4)(i)(A)

or (B).

(B) *Option B.* Institute the alternative measures specified in paragraph (4)(iii).

(iii) *Alternative measures for a Category II deficiency.* The wire rope may continue to be used if the employer ensures that the following measures are implemented:

(A) A qualified person assesses the deficiency in light of the load and other conditions of use and determines it is safe to continue to use the wire rope as long as the conditions established under this paragraph are met.

(B) A qualified person establishes the parameters for the use of the equipment with the deficiency, including a reduced maximum rated load.

(C) A qualified person establishes a specific number of broken wires, broken strands, or diameter reduction that, when reached, will require the equipment to be taken out of service until the wire rope is replaced or the damage is removed in accordance with paragraph (4)(i)(A) or (B).

(D) A qualified person sets a time limit, not to exceed 30 days from the date the deficiency is first identified, by which the wire rope must be replaced or the damage removed in accordance with paragraph (4)(i)(A) or (B).

(E) The workers who will conduct the shift inspections are informed of this deficiency and the measures taken under this paragraph.

(F) The qualified person's findings and procedures in paragraphs (A)–(D) are documented.

(iv) If a deficiency in Category III is identified, operations involving use of the wire rope in question shall be prohibited until:

(A) The wire rope is replaced, or

(B) If the deficiency (other than power line contact) is localized, the problem is corrected by severing the wire rope in two; the undamaged portion may continue to be used. Joining lengths of wire rope by splicing is prohibited. Repair of wire rope that contacted an energized power line is also prohibited.

(v) Where a wire rope is required to be removed from service under this Section, either the equipment (as a whole) or the control for the hoist with that wire rope shall be tagged-out until the wire rope is repaired or replaced.

(b) *Monthly inspection.*

- (1) Each month an inspection shall be conducted in accordance with paragraph (a) (wire rope shift inspection).
- (2) Wire ropes on equipment shall not be used until an inspection under this paragraph demonstrates that no corrective action under paragraph (a)(3) is required.
- (3) The inspection shall be documented according to paragraph 1415 (f)(3) (monthly inspection documentation).

(c) *Annual/comprehensive*

- (1) At least every 12 months, wire ropes in use on equipment shall be inspected by a qualified person in accordance with paragraph (a) (shift inspection).
- (2) In addition, at least every 12 months, the wire ropes in use on equipment shall be inspected by a qualified person, as follows:
 - (i) The inspection shall be for deficiencies of the types listed in paragraph (a)(2).
 - (ii) The inspection shall be complete and thorough, covering the surface of the entire length of the wire ropes, with particular attention given to:
 - (A) Critical review items listed in paragraph (a)(2).
 - (B) Those sections that are normally hidden during shift and monthly inspections.
 - (C) Wire rope in contact with saddles, equalizer sheaves or other sheaves where rope travel is limited.
 - (D) Wire rope subject to reverse bends.
 - (E) Wire rope passing over sheaves.
 - (F) Wire rope at or near terminal ends.
 - (iii) *Exception:* In the event an inspection under paragraph (c)(2) is not feasible 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), such inspections shall be conducted as soon as it becomes feasible, but no longer than an additional 6 months for running ropes and, for standing ropes, at the time of disassembly.

(3) If a deficiency is identified, an immediate determination shall be made by the qualified person as to whether the deficiency constitutes a hazard.

(i) If the deficiency is determined to constitute a hazard, operations involving use of the wire rope in question shall be prohibited until:

(A) The wire rope is replaced, or

(B) If the deficiency is localized, the problem is corrected by severing the wire rope in two; the undamaged portion may continue to be used. Joining lengths of wire rope by splicing is prohibited.

(ii) If the qualified person determines that, though not presently a hazard, the deficiency needs to be monitored, the employer shall ensure that the deficiency is checked in the monthly inspections.

(4) The inspection shall be documented according to paragraph 1415 (g)(7) (annual/comprehensive inspection documentation).

[There may be some additional items to incorporate per most recent info from Larry]

(d) Rope lubricants that are of the type that hinder inspection shall not be used.

1419 Wire Rope – Selection and installation criteria

(a) Selection of replacement wire rope shall be in accordance with the recommendations of a wire rope manufacturer, equipment manufacturer, or qualified person.

(b) *Boom hoist reeving.*

(1) Fiber core ropes shall not be used for boom hoist reeving, except for derricks.

(2) Rotation resistant ropes shall be used for boom hoist reeving only where the requirements of paragraph (c) are met.

(c) *Rotation resistant ropes.*

(1) Rotation resistant ropes shall have an operating design factor of no less than 3.5.

(2) Rotation resistant ropes with an operating design factor of less than 5 shall not be used for duty cycle or repetitive lifts.

(3) When using rotation resistant ropes with an operating design factor of less than 5 (for non-duty cycle, non-repetitive lifts), the following requirements shall be met for each lifting operation:

(i) A qualified person shall inspect the rope in accordance with Section 1418(a). The rope shall be used only if the qualified person determines that

there are no deficiencies constituting a hazard. In making this determination, more than one broken wire in any one lay shall be considered a hazard.

(ii) Operations shall be conducted in such a manner and at such speeds as to minimize dynamic effects.

(iii) Each lift made under these provisions shall be recorded in the monthly and annual inspection documents. Such prior uses shall be considered by the qualified person in determining whether to use the rope again.

(4) *Additional requirements for rotation resistant ropes for boom hoist reeving.*

(i) Rotation resistant ropes shall not be used for boom hoist reeving, except where the requirements of paragraph (ii) are met.

(ii) Rotation resistant ropes may be used as boom hoist reeving when load hoists are used as boom hoists for attachments such as luffing attachments or boom and mast attachment systems. Under these conditions, the following requirements shall be met:

~~(A) The requirements in the following portions of ANSI B-30.5 (2000): Section 5-1.3.1 (a), (b)(1) and (b)(2), [these are already incorporated in 1432(b)(4)]~~

(A) The drum shall provide a first layer rope pitch diameter of not less than 18 times the nominal diameter of the rope used.

(B) The requirements in 1435(b) (irrespective of the date of manufacture of the equipment), and 1435(c).

(C) The requirements in Section 5-1.3.2 (a), (a)(2) – (a)(4), (b) – (d).

(D) All sheaves used in the boom hoist reeving system shall have a rope pitch diameter of not less than 18 times the nominal diameter of the rope used.

(E) The design factor for the boom hoist reeving system shall be not less than five.

(F) The design factor for these ropes shall 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 crane rated load.

(c) Wire rope clips used in conjunction with wedge sockets shall be attached to the unloaded dead end of the rope only, except that the use of devices specifically designed for dead-ending rope in a wedge socket is permitted.

(d) Socketing shall be done in the manner specified by the manufacturer of the wire rope or fitting.

(e) Prior to cutting a wire rope, seizings shall be placed on each side of the point to be cut. The length and number of seizings shall be in accordance with the wire rope manufacturer's instructions.

14XX Controlled substances, alcohol use and testing.

(a) The employer shall institute a controlled substances testing program ("program") of its operators [should we include: signal persons, A/D supervisors, assembly/disassembly crew, riggers, persons receiving loads] of equipment covered by this Subpart that meets the requirements of this Section.

(b) The program shall meet the requirements of the following Subparts of Title 49 Code of Federal Regulations Part 382 (Federal Motor Carrier Safety Administration, DOT).

(1) Subpart A, with the exception of the following provisions:

(i) 382.101 and .103.

(ii) 382.107 definitions of:

Actual knowledge. Instead, actual knowledge means actual knowledge by an employer that a operator has used alcohol or controlled substances based on the employer's direct observation of the employee, information provided by the driver's previous employer(s) or an employee's admission of alcohol or controlled substance use, except as provided in 49 CFR 382.121. Direct observation as used in this definition means observation of alcohol or controlled substances use and does not include observation of employee behavior or physical characteristics sufficient to warrant reasonable suspicion testing under 49 CFR 382.307.

Commerce

Commercial motor vehicle. Instead, the word motor vehicle or commercial motor vehicle shall be substituted with "equipment covered by 1400."

Disabling damage

Driver. Instead, the word drive (or any form of) shall be substituted with "operate" (including "operating" and "operator").

Employer. Instead, employer means an employer covered by 1400.

Safety-sensitive function. Instead, safety-sensitive function shall mean all times an operator begins to work or is required to be in readiness to

work until the time he/she is relieved from work and all responsibility for performing work. Safety-sensitive functions include operating any equipment covered by 1400, [discuss: whether we can (legal basis) /should add: signaling, supervising assembly/disassembly operations, working in assembly/dissassembly, rigging].

(iii) 382.115. Instead, employers must implement the requirements of this part on the date the employer begins construction operations covered by 1400.

(iv) 382.119. Instead, employers are prohibited from temporarily removing an operator until test results have been verified by a medical review officer.

(2) Subpart B

(3) Subpart C, with the exception of the following provisions:

(i) 382.301(b)(3). Instead, the employer ensures that no prior employer of the operator of whom the employer has knowledge has records of a violation of this part within the previous six months or the controlled substances use rule of any DOT agency within the previous six months.

(ii) 382.303. Instead, employers shall comply with sections (e) through (g) below.

(ii) 382.305 (b)(1). Instead, the minimum annual percentage rate for random alcohol testing shall be 10 percent of the average number of operator positions.

(iii) 382.305(b)(2). Instead, the minimum annual percentage rate for random controlled substances testing shall be 50 percent of the average number of operator positions.

(iv) 382.305 (c), (d) (e), (f), (g), (h).

(v) 382.305(j). Instead, the employer shall randomly select a sufficient number of operators for testing during each calendar year to equal an annual rate not less than the percentage rate for random alcohol and controlled substances testing. If the employer conducts random testing for alcohol and/or controlled substances through a C/TPA, the number of operators to be tested may be calculated for each individual employer or may be based on the total number of operators covered by the C/TPA who are subject to random alcohol and/or controlled substances testing at the same percentage rate under this part.

(vi) 382.305 (k)(1) Instead, each employer shall require that each operator who is notified of selection for random alcohol and/or controlled substances

testing proceeds to the test site immediately. [do we want to rework this, maybe word it to say no later than the end of the day....]

(vii) 382.305 , (n), (o).

(4) Subpart D with the exception of the following provisions:

(i) 382.401(b)(1)(vii).

(ii) 382.401 (c)(1)(viii).

(iii) 382.401(d). Instead, all records shall be maintained (where?) or all records shall be readily available for inspection at the employer's principal place of business within two business days after a request has been made by an authorized representative of the Occupational Health & Safety Administration.

(iv) 382.401(e).

(v) 382.403.

(vi) 382.405 (c). Instead, each employer shall permit access to all facilities utilized in complying with the requirements of this part to the Secretary of Labor, and DOL agency, [or any State or local officials with regulatory authority over the employer or any of its operators.][?]

(vii) 382.405(d) Instead, each employer shall make available copies of all results for employer alcohol and/or controlled substances testing conducted under this part and any other information pertaining to the employer's alcohol misuse and/or controlled substances use prevention program, when requested by the Secretary of Labor, any DOL agency, [or any State or local officials with regulatory authority over the employer or any of its operators.]

(viii) 382.409 (c). Instead, no person may obtain the individual controlled substances test results retained by a medical review officer or third party administrator, and no medical review officer or third party administrator shall release the individual controlled substance test results of any operator to any person without first obtaining a specific, written authorization from the tested operator. Nothing in this paragraph (c) shall prohibit a medical review officer or third party administrator from releasing, to the employer or to officials of the Secretary of Labor, any DOL agency, or any State or local officials with regulatory authority over the controlled substances testing program under this part, the information delineated in part 40, Subpart G, of this title.

(5) Subpart E, with the exception of the following provisions:

(i) 382.501 (c).

(ii) 382.507.

(6) Subpart F, with the exception of 382.601(b)(2). [categories of operators?]

(c) *Testing Procedures.* Employers shall ensure that all alcohol or controlled substances testing conducted under this part complies with the procedures in Section 14XX.

(d) *Post-accident Testing.*

(1) As soon as practicable following an accident involving equipment covered by 1400, each employer shall test for alcohol and controlled substances for each of its surviving operators:

(i) Who was performing safety-sensitive functions with respect to the crane or derrick, if the accident involved the loss of human life; or

(ii) If the accident involves bodily injury to any person who, as a result of the injury, immediately receives medical treatment away from the site.

(2) For post-accident testing, alcohol tests shall be performed within eight hours of the accident and controlled substance tests shall be performed within thirty two hours of the accident.

(3) An operator who is subject to post-accident testing shall remain readily available for such testing or may be deemed by the employer to have refused to submit to testing.

(e) *Testing required or governed by more than one agency.*

(1) Where an operator is subject to random alcohol or controlled substances testing rules of more than one agency, including DOT agencies, for the same employer, the operator shall be subject to random alcohol and/or controlled substances testing at the annual percentage rate established by the agency regulating more than 50 percent of the operator's function.

(2) If an employer is required to conduct random alcohol or controlled substances testing under the alcohol or controlled substances testing rules of more than one agency, including DOT agencies, the employer may:

(i) Establish separate pools for random selection, with each pool containing the agency-covered employees who are subject to testing at the same required minimum annual percentage rate; or

(ii) Randomly select such employees for testing at the highest minimum annual percentage rate established for the calendar year by any agency to which the employer is subject.

(f) *Phase-in of requirements.* The requirements of this section will become effective [___ year(s) after the effective date of this standard.

14XX Controlled substance and alcohol use program procedures.

(a) The provisions of 49 CFR 40 that address alcohol or controlled substances testing are made applicable to employers by this part, as follows:

1422 Operator Qualifications. The employer must ensure that, prior to operating any equipment included in 1400 (a) and (b), the operator meets the certification requirements in this section.

(b) *Operator Certification.*

(1) Beginning [1 year after the effective date of this standard], the operator must be certified by either an accredited testing organization (in accordance with paragraph (d)), [by a government entity that administers certifications in accordance with paragraph (c)], or the employer (in accordance with paragraph (d)).

(2) From [4 years after the effective date of this standard], the operator must be certified by an accredited testing organization (in accordance with paragraph (e)) once the operator's certification under paragraph (1) expires.

(3) Certifications under paragraph (d) are valid for no more than [three years]. Certifications under paragraph (e) are valid for no more than [five years].

(4) *Re-certification:* [different tests than for initial certification?].

(c) *Certification criteria.* Certification must be based, at a minimum, on the following:

(1) A determination through a written test that:

(i) The individual knows the information necessary for safe operation of the specific type of equipment the individual will operate, including the following:

(A) The controls and operational/performance characteristics.

(B) Use of, and the ability to calculate (manually or with a calculator), load/capacity information on a variety of configurations of the

equipment, including on configurations typically used by the employer.

(C) Procedures for responding to power line contact.

() [Technical knowledge applicable to the specific type of equipment the individual will operate – we will look at NCCCO's list].

() [Site preparation – we will look at NCCCO's list].

(D) This Subpart, including applicable incorporated materials.

(ii) The individual is able to read and locate relevant information in the equipment manual and other materials containing information referred to in paragraph (i).

(2) A determination through a practical test that the individual has the skills necessary for safe operation of the equipment, including the following:

(i) Ability to recognize, from visual and audible observation, the items listed in section 1415(c) (pre-shift inspection).

(ii) Operational and maneuvering skills.

(iii) Application of load chart information.

(iv) Application of safe shut-down and securing procedures.

(d) *Certification by the employer.*

(NOTE: From [date], operator certifications must be issued by an accredited testing organization).

(1) To certify an operator for the equipment, the employer must make the determinations specified in paragraph (c).

(2) *Use of another entity to administer tests.*

(i) Although the employer must make the determination as to whether to certify the operator for the equipment, the employer may use another entity to administer the tests in paragraphs (c) (1) and (2) if that entity is qualified to administer those tests.

(ii) The employer must base its determination on whether to certify the individual, at a minimum, on:

(A) A review of the test records from the entity that administered the tests.

(B) Observation of the employee operating the equipment in test lifts prior to determining whether to certify the individual.

(3) *Certification by another employer is not transferable.* The employer of the operator must make its own determination as to whether to certify the employee to operate the equipment, although it may use tests administered by another employer where the requirements of paragraph (d)(2) are met in assessing the operator.

(5) *Revocation.* If the employer has reason to believe that the operator may not be qualified to operate the equipment, the employer must [immediately] revoke the certification. The operator must not be permitted to operate the equipment unless he/she is recertified.

(6) *Records.* The employer must retain the current test records for each operator it has certified throughout that operator's employment with the employer. This requirement applies irrespective of whether the employer or another entity administers the tests.

NOTE: After [4 years after effective date of the standard], employers will no longer be permitted to meet the certification requirement by certifying operators themselves; at that point, certification must be by an accredited testing organization.

(e) *Certification by an accredited testing organization.*

(1) For a testing organization to be considered accredited to certify operators under this Subpart, it must:

(i) Be accredited by a nationally recognized accrediting agency based on that agency's determination that industry recognized criteria for written testing materials, practical examinations, grading, facilities/equipment and personnel have been met.

(ii) Administer written and practical tests that assess the operator applicant regarding, at a minimum, the knowledge and skills listed in (c)(1) and (2).

(2) For an operator to be considered certified by an accredited testing organization, the operator must have a current certification to operate the equipment from a testing organization that meets the requirements in paragraph (e)(1).

~~(3) Where the employer is an accredited testing organization, the operator must have a current certification to operate the equipment from an accredited testing organization other than the employer. [Consider deleting]~~

- (4) If the employer has reason to believe that the operator may not be qualified, the employer must prohibit the employee from operating the equipment unless he/she is recertified.
- (5) *Records.* Documentation verifying the operator's certification from an accredited testing organization must be available to the Secretary.
- (f) *Licensing by state or local governments.* Nothing in this section shall preempt a state or local government from enforcing operator licensing requirements that are more stringent than the requirements in this section. [Note that we are still examining the legal viability of this paragraph].

CDAC WORKING DRAFT

1423 Keeping Clear of the Load [Revised]

(a) Where available, hoisting routes that minimize the exposure of workers to hoisted loads shall be used, to the extent consistent with public safety.

(b) While the operator is not moving a suspended load, no employee shall be within the fall zone, except for employees:

- (1) Engaged in hooking, unhooking or guiding a load, or
- (2) Engaged in the initial attachment of the load to a component or structure, or
- (3) Operating a concrete hopper.

(c) When employees are engaged in hooking, unhooking, or guiding the load, or in the initial connection of a load to a component or structure and are within the fall zone, the following criteria shall be met:

- (1) The materials being hoisted shall be rigged to prevent unintentional displacement.
- (2) Hooks with self-closing latches or their equivalent shall be used. *Exception: "J" hooks are permitted to be used for setting wooden trusses.*
- (3) The materials shall be rigged by a qualified rigger.

(d) *Receiving a load.* Only employees needed to receive a load shall be permitted to be within the fall zone when a load is being landed.

(e) During a tilt-up or tilt-down operation:

- (1) No employee shall be directly under the load.
- (2) Only employees essential to the operation shall be in the fall zone (but not directly under the load).

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; see Section 1435.

1424 Fall Protection [Revised]

(a) *Application.*

(1) Paragraphs (b)-(d) apply to all equipment covered by this Subpart except tower cranes.

(2) Paragraph (e) applies to all equipment covered by this Subpart.

(3) Paragraph (f) applies only to tower cranes.

(b) *Boom walkways.*

(1) Equipment manufactured after January 1, 2008 with lattice booms shall be equipped with walkways on the boom(s) if the vertical profile of the boom (from cord centerline to cord centerline) is 6 or more feet.

(2) *Boom walkway criteria.*

(a) The walkways shall be at least 12 inches wide.

(b) *Guardrails, railings and other permanent fall protection attachments along walkways are:*

(i) Not required.

(ii) Prohibited on booms supported by pendant ropes or bars if the guardrails/railings/attachments could be snagged by the ropes or bars.

(iii) Prohibited if of the removable type (designed to be installed and removed each time the boom is assembled/disassembled).

(iv) Where not prohibited, guardrails or railings may be of any height up to, but not more than, 45 inches.

(c) *Steps, handholds, grabrails and railings.*

(1) The employer shall maintain originally-equipped steps, handholds, ladders and guardrails/railings/grabrails in good condition.

(2) Equipment manufactured one year after the effective date of this standard shall be equipped so as to provide safe access and egress between the ground and the operator work station(s), including the forward and rear positions, by the provision of devices such as steps, handholds, ladders, and guardrails /railings/grabrails. These shall meet the following criteria:

(i) Steps, ladders and guardrails/railings/ grabrails shall meet the requirements of SAE J185 (May, 2003) or ISO 11660-2 (1994) [we will change these if necessary to versions in effect on date of publication of this standard], except where infeasible.

(ii) Walking/stepping surfaces, except for crawler treads, shall have slip-resistant features/properties (such as diamond plate metal, strategically placed grip tape, expanded metal, or slip-resistant paint).

(d) For non-assembly/disassembly work, the employer shall provide and ensure the use of fall protection equipment for employees who are on a walking/working surface with an unprotected side or edge more than 6 feet above a lower level as follows:

(1) When moving point-to-point:

(i) On non-lattice booms (whether horizontal or not horizontal).

(ii) On lattice booms that are not horizontal.

(2) While at a work station on any part of the equipment (including the boom, of any type), except when the employee is at or near draw-works (when the equipment is running), in the cab, or on the deck.

(e) For assembly/disassembly work, the employer shall provide and ensure the use of fall protection equipment for employees who are on a walking/working surface with an unprotected side or edge more than 15 feet above a lower level.

(f) *Anchorage criteria.*

(1) *Anchorage for fall arrest and positioning device systems.*

(i) Personal fall arrest systems and positioning systems shall be anchored to any apparently substantial part of the equipment unless a competent person, from a visual inspection, without an engineering analysis, would conclude that the applicable criteria in 1926.502 would not be met.

(ii) Attachable anchor devices (portable anchor devices that are attached to the equipment) shall meet the applicable anchorage criteria in 1926.502.

(2) *Anchorage for restraint systems.* Restraint systems shall be anchored to any part of the equipment that is capable of withstanding twice the maximum load that a worker may impose on it during reasonably anticipated conditions of use.

(g) *Tower cranes.*

(1) For non-erecting/dismantling work, the employer shall provide and ensure the use of fall protection equipment for employees who are on a walking/working surface with an unprotected side or edge more than 6 feet above a lower level.

(2) For erecting/dismantling work, the employer shall provide and ensure the use of fall protection equipment for employees who are on a walking/working surface with an unprotected side or edge more than 15 feet above a lower level.

(h) *Anchoring to the load line.* A fall arrest system is permitted to be anchored to the crane/derrick's hook (or other part of the load line) where the following requirements are met:

(1) 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 1926.502 (d)(15).

(2) The equipment operator shall be at the work site and informed that the equipment is being used for this purpose.

1425 Hoisting Personnel

The requirements of this section are supplemental to the other requirements in this Subpart and apply when one or more employees are hoisted.

(a) The use of equipment to hoist employees is prohibited except where the employer demonstrates that the erection, use, and dismantling of conventional means of reaching the worksite, such as a personnel hoist, ladder, stairway, aerial lift, elevating work platform, or scaffold, would be more hazardous, or is not possible because of the project's structural design or worksite conditions. This paragraph does not apply to work covered by Subpart R (Steel Erection).

(b) *Use of personnel platform.*

(1) When using equipment to hoist employees, the employees shall be in a personnel platform that meets the requirements of paragraph (e).

(2) *Exceptions:* A personnel platform is not required for hoisting employees:

(i) Into and out of drill shafts that are up to and including 8 feet in diameter (see paragraph (o) for requirements for hoisting drill shaft workers).

(ii) In pile driving operations (see paragraph (p) for requirements for hoisting these workers).

(iii) Solely for transfer to or from a marine worksite in a marine hoisted personnel transfer device (see paragraph (r) for requirements for hoisting these workers).

(c) *Equipment set-up.*

(1) The equipment shall be uniformly level, within one percent of level grade, and located on footing that a qualified person has determined to be sufficiently firm and stable.

(2) Equipment with outriggers shall have them all extended and locked. The amount of extension shall be the same for all outriggers and in accordance with manufacturer procedures and load charts.

(d) *Equipment criteria.*

(1) *Capacity: use of suspended personnel platforms.* The total weight of the loaded personnel platform, load line and related rigging load (with the platform loaded, including the hook, load line and rigging) shall not exceed 50 percent of the rated capacity for the radius and configuration of the equipment (including the hook, load line and rigging), except during proof testing.

(2) *Capacity: use of boom-attached personnel platforms.* The total weight of the loaded personnel platform shall not exceed 50 percent of the rated capacity for the radius and configuration of the equipment (except during proof testing).

(3) When the occupied personnel platform is in a stationary working position, the load and boom hoist brakes, swing brakes, and operator actuated secondary braking and locking features (such as pawls or dogs) or automatic secondary brakes shall be engaged.

(4) *Devices.*

(i) Equipment with a variable angle boom shall be equipped with:

(A) a boom angle indicator (except for derricks), readily visible to the operator.

(B) a boom hoist limiting device.

(ii) Equipment with a variable angle jib shall be equipped with:

(A) a jib angle indicator, readily visible to the operator.

(B) [a jib hoist limiting device?]

(iii) Equipment with telescoping booms shall be equipped with a device to indicate the boom's extended length clearly to the operator, or has measuring marks on the boom.

(iv) *Anti-two-block.* A device which automatically prevents damage and load failure from contact between the load block, overhaul ball, or similar

component, and the boom tip (or fixed upper block or similar component) shall be used. The device(s) must prevent such damage/failure at all points where two-blocking could occur. *Exception:* this device is not required when hoisting personnel in pile driving operations.

(v) *Controlled load lowering.* The load line hoist drum shall have a system, other than the load line hoist brake, which regulates the lowering rate of speed of the hoist mechanism. This system or device must be used when hoisting personnel.

(NOTE: free fall of the load line hoist is prohibited (see 1435(b)(2); the use of equipment in which the boom hoist mechanism can free fall is also prohibited (see 1435(a)(1)).

(v) *Proper operation required.* Personnel hoisting operations shall not begin unless the devices listed in this section are in proper working order. If a device stops working properly during such operations, the operator shall safely stop operations. Personnel hoisting operations shall not resume until the device is again working properly. Alternative measures are not permitted.

(5) Direct attachment of a personnel platform to a luffing jib is prohibited.

(e) *Personnel platform criteria.*

(1) The personnel platform and attachment/suspension system shall be designed for hoisting personnel by a qualified person familiar with structural design.

(2) The system used to connect the personnel platform to the equipment shall allow the platform to remain within 10 degrees of level, regardless of boom angle.

(3) The suspension system shall be designed to minimize tipping of the platform due to movement of employees occupying the platform.

(4) The personnel platform itself (excluding the guardrail system and personal fall arrest system anchorages), shall be capable of supporting, without failure, its own weight and at least five times the maximum intended load.

(5) All welding of the personnel platform and its components shall be performed by a certified welder familiar with the weld grades, types and material specified in the platform design.

(6) The personnel platform shall be equipped with a guardrail system which meets the requirements of 1926 Subpart M, and shall be enclosed at least from the toeboard to mid-rail with either solid construction material or expanded metal having openings no greater than ½ inch (1.27cm). Points to which personal fall arrest systems are attached must meet the anchorage requirements in 1926 subpart M.

(7) A grab rail shall be installed inside the entire perimeter of the personnel platform except for access gates/doors.

(8) *Access gates/doors.* If installed, access gates/doors of all types (including swinging, sliding, folding, or other types) shall:

(i) Not swing outward.

(ii) Be equipped with a device that prevents accidental opening.

(9) Headroom shall be sufficient to allow employees to stand upright in the platform.

(10) In addition to the use of hard hats, employees shall be protected by overhead protection on the personnel platform when employees are exposed to falling objects. The platform overhead protection shall not obscure the view of the operator or platform occupants (such as wire mesh that has up to 1/2 inch openings), unless full protection is necessary.

(11) All edges exposed to employee contact shall be smooth enough to prevent injury.

(12) The weight of the platform and its rated load capacity shall be conspicuously posted on the platform with a plate or other permanent marking.

[Do we also need to have the maximum intended load posted also?]

(f) *Personnel platform loading.*

(1) The personnel platform shall not be loaded in excess of its rated load capacity.

(2) *Use.*

(i) Personnel platforms shall be used only for employees, their tools, and the materials necessary to do their work. Platforms shall not be used to hoist materials or tools when not hoisting personnel.

(ii) *Exception:* materials and tools to be used during the lift, if secured and distributed in accordance with (e)(3) and (e)(4), may be in the platform for trial lifts.

(3) Materials and tools shall be:

(i) Secured to prevent displacement.

(ii) Evenly distributed within the confines of the platform while it is suspended.

(4) The number of employees occupying the personnel platform shall not exceed the maximum number the platform was designed to hold or the number required to perform the work, whichever is less.

(g) *Attachment and rigging.*

(1) *Hooks and other detachable devices.*

(i) Hooks used in the connection between the hoist line and the personnel platform (including hooks on overhaul ball assemblies, lower load blocks, bridle legs, or other attachment assemblies or components) shall be:

(A) Of a type that can be closed and locked, eliminating the throat opening.

(B) Closed and locked when attached.

(ii) Shackles used in place of hooks must of the alloy anchor type, with either:

(A) A bolt, nut and retaining pin, in place, or

(B) Of the screw type, with the screw pin secured from accidental removal.

(iii) Where other detachable devices are used, they must be of the type that can be closed and locked to the same extent as the devices addressed in paragraphs (i) and (ii). Such devices must be closed and locked when attached.

(2) *Rope bridle.* When a rope bridle is used to suspend the personnel platform, each bridle leg shall be connected to a master link or shackle (see paragraph (g)) in a manner that ensures that the load is evenly divided among the bridle legs.

(3) Rigging hardware (including wire rope, shackles, rings, master links, and other rigging hardware) and hooks must be capable of supporting, without failure, at least five times the [maximum intended load] [~~rated load capacity~~] applied or transmitted to that component. [it can't be 5x the rated load capacity, since that would mean it would have a much higher rated load --]. Where rotation resistant rope is used, the slings shall be capable of supporting without failure at least ten times the maximum intended load.

(4) Eyes in wire rope slings shall be fabricated with thimbles.

(5) Bridles and associated rigging for suspending the personnel platform shall be used only for the platform and the necessary employees, their tools and materials

necessary to do their work, and shall not be used for any other purpose when not hoisting personnel.

(h) *Trial lift and inspection.*

(1) A trial lift with the unoccupied personnel platform loaded at least to the anticipated liftweight shall be made from ground level, or any other location where employees will enter the platform, to each location at which the platform is to be hoisted and positioned. Where there is more than one location to be reached from a single set-up position, either individual trial lifts for each location, or a single trial lift for all locations, shall be performed.

(2) The trial lift shall be performed immediately prior to each shift in which personnel will be hoisted. In addition, the trial lift shall be repeated prior to hoisting employees in each of the following circumstances:

(i) The equipment is moved and set up in a new location or returned to a previously used location.

(ii) The lift route is changed, unless the competent person determines that the new route presents no new factors affecting safety.

(3) The competent person shall determine that:

(i) Safety devices and operational aids required by this section are activated and functioning properly. Other safety devices and operational aids must meet the requirements of section 1414__.

(ii) Nothing interferes with the equipment or the personnel platform in the course of the trial lift.

(iii) The lift will not exceed 50 percent of the equipment's rated capacity at any time during the lift.

(iv) The load radius to be used during the lift has been accurately determined.

(4) Immediately after the trial lift, the competent person shall:

(i) Conduct a visual inspection of the equipment, base support or ground, and personnel platform, to determine whether the trial lift has exposed any defect or problem or produced any adverse effect.

(ii) Confirm that, upon the completion of the trial lift process, the test weight has been removed.

(5) Immediately prior to each lift:

(i) The platform shall be hoisted a few inches and inspected by a competent person to ensure that it is secure and properly balanced.

(ii) The following conditions must be determined by a competent person to exist before the lift of personnel proceeds:

(A) Hoist ropes shall be free of ~~kinks~~, deficiencies in accordance with paragraph 1418(a).

(B) Multiple part lines shall not be twisted around each other.

(C) The primary attachment shall be centered over the platform.

(D) If the load rope is slack, the hoisting system shall be inspected to ensure that all ropes are properly seated on drums and in sheaves.

(6) Any condition found during the trial lift and subsequent inspection(s) that fails to meet a requirement of this standard or otherwise creates a safety hazard shall be corrected before hoisting personnel.

(i) [Reserved]

(j) *Proof testing.*

(1) At each jobsite, prior to hoisting employees on the personnel platform, and after any repair or modification, the platform and rigging shall be proof tested to 125 percent of the platform's rated capacity. The proof test may be done concurrently with the trial lift.

(2) The platform shall be lowered by controlled load lowering, braked and held in a suspended position for a minimum of five minutes with the test load evenly distributed on the platform.

(3) After proof testing, a competent person shall inspect the platform and rigging to determine if the test has been passed. If any deficiencies are found that pose a safety hazard, the platform and rigging shall not be used to hoist personnel unless the deficiencies are corrected, the test is repeated, and a competent person determines that the test has been passed.

(4) Personnel hoisting shall not be conducted until the competent person determines that the platform and rigging have successfully passed the proof test.

(k) *Work practices.*

- (1) Hoisting of the personnel platform shall be performed in a slow, controlled, cautious manner, with no sudden movements of the equipment or the platform.
- (2) Platform occupants shall:
 - (i) Keep all parts of the body inside the platform during raising, lowering, and horizontal movement. This provision does not apply to an occupant of the platform when necessary to position the platform or while performing the duties of a signal person.
 - (ii) 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.
 - (iii) Not pull the platform out of plumb in relation to the hoisting equipment.
- (3) Before employees exit or enter a hoisted personnel platform that is not landed, the platform shall be secured to the structure where the work is to be performed, unless securing to the structure would create a greater hazard.
- (4) If the platform is tied to the structure, the operator shall not move the platform until the operator receives confirmation that it is freely suspended.
- (5) Tag lines shall be used when necessary to control the platform.
- (6) *Platforms without controls.* Where the platform is not equipped with controls, the equipment operator shall remain at the equipment controls at all times while the platform is occupied.
- (7) *Platforms with controls.* Where the platform is equipped with controls, the following must be met at all times while the platform is occupied:
 - (i) The occupant using the controls in the platform must be a qualified person with respect to their use, including the safe limitations of the equipment and hazards associated with its operation.
 - (ii) The equipment operator must be at the equipment controls, or in the personnel platform, or on site and in view of the equipment.
 - (iii) The platform operating manual must be in the platform or on the equipment.
- (8) *Environmental conditions.*
 - (i) *Wind.* When wind velocity (sustained or gusts) exceeds 20 mph at the personnel platform, a qualified person shall:

(A) Reassess whether lifting personnel is the safest means of performing the work. If it is not, the lifting operation shall not begin (or, if already in progress, shall be terminated).

(B) Determine if, in light of the wind conditions, it is not safe to lift personnel. If it is not, the lifting operation shall not begin (or, if already in progress, shall be terminated).

(ii) *Other weather and environmental conditions.* A qualified person shall consider indications of dangerous weather conditions, or other impending or existing danger, in determining whether lifting personnel is the safest means available and whether work needs to be stopped.

(9) Employees being hoisted shall remain in direct communication with the signal person (where used), or the operator.

(10) *Fall protection.*

(i) Except over water, employees occupying the personnel platform shall be provided and use a personal fall arrest system. The system shall be attached to a structural member within the personnel platform.

(ii) The fall arrest system, including the attachment point (anchorage) used to comply with paragraph (i), shall meet the requirements in 1926.502.

NOTE: When working over water, the requirements of 1926.106 apply.

(11) *Other load lines.*

(i) No lifts shall be made on any other of the equipment's load lines while personnel are suspended on a platform, except in pile driving operations.

(ii) *Factory-produced boom-mounted personnel baskets that incorporate a winch as original equipment:* loads are permitted to be hoisted by such a winch while employees occupy the personnel platform 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.

(12) *Traveling – equipment other than derricks.*

(i) Hoisting of employees while the equipment is traveling is prohibited, except for:

(A) Equipment that travels on fixed rails, or

(B) Where the employer demonstrates that there is no less hazardous way to perform the work. This exception does not apply to rubber-tired equipment.

(ii) Where employees are hoisted while the equipment is traveling, the following criteria shall be met:

- (A) Crane travel shall be restricted to a fixed track or runway.
- (B) Where a runway is used, it shall 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. An existing surface may be used as long as it meets these criteria.
- (C) Travel shall be limited to boom length.
- (D) The boom shall be parallel to the direction of travel, except where it is safer to do otherwise.
- (E) A complete trial run shall be performed to test the route of travel before employees are allowed to occupy the platform. This trial run can be performed at the same time as the trial lift required by paragraph (g) which tests the lift route.

(13) *Travelling -- derricks.* Derricks are prohibited from travelling while personnel are hoisted.

(l) [Reserved]

(m) *Pre-lift meeting.* A pre-lift meeting shall be:

- (1) Held to review the applicable requirements of this section and the procedures that will be followed.
- (2) 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.
- (3) Held prior to the trial lift at each new work location, and shall be repeated for any employees newly assigned to the operation.

(n) *Hoisting personnel near power lines.* Hoisting personnel within 20 feet of a power line that is up to 350 kV, and hoisting personnel within 50 feet of a power line that is over 350 kV, is prohibited, except for work covered by 1926 Subpart V (Power Transmission and Distribution).

(o) *Hoisting personnel in drill shafts.* When hoisting employees into and out of drill shafts that are up to and including 8 feet in diameter, the following requirements shall be met:

- (1) The employee shall be in either a personnel platform or on a boatswain's chair.

(2) If using a personnel platform, paragraphs (a) through (n) apply.

(3) If using a boatswain's chair:

(i) The following paragraphs of §1425 apply: (a), (c), (d)(1), (d)(3), (d)(4), (e)(1), (e)(2), (e)(3), (f)(1), (f)(2)(i), (f)(3)(i), (g), (h), (j) [can you proof test a boatswain's chair?], (k)(1), (k)(6), (k)(8), (k)(9), (k)(11)(i), (m), (n). Where the terms "personal platform" or "platform" are used in these paragraphs, substitute them with "boatswain's chair."

(ii) A signal person shall be stationed at the shaft opening.

(iii) The employee shall be hoisted in a slow, controlled descent and ascent.

(iv) The employee shall use personal fall protection equipment, including a full body harness, attached independent of the crane/derrick.

(v) The fall protection equipment shall meet the applicable requirements in 1926.502.

(vi) The boatswain's chair itself (excluding the personal fall arrest system anchorages), shall be capable of supporting, without failure, its own weight and at least five times the maximum intended load.

(vii) No more than one person shall be hoisted at a time.

(p) *Hoisting personnel for pile-driving operations.* When hoisting an employee in pile driving operations, the following requirements shall be met:

(1) The employee shall be in a personnel platform except where use of a personnel platform is infeasible; in such a case, a boatswain's chair shall be used. [should the boatswain's chair option be allowed only if a personnel platform is infeasible?]

(2) Clearly mark 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 a spotter.

(3) If using a personnel platform, paragraphs (b) through (n) apply.

(4) If using a boatswain's chair:

(i) The following paragraphs of §1425 apply: (a), (c), (d)(1), (d)(3), (d)(4), (e)(1), (e)(2), (e)(3), (f)(1), (f)(2)(i), (f)(3)(i), (g), (h), (j), (k)(1), (k)(6), (k)(8), (k)(9), (k)(11)(i), (m), and (n). Where the terms "personal platform" or

“platform” are used in these paragraphs, substitute them with “boatswains chair.”

(ii) The employee shall use personal fall protection equipment, including a full body harness, independently attached to the lower load block or overhall ball.

(iii) The fall protection equipment shall meet the applicable requirements in 1926.502.

(q) [Reserved].

(r) *Hoisting personnel for marine transfer.* When hoisting employees solely for transfer to or from a marine worksite, the following requirements shall be met:

(1) The employee shall be in either a personnel platform or a marine hoisted personnel transfer device.

(2) If using a personnel platform, paragraphs (a) through (n) apply.

(3) If using a marine hoisted personnel transfer device:

(i) The following paragraphs of §1425 apply: (a), (c)(2), (d)(1), (d)(3), (d)(4), (e)(1) - (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). Where the terms “personal platform” or “platform” are used in these paragraphs, substitute them with “marine hoisted personnel transfer device.”

(ii) Each employee shall use a personal fall arrest system (or restraint system), connected to the transfer device by a quick-release connection. [Some have suggested hooking the life vest to the transfer device instead of using fall arrest equipment].

(iii) Each employee shall wear a full body harness as part of the personal fall arrest system or restraint system. [Some have suggested that there is a problem with wearing a life vest over a full body harness]

(iv) The transfer device shall be used only for transferring workers.

(v) The number of workers occupying the transfer device shall not exceed the maximum number it was designed to hold.

(vi) Each employee shall wear a U.S. Coast Guard personal floatation device.

1426 Qualifications of Maintenance & Repair Workers

(a) Maintenance, inspection and repair personnel are permitted to operate the equipment only where the following requirements are met:

(1) The operation is limited to those functions necessary to perform maintenance, inspect or verify the performance of the equipment.

(2) The personnel either:

(i) Operate the equipment under the direct supervision of an operator who meets the requirements of section 1422 (Operator Qualifications), or

(ii) Are familiar with the operation, safe limitations, characteristics and hazards associated with the type of equipment.

(b) Maintenance and repair personnel shall meet the definition of a qualified person with respect to the equipment and maintenance/repair tasks performed.

1428 Ground conditions.

(a) *Definitions.*

(1) "Ground conditions" means the ability of the ground to support the equipment (including slope, compaction and firmness).

(2) "Supporting materials" means blocking, mats, cribbing, marsh buggies (in marshes/wetlands), or similar supporting materials or devices.

(b) The equipment shall not be assembled or used unless ground conditions are firm, drained (except for marshes/wetlands), and graded to a 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.

(c) The controlling entity shall:

(1) Ensure that ground preparations necessary to meet the requirements in paragraph (b) 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) that are identified in documents (such as site drawings, as-built drawings, and soil analyses) if they are available to the controlling entity.

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

(e) If the person supervising the equipment assembly or the operator determines that ground conditions do not meet the requirements in paragraph (b), that person's employer shall 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) can be met.

1429 Work Area Control

(a) *Swing radius hazards.*

(1) The requirements in paragraph (a)(2) apply where there are accessible areas in which the equipment's rotating superstructure (whether permanently or temporarily mounted) poses a reasonably foreseeable risk of:

(i) Striking and injuring an employee; or

(ii) Pinching/crushing an employee against another part of the equipment or another object.

(2) To prevent employees from entering these hazard areas, the employer shall:

(i) Instruct employees assigned to work on or near the equipment ("authorized personnel") in how to recognize struck-by and pinch/crush hazard areas posed by the rotating superstructure.

(ii) Erect and maintain control lines, warning lines, railings or similar barriers to mark the boundaries of the hazard areas. *Exception:* where it is neither feasible to erect such barriers on the ground nor on the equipment, the hazard areas shall be clearly marked by a combination of warning signs (such as "Danger – Swing/Crush Zone" or "Danger – This Thing's Gonna Swing and Crunch You – Zone") and high visibility markings on the equipment that identify the hazard areas. In addition, the employer shall train the employees to understand what these markings signify.

~~(3) Unauthorized personnel shall not enter the hazard area without the operator's knowledge.~~

(3) *Protecting workers in the hazard area.*

(i) Before an employee goes to a location in the hazard area that is out of view of the operator, the employee must ensure that the operator is informed that he/she is going to that location.

(ii) Where the operator knows that an employee went to a location covered by paragraph (1), the operator shall not rotate the superstructure until the operator:

(A) Gives a warning that is understood by the employee as a signal that the superstructure is about to be rotated and allows time for the employee to get to a safe position, or

(B) Is informed in accordance with a pre-arranged system of communication that the employee is in a safe position.

(b) *Multiple equipment coordination.* Where any part of a crane/derrick is within the working radius of another crane/derrick, the controlling entity shall institute a system to coordinate operations. If there is no controlling entity, the each entity directing the [equipment operator] use of each piece of equipment shall institute such a system.

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1430 Power Line Safety

14XX Power line safety (up to 350 kV) – assembly and disassembly

(a) Before assembling or disassembling a crane, the employer must determine if any part of the crane, load line or load (including rigging and lifting accessories) could get, in the direction or area of assembly, within 20 feet of a power line during the assembly/disassembly process. If so, the employer must meet the requirements in Option (1), Option (2), or Option (3), 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 crane, load line or load (including rigging and lifting accessories), gets within 20 feet of the power line by implementing the measures specified in (b).

(3) *Option (3) – Table A clearance.*

(i) Determine the line's voltage and the minimum approach distance permitted under Table A.

(ii) Determine if any part of the crane, load line or load (including rigging and lifting accessories), could get within the minimum approach distance of the power line permitted under Table A. If so, then the employer must follow the requirements in paragraph (b).

(b) *Preventing encroachment/electrocution.* Where encroachment precautions are required under Option (2), or Option (3), the following requirements must be met:

(1) Conduct a planning meeting with the competent-qualified person who will supervise the assembly/disassembly process, operator, assembly/disassembly crew and the other workers who will be in the assembly/disassembly area to review the location of the power line(s) and the steps that will be implemented to prevent encroachment/electrocution.

(2) If tag lines are used, they must be non-conductive.

(3) At least one of the following additional measures must be in place:

(i) Use a dedicated spotter who is in continuous contact with the crane operator. The spotter must:

(A) Be equipped with a visual aid to assist in identifying the minimum clearance distance. Examples of a visual aid include, but are not limited to: a line painted on the ground; a clearly visible line on

stanchions; a set of clearly visible line-of-sight landmarks (such as a fence post behind the spotter and a building corner ahead of the spotter).

(B) Be positioned to effectively gauge the clearance distance.

(C) Where necessary, use equipment that enables the spotter to communicate directly with the crane operator, in accordance with Section 1409 (Radio, telephone, or other electronic transmission of signals).

(D) Give timely information to the crane operator so that the required clearance distance can be maintained.

(ii) A proximity alarm set to give the operator sufficient warning to prevent encroachment.

(iii) A device that automatically warns the operator when to stop movement, such as a range control warning device. Such a device must be set to give the operator sufficient warning to prevent encroachment.

(iv) A device that automatically limits range of movement, set to prevent encroachment.

(v) An elevated warning line, barricade, or line of signs, in view of the operator, equipped with flags or similar high-visibility markings.

(c) *Assembly/disassembly below power lines prohibited.* No part of a crane, load line or load (including rigging and lifting accessories), whether partially or fully assembled, is allowed below a power line unless the employer has confirmed that the utility owner/operator has deenergized and (at the worksite) visibly grounded the power line.

(d) *Assembly/disassembly inside Table A clearance prohibited.* No part of a crane, load line or load (including rigging and lifting accessories), whether partially or fully assembled, is allowed within the minimum approach distance under Table A of a power line unless the employer has confirmed that the utility owner/operator has deenergized and (at the worksite) visibly grounded the power line.

(e) *Voltage information.* Where Option (3) is used, owner/operators of power lines must provide the requested voltage information within two working days of the employer's request.

(f) *Power lines presumed energized.* The employer must assume that all power lines are energized unless the utility owner/operator confirms that the power line has been and continues to be deenergized and visibly grounded at the worksite.

(g) *Posting of electrocution warnings.* There must be at least one electrocution hazard warning conspicuously posted in the cab so that it is in view of the operator and (except for overhead gantry and tower cranes) at least two on the outside of the equipment.

14XX Power line safety (up to 350 kV) – crane operations

(a) *Hazard assessments and precautions inside the work zone.* Before beginning crane operations, the employer must:

(1) *Identify the work zone.*

(i) Define a workzone by demarcating boundaries (such as with flags, or a device such as a range limit device or range control warning device) and prohibit the operator from operating the crane past those boundaries, or

(ii) Define the workzone as the area 360 degrees around the crane, up to the crane's maximum working radius.

(2) Determine if any part of the crane, load line or load (including rigging and lifting accessories), if operated up to the crane's maximum working radius in the work zone, could get within 20 feet of a power line. If so, the employer must meet the requirements in Option (1), Option (2), or Option (3), as follows:

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

(ii) *Option (2) – 20 foot clearance.* Ensure that no part of the crane, load line or load (including rigging and lifting accessories), gets within 20 feet of the power line by implementing the measures specified in (b).

(iii) *Option (3) – Table A clearance.*

(A) Determine the line's voltage and the minimum approach distance permitted under Table A.

(B) Determine if any part of the crane, load line or load (including rigging and lifting accessories), while operating up to the crane's maximum working radius in the work zone, could get within the minimum approach distance of the power line permitted under Table A. If so, then the employer must follow the requirements in paragraph (b).

(b) *Preventing encroachment/electrocution.* Where encroachment precautions are required under Option (2), or Option (3), the following requirements must be met:

(1) Conduct a planning meeting with the operator and the other workers who will be in the area of the crane or load to review the location of the power line(s), and the steps that will be implemented to prevent encroachment/electrocution.

(2) If tag lines are used, they must be non-conductive.

(3) Erect and maintain an elevated warning line, barricade, or line of signs, in view of the crane operator, equipped with flags or similar high-visibility markings, at 20 feet from the power line (if using Option (2)) or at the minimum approach distance under Table A (if using Option (3)).

(4) Implement at least one of the following measures:

(i) A proximity alarm set to give the operator sufficient warning to prevent encroachment.

(ii) A dedicated spotter who is in continuous contact with the crane operator. Where this measure is selected, the spotter must:

(A) Be equipped with a visual aid to assist in identifying the minimum clearance distance. Examples of a visual aid include, but are not limited to: a line painted on the ground; a clearly visible line on stanchions; a set of clearly visible line-of-sight landmarks (such as a fence post behind the spotter and a building corner ahead of the spotter).

(B) Be positioned to effectively gauge the clearance distance.

(C) Where necessary, use equipment that enables the spotter to communicate directly with the crane operator.

(D) Give timely information to the crane operator so that the required clearance distance can be maintained.

(iii) A device that automatically warns the operator when to stop movement, such as a range control warning device. Such a device must be set to give the operator sufficient warning to prevent encroachment.

(iv) A device that automatically limits range of movement, set to prevent encroachment.

(v) An insulating link/device installed at a point between the end of the load line (or below) and the load to prevent energization of the load.

(c) *Voltage information.* Where Option (3) is used, operators of power lines must provide the requested voltage information within two working days of the employer's request.

(d) *Operations below power lines.*

(1) No part of a crane, load line or load (including rigging and lifting accessories) is allowed below a power line unless the employer has confirmed that the utility owner/operator has deenergized and (at the worksite) visibly grounded the power line, except where one of the exceptions in (d)(2) applies.

(2) *Exceptions.* Paragraph (d)(1) is inapplicable where the employer demonstrates that one of the following applies:

(i) The work is covered by 29 CFR 1926 Subpart V.

(ii) For equipment with non-extensible booms: The uppermost part of the equipment, with the boom at true vertical, would be more than 20 feet below the plane of the power line or more than the Table A minimum clearance distance below the plane of the power line.

(iii) 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 below the plane of the power line or more than the Table A minimum clearance distance below the plane of the power line.

(iv) The employer demonstrates that compliance with paragraph (d)(1) is infeasible and meets the requirements of Section __ [Red Zone requirements].

(e) *Power lines presumed energized.* The employer must assume that all power lines are energized unless the utility owner/operator confirms that the power line has been and continues to be deenergized and visibly grounded at the worksite.

(f) Prior to work near transmitter/communication towers where the equipment is close enough for an electrical charge to be induced in the equipment or materials being handled, the transmitter shall be de-energized or tests shall be made to determine if electrical charge is induced on the crane/derrick. The following precautions shall be taken when necessary to dissipate induced voltages:

(1) The equipment shall be provided with an electrical ground.

(2) Non-conductive rigging or an insulating link/device shall be used.

(g) *Training.*

(1) Operators and crew assigned to work with the equipment shall be trained on the following:

(i) The procedures to be followed in the event of electrical contact with a power line. Such training shall include:

(A) Information regarding the danger of electrocution from the operator simultaneously touching the equipment and the ground.

(B) 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.

(C) The safest means of evacuating from equipment that may be energized.

(D) The size of the potentially energized zone around the equipment.

(E) The need for crew in the area to avoid approaching or touching the equipment.

(F) Safe clearance distance from power lines.

(ii) Power lines are presumed to be energized unless the utility owner/operator confirms that the line has been and continues to be deenergized, and visibly grounded at the the worksite.

(iii) Power lines are 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.

(iv) The limitations of an insulating link/device, proximity alarm, and range control (and similar) device, if used.

(2) Employees working as dedicated spotters shall be trained to enable them to effectively perform their task, including training on the applicable requirements of this Section.

14XX Power line safety (over 350 kV)

The requirements of sections 14XX and 14XX apply to power lines over 350 kV, except "50 feet" applies instead of "20 feet".

14XX Power line safety (all voltages) – crane operations inside the Table A zone

Crane operations in which any part of the crane, load line or load (including rigging and lifting accessories) is within the minimum approach distance under Table A of an energized

power line is prohibited, except where the employer demonstrates that the following requirements are met:

- (a) The employer determines that it is infeasible to do the work without breaching the minimum approach distance under Table A.
- (b) The employer determines that, after consultation with the utility owner/operator, it is infeasible to deenergize and ground the power line or relocate the power line.
- (c) The power line owner/operator or 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. The factors that must be considered in making this determination include, but are not limited to: conditions affecting atmospheric conductivity; time necessary to bring the equipment, load line (including . . . accessories) and load to a complete stop; wind conditions; degree of sway in the power line; lighting conditions, and other conditions affecting the ability to prevent electrical contact.
- (d) A planning meeting with the employer and power line operator (or registered professional engineer who is a qualified person with respect to electrical power transmission and distribution) is held to determine the procedures that will be followed to prevent electrical contact and electrocution. At a minimum these procedures shall include:
 - (1) If the power line is equipped with a device that automatically reenergizes the circuit in the event of a power line contact, the device must be deactivated.
 - (2) A dedicated spotter who is in continuous contact with the crane operator. The spotter must:
 - (i) Be equipped with a visual aid to assist in identifying the minimum clearance distance. Examples of a visual aid include, but are not limited to: a line painted on the ground; a clearly visible line on stanchions; a set of clearly visible line-of-sight landmarks (such as a fence post behind the spotter and a building corner ahead of the spotter).
 - (ii) Be positioned to effectively gauge the clearance distance.
 - (iii) Where necessary, use equipment that enables the spotter to communicate directly with the crane operator.
 - (iv) Give timely information to the crane operator so that the required clearance distance can be maintained.
 - (3) 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, to prevent electrical contact.

(4) An insulating link/device installed at a point between the end of the load line (or below) and the load to prevent the load from being energized.

(5) Non-conductive rigging if the rigging may be within the Table A distance during the operation.

(6) If the crane is equipped with a device that automatically limits range of movement, it must be used and set to prevent any part of the crane, load line or load (including rigging and lifting accessories) from breaching the minimum approach distance established under paragraph (c).

(7) If a tag line is used, it must be of the non-conductive type.

(8) Barricades forming a perimeter at least 10 feet away from the equipment to prevent unauthorized personnel from entering the work area. In areas where obstacles prevent the barricade from being at least 10 feet away, the barricade shall be as far from the equipment as feasible.

(9) Workers other than the crane operator must be prohibited from touching the load line above the insulating link/device and crane.

(10) Only personnel essential to the operation shall be permitted to be in the area of the crane and load.

(11) The crane must be properly grounded.

(12) Insulating sleeves shall be installed by the utility owner/operator except where such sleeves are unavailable for the line voltages involved.

(e) The procedures developed to comply with paragraph (d) are documented and immediately available on-site.

(f) The crane user and utility owner/operator meet with the crane operator and the other workers who will be in the area of the crane or load to review the procedures that will be implemented to prevent breaching the minimum approach distance established in paragraph (c) and prevent electrocution.

(g) The procedures developed to comply with paragraph (d) are implemented.

(h) *Supervision.*

(i) The utility owner/operator and all employers of employees involved in the work shall identify one person who will direct the implementation of the procedures.

(ii) The person identified in accordance with paragraph (h)(i) shall direct the implementation of the procedures and shall have the authority to stop work at any time to ensure safety.

(i) [Reserved]

(j) If a problem occurs implementing the procedures being used to comply with paragraph (d), or indicating that those procedures are inadequate to prevent electrocution, the employer shall safely stop operations and either develop new procedures to comply with paragraph (d) or have the utility owner/operator deenergized and visibly ground or relocate the power line before resuming work.

14XX Power line safety – equipment in transit

(a) This section applies to equipment while travelling under a power line on the construction site with no load and the boom/mast and boom/mast support system lowered sufficiently to meet the requirements of paragraph (b).

(b) The employer shall ensure that:

(1) The clearances specified in paragraph (c), Table [X], are maintained.

(2) The effects of speed and terrain on equipment movement (including movement of the boom/mast) are considered so that those effects do not cause the clearances to be reduced below those specified in Table [X].

(3) *Dedicated spotter.* If any part of the equipment while travelling will get within 20 feet of the power line, the employer shall ensure that a dedicated spotter who is in continuous contact with the crane operator is used. The spotter must:

(i) Be equipped with a visual aid to assist in identifying the minimum clearance distance specified in paragraph (c), Table [X]. Examples of a visual aid include, but are not limited to: a line painted on the ground; a clearly visible line on stanchions; a set of clearly visible line-of-sight landmarks (such as a fence post behind the spotter and a building corner ahead of the spotter).

(ii) Be positioned to effectively gauge the clearance distance.

(iii) Where necessary, use equipment that enables the spotter to communicate directly with the crane operator.

(iv) Give timely information to the crane operator so that the required clearance distance can be maintained.

1432 Design, construction and testing.

The following requirements apply to equipment that has a manufacturer-rated hoisting/lifting capacity of 2000 pounds or more.

(a) Crawler, truck and locomotive cranes manufactured prior to [effective date of 1926.1400] shall meet the applicable requirements for design, construction, and testing as prescribed in ANSI B30.5 – 1968, Safety Code for Crawler, Locomotive, and Truck Cranes.

(b) Mobile (including crawler and truck) and locomotive cranes manufactured on or after [effective date of the standard] shall meet the following portions of ASME B30.5 – 2000 with addenda ASME B30.5a – 2002 Safety Code for Mobile and Locomotive Cranes, as applicable:

- (1) In section 5-1.1.1 (“Load Ratings – Where Stability Governs Lifting Performance”), paragraphs (a) – (d) (including subparagraphs).
- (2) In section 5-1.1.2 (“Load Ratings – Where Structural Competence Governs Lifting Performance”), paragraph (b).
- (3) Section 5-1.2 (“Stability (Backward and Forward)”).
- (4) In section 5-1.3.1 (“Boom Hoist Mechanism”), paragraphs (a), (b)(1) and (b)(2).
- (5) In section 5-1.3.2 (“Load Hoist Mechanism”), paragraphs (a), (a)(2) – (a)(4) (including subparagraphs), (b) – (d) (including subparagraphs).
- (6) Section 5-1.3.3 (“Telescoping Boom”).
- (7) Section 5-1.4 (“Swing Mechanism”).
- (8) In section 5-1.5 (“Crane Travel”), all provisions except 5-1.5.3(d).
- (9) In section 5-1.6 (“Controls”), all provisions except 5-1.6.1 (c).
- (10) Section 5-1.7.4 (“Sheaves”).
- (11) Section 5-1.7.5 (“Sheave sizes”).
- (12) In section 5-1.9.1 (“Booms”), paragraph (f).
- (13) Section 5-1.9.3 (“Outriggers”).
- (14) Section 5-1.9.4 (“Locomotive Crane Equipment”).
- (15) Section 5-1.9.7 (“Clutch and Brake Protection”).

(16) In section 5-1.9.12 (“Miscellaneous equipment”), paragraphs (a), (c), (e), and (f).

(c) Prototype testing: crawler, truck and locomotive cranes manufactured prior to [effective date of 1926.1400] shall meet the applicable requirements for prototype testing as prescribed in ANSI B30.5 – 1968, Safety Code for Crawler, Locomotive, and Truck Cranes.

(d) Prototype testing: mobile (including crawler and truck) and locomotive cranes manufactured on or after [effective date of the standard] shall meet the prototype testing requirements in Test Option A or Test Option B.

(1) *Test Option A.*

(i) The following applies to equipment with cantilevered booms (such as hydraulic boom cranes): All the tests listed in SAE J-1063, Table 1, shall be performed to load all critical structural elements to their respective limits. All the strength margins listed in SAE J 1063 table 2 shall be met.

(ii) The following applies to equipment with pendant supported lattice booms: All the tests listed in SAE J-987, Table 1, shall be performed to load all critical structural elements to their respective limits. All the strength margins listed in SAE J 987 table 2 shall be met.

(2) *Test Option B.* The testing and verification requirements of CEN’s EN 13000 (2004) shall be met. In applying the CEN standard, the following additional requirements shall be met:

(i) The following applies to equipment with cantilevered booms (such as hydraulic boom cranes): The analysis methodology (computer modeling) must demonstrate that all load cases listed in SAE J1063 meet the strength margins listed in SAE J1063 Table 2.

(ii) The following applies to equipment with pendant supported lattice booms: The analysis methodology (computer modeling) must demonstrate that all load cases listed in SAE J987 meet the strength margins listed in SAE J987 Table 2.

(iii) *Analysis verification.* The physical testing requirements under SAE J1063 and SAE J987 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.

(e) All equipment covered by this Subpart shall meet the following requirements:

(1) *Load capacity/ratings and related information.* The information available in the cab (see Section 1406 (c)) regarding load capacity/ratings and related information shall include, at a minimum, the information identified in Section 5-1.1.3 (“Load Rating Chart”) (a)(1), (a)(2), (a)(4), (a)(5), and (b)(1)-(12). [Write these in full in the text].

(2) Load hooks (including latched and unlatched types), ball assemblies and load blocks shall be of sufficient weight to overhaul the line from the highest hook position for boom or boom and jib lengths and the number of parts of the line in use.

(3) Hook and ball assemblies and load blocks shall be marked with their rated capacity and weight.

(4) *Latching hooks.*

(i) Hooks shall be equipped with latches, except where the requirements of paragraph (ii) are met.

(ii) Hooks without latches, or with latches removed or disabled, shall not be used unless:

(A) A qualified person has determined that it is safer to hoist and place the load without latches (or with the latches removed/tied-back).

(B) Routes for the loads are pre-planned to ensure that no employee is required to work in the fall zone except for employees necessary for the hooking or unhooking of the load.

(iii) The latch shall close the throat opening and be designed to retain slings or other lifting devices/accessories in the hook when the rigging apparatus is slack.

(5) *Posted warnings.* Posted warnings required by this Subpart as well as those originally supplied with the equipment by the manufacturer shall be maintained in legible condition.

(6) An accessible fire extinguisher shall be on the equipment.

(7) *Cabs.* Equipment with cabs shall meet the following requirements:

(i) Cabs shall be designed with a form of adjustable ventilation and method for clearing the windshield for maintaining visibility and air circulation. Examples of means for adjustable ventilation include air conditioner or window that can be opened (for ventilation and air circulation); examples of means for maintaining visibility include heater (for preventing windshield icing), defroster, fan, windshield wiper.

(ii) Cab doors (swinging, sliding) shall be designed to prevent inadvertent opening or closing while traveling or operating the machine. Swinging doors adjacent to the operator shall open outward. Sliding operator doors shall open rearward.

(iii) *Windows.*

(A) The cab shall have windows in front and on both sides of the operator. Forward vertical visibility shall be sufficient to give the operator a view of the boom point at all times.

(B) Windows may have sections designed to be opened or readily removed. Windows with sections designed to be opened shall be designed so that they can be secured to prevent inadvertent closure.

(C) Windows shall be of safety glass or material with similar optical and safety properties, that introduce no visible distortion or otherwise obscure visibility that interferes with the safe operation of the equipment.

(iv) A clear passageway shall be provided from the operator's station to an exit door on the operator's side.

(v) Areas of the cab roof that serve as a workstation for rigging, maintenance or other equipment-related tasks shall be capable of supporting 250 pounds without permanent distortion.

(8) Belts, gears, shafts, pulleys, sprockets, spindles, drums, fly wheels, chains, and other parts or components that reciprocate, rotate or otherwise move shall be guarded where contact by employees (except for maintenance and repair workers) is possible in the performance of normal duties.

(9) All exhaust pipes, turbochargers, and charge air coolers shall be insulated or guarded where contact by employees (except for maintenance and repair workers) is possible in the performance of normal duties.

(10) Hydraulic and pneumatic lines shall be protected from damage to the extent feasible.

(11) The equipment shall be designed so that exhaust fumes are not discharged in the cab and are discharged in a direction away from the operator.

(12) *Friction mechanisms.* Where friction mechanisms (such as brakes and clutches) are used to control the boom hoist or load line hoist, they shall be:

(i) Of a size and thermal capacity sufficient to control all rated loads with the minimum recommended reeving.

(ii) Adjustable to permit compensation for lining wear to maintain proper operation.

(13) *Hydraulic load hoists.* Hydraulic drums shall have an integrally mounted holding device or internal static brake to prevent load hoist movement in the event of hydraulic failure.

(f) The employer's obligations under paragraphs (a) – (d) and (e)(7) – (13) are met where it can refer to documentation from the manufacturer showing that the equipment has been designed, constructed and tested in accordance with those paragraphs and the equipment has not changed, except in accordance with Section 1416 (Equipment modifications).

1433 Floating cranes/derricks and land cranes/derricks on barges

(a) This section contains supplemental requirements for floating cranes/derricks and land cranes/derricks on barges, pontoons, vessels or other means of floatation; all Sections of this Subpart apply to floating cranes/derricks and land cranes/derricks on barges, pontoons, vessels or other means of floatation, unless specified otherwise. The requirements of this Section do not apply to jacked barges when the jacks are deployed to the river/lake/sea bed and the barge is fully supported by the jacks.

(b) *General requirements.* The requirements in paragraphs (c) – (h) apply to both floating cranes/derricks and land cranes/derricks on barges, pontoons, vessels or other means of floatation.

() *Work area control.*

(1) The requirements of Section 1429 (Work area control) applies, except for paragraph 1429(a)(2)(ii).

(2) The employer shall either:

(i) Erect and maintain control lines, warning lines, railings or similar barriers to mark the boundaries of the hazard areas, or

(ii) The hazard areas shall be clearly marked by a combination of warning signs (such as “Danger – Swing/Crush Zone” or “Danger – This Thing’s Gonna Swing and Crunch You – Zone”) and high visibility markings on the equipment that identify the hazard areas. In addition, the employer shall train the employees to understand what these markings signify.

(c) *Keeping clear of the load.* Section 1423 does not apply.

(d) *Additional Safety devices.* In addition to the safety devices listed in Section 1414, the following safety devices are required:

(1) Pontoon or barge/vessel list [and trim?] device. This shall be located in the cab or, where there is no cab, at the operator's station.

[Note: some have suggested requiring a crane/derrick list and trim indicator (but note that a leveling device is already required in 1414)].

(2) Horn.

(3) Positive crane house lock.

(4) *Wind speed and direction indicator.* A competent person shall determine if wind is a factor that needs to be considered; if it needs to be considered, a wind speed and direction indicator shall be used.

(e) *Operational aids.*

(1) An anti two-block device is required only when either hoisting personnel or hoisting over a coffer dam.

(2) Paragraph 14XX (e)(4) (load weighing and similar devices) does not apply.

(f) *Accessibility of procedures applicable to equipment operation.* If the crane/derrick has a cab, the requirements of Section 1406 (c) apply. If the crane/derrick does not have a cab:

(1) Rated capacities (load charts) shall be posted at the operator's station. If the operator's station is moveable (such as with pendant-controlled equipment), the load charts shall be posted on the equipment.

(2) Procedures applicable to the operation of the equipment (other than load charts), recommended operating speeds, special hazard warnings, instructions and operators manual, shall be readily available on board.

(g) *Inspections.* In addition to meeting the requirements of Section 1415 for inspecting the crane/derrick, the employer shall ensure that the barge, pontoons, vessel or other means of floatation used to support a land crane/derrick is inspected as follows:

(1) *Shift.* The means used to secure/attach the equipment to the vessel/floatation device shall be inspected for proper condition, including wear, corrosion, loose or missing fasteners, defective welds, and (where applicable) insufficient tension.

(2) *Weekly.* Void compartments shall be sounded for leakage every 7 days. [note that ANSI requires these to be inspected weekly].

(3) *Monthly.* The vessel/means of floatation used shall be inspected for the following:

(i) The means used to secure/attach the equipment to the vessel/floatation device shall be inspected for proper condition, including wear, corrosion and (where applicable) insufficient tension.

(ii) Void compartments shall be sounded for leakage.

(iii) Ballast compartments for proper ballast.

(iv) Deckload for proper securing.

(v) Chain lockers, storage, fuel compartments and battening of hatches for serviceability as a water-tight appliance.

(vi) Firefighting and lifesaving equipment in place and functional.

(4) The daily, weekly and monthly inspections shall be conducted by a competent person. If any deficiency is identified, an immediate determination shall be made by ~~the competent~~ a qualified person as to whether the deficiency constitutes a hazard. If the deficiency is determined to constitute a hazard, the vessel/floatation device shall be removed from service until it has been corrected.

(5) *Annual: external vessel/floatation device inspection.*

(i) The external portion of the barge, pontoons, vessel or other means of floatation used shall be inspected [should this include below the water line? Do we need to identify items to inspect?] annually by a qualified person who has expertise with respect to vessels/floatation devices (such as a marine engineer, marine architect, or licensed surveyor). The inspection shall include the following items:

(A) The items identified in paragraphs (1)(Daily), (2)(Weekly) and (3)(Monthly).

(B) Cleats, bitts, chocks, fenders, capstans, ladders, and stanchions, for significant: corrosion, wear, deterioration, and deformation.

(C) External evidence of leaks and structural damage.

(D) Four-corner draft readings.

(E) Firefighting equipment for serviceability.

(F) [Anything else?]

(ii) Rescue skiffs, lifelines, work vests, life preservers and ring buoys shall be inspected for ~~deterioration and seaworthiness~~ proper condition.

(iii) If any deficiency is identified, an immediate determination shall be made by the qualified person as to whether the deficiency constitutes a hazard or, though not yet a hazard, needs to be monitored in the monthly inspections. If the deficiency is determined to constitute a hazard, the vessel/floatation device shall be removed from service until it has been corrected.

(iv) If the qualified person determines that, though not presently a hazard, the deficiency needs to be monitored, the employer shall ensure that the deficiency is checked in the monthly inspections.

(6) *Quadrennial: internal vessel/floatation device inspection.*

(i) The internal portion of the barge, pontoons, vessel or other means of floatation used shall be ~~inspected~~ surveyed once every 4 years by a marine surveyor.

(ii) If any deficiency is identified, an immediate determination shall be 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.

(iii) If the deficiency is determined to constitute a hazard, the vessel/floatation device shall be removed from service until it has been corrected.

(iv) If the surveyor determines that, though not presently a hazard, the deficiency needs to be monitored, the employer shall ensure that the deficiency is checked in the monthly or annual inspections, as appropriate.

(7) *Documentation.* The monthly and annual inspections required in paragraphs (4) and (5) shall be documented in accordance with Section 1415 (f)(3) and (g)(7), respectively. The quadrennial inspection required in paragraph (6) shall be documented in accordance with Section 1415(g)(7), except that the documentation for that inspection shall be retained for a minimum of 4 years.

(h) *Working with a diver.* The following additional requirements apply when working with a diver:

(1) If a crane/derrick is used to get a diver into and out of the water, it shall not be used for any other purpose until the diver is back on board. When used for more than one diver, it shall not be used for any other purpose until all divers are back on board.

(2) The operator shall remain at the controls of the crane/derrick at all times.

(3) In addition to the requirements in Sections ___ (Signals), either:

(i) A clear line of sight shall be maintained between the operator and tender [definition?], or

(ii) The signals between the operator and tender shall be transmitted electronically.

(4) The means used to secure the crane/derrick to the barge/pontoons/vessel (see paragraph (k)(5)) shall not allow any amount of shifting in any direction.

(i) [Reserved]

() The barge, pontoons, vessel or other means of floatation shall be capable of withstanding imposed environmental, operational and in-transit loads under conditions specified by its manufacturer.

(j) *Floating cranes/derricks.* For equipment designed by the manufacturer (or employer) for marine use by permanent attachment to barges, pontoons, vessels or other means of floatation:

(1) *Load charts.*

(i) The manufacturer load charts applicable to operations on water shall not be exceeded. When using these charts, the employer shall comply with all parameters and limitations (such as dynamic/environmental parameters) applicable to the use of the charts.

(ii) The load charts shall take into consideration a minimum wind speed of 40 miles per hour.

(2) The requirements for maximum allowable list and maximum allowable trim as specified in Table M1 shall be met.

| TABLE M1 | | |
|---|------------------------|------------------------|
| <i>Equipment designed for marine use by permanent attachment (other than derricks):</i> | | |
| Rated Capacity | Maximum Allowable List | Maximum Allowable Trim |
| 25 tons or less | 5 degrees | 5 degrees |
| Over 25 tons | 7 degrees | 7 degrees |
| <i>Derricks designed for marine use by permanent attachment:</i> | | |
| Any rated capacity | 10 degrees | 10 degrees |

(3) The equipment shall be stable under the conditions specified in Tables M2 and M3.

| TABLE M2 | | |
|------------------------------|------------|-------------------|
| Operated at | Wind speed | Minimum freeboard |
| Rated load capacity | 60 mph | 2 ft |
| Rated load capacity plus 25% | 60 mph | 1 ft |
| High boom, no load | 60 mph | 2 ft |

| TABLE M3 | |
|---|------------|
| <i>For backward stability of the boom:</i> | |
| Operated at | Wind speed |
| High boom, no load, full back list (least stable condition) | 90 mph |

(4) If the equipment is employer-made, it shall not be used unless the employer has documents demonstrating that the load charts and applicable parameters for use meet the requirements of paragraphs (j)(1), (2) and (3). Such documents shall be 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 floatation).

(5) The barge, pontoons, vessel or other means of floatation used shall:

(i) Be structurally sufficient to withstand the static and dynamic loads of the crane/derrick when operating at the crane/derrick's maximum rated capacity.

(ii) Have a subdivided hull with one or more longitudinal watertight bulkheads for reducing the free surface effect.

(iii) Have access to void compartments to allow for inspection and pumping.

(k) *Land cranes/derricks.* For land cranes/derricks used on barges, pontoons, vessels or other means of floatation:

(1) The rated capacity of the equipment (load charts) applicable for use on land shall be reduced to:

(i) Account for increased loading from list, trim, wave action, and wind.

(ii) Be applicable to a specified location(s) on the specific barge, pontoons, vessel or other means of floatation that will be used, under the expected environmental conditions.

(iii) Ensure that the conditions required in paragraphs (3) and (4) are met.

(2) The rated capacity modification required in paragraph (1)(i) shall be done by the equipment manufacturer, or a qualified person who has expertise with respect to both land crane/derrick capacity and the stability of vessels/floatation devices.

(3) *List and trim.*

(i) The maximum allowable list and the maximum allowable trim for the barge/pontoons/vessel/other means of floatation shall not exceed the amount necessary to ensure that the conditions in paragraph (4) are met. In addition, the maximum allowable list and the maximum allowable trim shall not exceed the least of the following: 5 degrees, the amount specified by the crane/derrick manufacturer, or where an amount is not so specified, the amount specified by the qualified person.

(ii) The maximum allowable list and the maximum allowable trim for the land crane/derrick shall not exceed the amount specified by the crane/derrick manufacturer, or where an amount is not so specified, the amount specified by the qualified person.

(4) The following conditions shall be met:

(i) All deck surfaces of the barge, pontoons, vessel or other means of floatation used shall be above water.

(ii) The entire bottom area of the barge, pontoons, vessel or other means of floatation used shall be submerged.

(5) *Positive securing/attachment, corralling, rails system and centerline cable system.* The employer shall meet the requirements in Option (1), Option (2), Option (3), or Option (4). Whichever option is used, the requirements of paragraph (v) must also be met.

(i) *Option (1) – Physical attachment.* The crane/derrick shall be physically attached to the barge, pontoons, vessel or other means of floatation. Methods of physical attachment include crossed-cable systems attached to the crane/derrick and vessel/means of floatation (this type of system allows the crane/derrick to lift up slightly from the surface of the vessel/means of floatation), bolting or welding the crane/derrick to the vessel/means of floatation, strapping the crane/derrick to the vessel/means of floatation with chains, or other methods of physical attachment.

(ii) *Option (2) – Corraling.* The crane/derrick shall be prevented from shifting by installing barricade restraints (a corraling system). Corraling systems shall not allow any amount of shifting in any direction by the crane.

(iii) *Option (3) – Rails.* The crane/derrick shall be prevented from shifting by being mounted on a rail system. Rail clamps and rail stops are required. The crane/derrick shall be secured from movement during operation.

(iv) *Option (4) – Centerline cable system.* The crane/derrick shall be prevented from shifting by being mounted to a wire rope system. The wire rope system shall meet the following requirements:

(A) The wire rope shall be of sufficient size/strength to support the side load of crane/derrick.

(B) The wire shall be physically attached to the barge/pontoons/vessel.

(C) The wire shall be attached to the crane/derrick by appropriate attachment methods (such as shackles or sheaves) on the undercarriage which will allow the crew to secure the crane/derrick from movement during operation and to move the crane/derrick longitudinally along the vessel for repositioning.

(D) Means shall be installed to prevent the crane/derrick from passing the forward or aft end of the wire attachments.

(E) The crane/derrick shall be secured from movement during operation.

(v) The systems/means used to comply with Option (1), Option (2), Option (3), or Option (4) shall be designed by a qualified person.

(vi) *Exception.* For mobile auxiliary cranes used on the deck of a floating crane/derrick, the requirement to use Option (1), Option (2), Option (3), or Option (4) does not apply where the employer demonstrates that the following requirements have been met:

(A) A marine engineer or registered professional engineer familiar with floating crane/derrick design develops and signs a written plan for the use of the mobile auxiliary crane.

(B) The plan shall be designed so that the applicable requirements of this Section will be met despite the position, travel, operation, and lack

of positive securing/attachment (or corralling or use of rails) of the mobile auxiliary crane.

(C) The plan shall specify the areas of the deck where the mobile auxiliary crane is permitted to be positioned, travel, and operate and the parameters/ limitations of such movements and operation.

(D) The deck shall be marked to identify the permitted areas for positioning, travel, and operation.

(E) The plan shall specify the dynamic/environmental conditions that must be present for use of the plan.

(F) If the dynamic/environmental conditions in paragraph (E) are exceeded, the mobile auxiliary crane shall be positively secured/ attached or corralled in accordance with Option (1) or Option (2).

(6) The barge, pontoons, vessel or other means of floatation used shall:

(i) Be 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 anticipated deck loads and ballasted compartments.

(ii) Have a subdivided hull with one or more longitudinal watertight bulkheads for reducing the free surface effect.

(iii) Have access to void compartments to allow for inspection and pumping.

1435 Free fall and controlled load lowering

(a) *Boom free fall prohibitions.*

(1) The use of equipment in which the boom is designed to free fall (live boom) is prohibited in each of the following circumstances:

(i) An employee is in the fall zone of the boom or load.

(ii) An employee is being hoisted.

(iii) The load or boom is directly over a power line, or over the area extending the Table A clearance distance to each side of the power line.

(iv) The load is over a shaft.

(v) The load is over a coffer dam, except where there are no workers in the fall zone.

(vi) Lifting operations are taking place in a refinery or tank farm.

(2) The use of cranes in which the boom is designed to free fall (live boom) is permitted only where none of the circumstances listed in paragraph (1) are present and:

(i) The equipment was manufactured prior to October 31, 1984, or

(ii) The equipment is a floating crane/derrick or is on pontoons, a barge or a vessel.

(b) *Preventing boom free fall.* Where the use equipment with a boom that is designed to free fall (live boom) is prohibited (see paragraph (a)(1)), the boom hoist shall have a secondary mechanism or device designed to prevent the boom from falling in the event the primary system used to hold or regulate the boom hoist fails, as follows:

(1) Friction drums shall have:

(i) A friction clutch and, in addition, a braking device, to allow for controlled boom lowering.

(ii) A secondary braking or locking device, which is manually or automatically engaged, to back-up the primary brake while the boom is held (such as a secondary friction brake or a ratchet and pawl device).

(2) Hydraulic drums shall have an integrally mounted holding device or internal static brake to prevent boom hoist movement in the event of hydraulic failure.

(3) Neither clutches nor hydraulic motors shall be considered brake or locking devices for purposes of this Subpart.

(4) Hydraulic boom cylinders shall have an integrally mounted holding device.

(c) *Preventing uncontrolled retraction.* Hydraulic telescoping booms shall have an integrally mounted holding device to prevent boom movement in the event of hydraulic failure.

(d) *Load line free fall.* In each of the following circumstances, controlled load lowering is required and free fall of the load line hoist is prohibited:

(1) An employee is directly under the load.

(2) An employee is being hoisted.

(3) The load is directly over a power line, or over the area extending the Table A clearance distance to each side of the power line.

(4) The load is over a shaft or cofferdam.

1436 Multiple-crane/derrick lifts -- supplemental requirements

(a) *Plan development.* Before beginning a crane/derrick operation in which more than one crane/derrick will be supporting the load, the operation must be planned. The planning must meet the following requirements:

(1) The plan must be developed by a qualified person.

(2) The plan must be designed to ensure that the requirements of this Subpart are met.

(3) Where the qualified person determines that engineering expertise is needed for the planning, the employer must ensure that it is provided.

(b) *Plan implementation.*

(1) The multiple-crane/derrick lift must be supervised 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.

(2) The supervisor must review the plan with all workers who will be involved with the operation.

1437 Tower Cranes

(a) This Section contains supplemental requirements for tower cranes; all Sections of this Subpart apply to tower cranes unless specified otherwise.

(b) *Erecting, climbing and dismantling.*

(1) Sections 1402 (Assembly/disassembly – selection of manufacturer or employer procedures), 1403 (Assembly/disassembly – general requirements), and 1404 (Disassembly – additional requirements for disassembly of booms and jibs), apply to tower cranes (except as otherwise specified), except that the term “assembly/disassembly” is replaced by “erecting, climbing and dismantling,” and the term “disassembly” is replaced by “dismantling.”

(2) *Dangerous areas (self-erecting tower cranes).* In addition to the requirements in 1403(e), for self-erecting tower cranes, the following applies: Employees shall not be in or under the tower, jib, or rotating portion of the crane 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.

(3) *Addressing specific hazards.* The requirements in 1403(h)(1)-(9) apply. In addition, the A/D supervisor shall address the following:

(i) *Foundations and structural supports.* Tower crane foundations and structural supports shall be designed by the manufacturer or a registered professional engineer.

(ii) *Loss of backward stability.* Backward stability must be considered before swinging self erecting cranes or cranes on travelling or static undercarriages.

(iii) *Wind velocity.* Wind must not exceed the velocity recommended by the manufacturer or, where manufacturer does not specify this information, the velocity determined by a qualified person.

(4) *Signs.* The size and location of signs installed on tower cranes must be in accordance with manufacturer procedures. Where these are unavailable, a registered professional engineer familiar with the type of equipment involved must approve in writing the size and location of any signs.

(5) *Plumb tolerance.* Towers shall be erected plumb to the manufacturer's tolerance and verified by a qualified person. Where the manufacturer does not specify plumb tolerance, the crane tower shall be plumb to a tolerance of at least 1:500 (approximately 1 inch in 40 feet). ~~a qualified person shall determine that the [this concept is included in the first sentence]~~

(6) *Multiple tower crane jobsites.* On jobsites where more than one fixed jib (hammerhead) tower crane is installed, the cranes shall be located so such that no crane may come in contact with the structure of another crane. Cranes are permitted to pass over one another.

(7) *Climbing procedures.* Prior to, and during, all climbing procedures (including inside climbing and top climbing), the employer shall:

(i) Comply with all manufacturer prohibitions.

(ii) Have a registered professional engineer verify that the host structure is strong enough to sustain the forces imposed through the braces, brace anchorages and supporting floors.

(iii) Ensure that no part of the climbing procedure takes place when wind exceeds the velocity recommended by the manufacturer or, where the

manufacturer does not specify this information, the velocity determined by a qualified person.

(c) *Safety devices.*

(1) Paragraph 1414 does not apply to tower cranes.

(2) The following safety devices are required on all tower cranes unless otherwise specified:

(i) Boom stops on luffing boom type tower cranes.

(ii) Jib stops on luffing boom type tower cranes if equipped with a jib attachment.

(iii) Travel rail end stops at both ends of travel rail.

(iv) Travel rail clamps on all travel bogies.

(v) Integrally mounted check valves on all load supporting hydraulic cylinders.

(vi) Hydraulic system pressure limiting device.

(vii) The following brakes, which shall automatically set in the event of pressure loss or power failure, are required:

(A) A hoist brake on all hoists. ~~Boom hoist brake.~~

(B) Swing brake.

(C) Trolley brake.

(D) Rail travel brake.

(viii) Deadman control or forced neutral return control levers. [is this for all controls?]

(ix) Emergency stop switch at the operator's station.

(3) *Proper operation required.* Operations shall not begin unless the devices listed in this section are in proper working order. If a device stops working properly during operations, the operator shall safely stop operations. Operations shall not resume until the device is again working properly. Alternative measures are not permitted to be used.

(d) *Operational aids.*

(1) Section 14XX does not apply to tower cranes.

(2) The devices listed in this section (“operational aids”) are required on all tower cranes covered by this Subpart, unless otherwise specified.

(3) Operations shall not begin unless the operational aids are in proper working order, except where the employer meets the specified temporary alternative measures. More protective alternative measures specified by the tower crane manufacturer, if any, shall be followed.

(4) If an operational aid stops working properly during operations, the operator shall safely stop operations until the temporary alternative measures are implemented or the device is again working properly. 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 Section 1416.

(5) *Category I operational aids and alternative measures.* Operational aids listed in this paragraph that are not working properly shall be repaired no later than 7 days after the deficiency occurs. *Exception:* If the employer documents that it has ordered the necessary parts within 7 days of the occurrence of the deficiency, the repair shall be completed within 7 days of receipt of the parts.

(i) *Trolley travel limiting device.* The travel of the trolley shall be restricted at both ends of the jib by a trolley travel limiting device to prevent the trolley from running into the trolley end stops. *Temporary alternative measures:*

(A) *Option A.* The trolley rope shall 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.

(B) *Option B.* A spotter shall be used when operations are conducted within 10 feet of the outer or inner trolley end stops.

(ii) *Boom hoist limiting device.* The range of the boom shall be limited at the minimum and maximum radius. *Temporary alternative measures:* Clearly mark the cable (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 use a spotter.

(iii) *Anti two-blocking device.* The tower crane shall be equipped with a 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). The device(s) must prevent such damage at all points where two-blocking could occur. *Temporary alternative measures:*

Clearly mark the cable (so it can 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 a spotter.

(iv) *Hoist drum lowering device.* Tower cranes manufactured [after the effective date of this standard] shall be equipped with a device that prevents the last 2 wraps of hoist cable from being spooled off the drum. *Temporary alternative measures:* Mark the cable (so it can be seen by the operator) at a point that will give the operator sufficient time to stop the hoist prior to last 2 wraps of hoist cable being spooled off the drum, or use a spotter.

(v) *Load moment limit device.* The tower crane shall have a device that prevents moment overloading. *Temporary alternative measures:* A radius indicating device shall be used. If the tower crane is not equipped with a radius indicating device, the radius shall be measured to ensure the load is within the rated capacity of the crane. (NOTE: in all cases, irrespective of the presence or absence of a properly functioning load related operational aid, the determination of load weight through the measures specified in Section 1406(o)(3)(load weight) is required).

(vi) *Hoist line pull limiting device.* The capacity of the hoist shall be limited to prevent overloading, including each individual gear ratio if equipped with a multiple speed hoist transmission. *Temporary alternative measures:* No alternative measure is required. (NOTE: in all cases, irrespective of the presence or absence of a properly functioning load related operational aid, the determination of load weight through the measures specified in Section 1406(o)(3)(load weight) is required).

(vii) *Rail travel limiting device.* The travel distance in each direction shall be limited to prevent the travel bogies from running into the end stops or buffers. *Temporary alternative measures:* A spotter shall be used when operations are conducted within 10 feet of the either end of the travel rail end stops.

(viii) *Boom hoist drum positive locking device.* The boom hoist drum shall be equipped with a device to positively lock the boom hoist drum. *Temporary alternative measures:* The device shall be manually set when required if an electric, hydraulic or automatic type is not functioning.

(6) *Category II operational aids and alternative measures.* Operational aids listed in this paragraph that are not working properly shall be repaired no later than 30 days after the deficiency occurs. *Exception:* If the employer documents that it has ordered the necessary parts within 7 days of the occurrence of the deficiency, and the part is not received in time to complete the repair in 30 days, the repair shall be completed within 7 days of receipt of the parts.

(i) *Boom angle or hook radius indicator.*

(A) Luffing boom tower cranes shall have a boom angle indicator readable from the operator's station.

(B) Hammerhead tower cranes manufactured [1 year after the effective date of this standard] shall have a hook radius indicator readable from the operator's station.

(C) *Temporary alternative measures:* Hook radii or boom angle shall be determined by measuring the hook radii or boom angle with a measuring device.

(ii) *Trolley travel deceleration device.* The trolley speed shall be automatically reduced prior to the trolley reaching the end limit in both directions. *Temporary alternative measure:* The operator shall reduce the trolley speed when approaching the trolley end limits.

(iii) *Boom hoist deceleration device.* The boom speed shall be automatically reduced prior to the boom reaching the minimum or maximum radius limit. *Temporary alternative measure:* The operator shall reduce the boom speed when approaching the boom maximum or minimum end limits.

(iv) *Load hoist deceleration device.* The load speed shall be automatically reduced prior to the hoist reaching the upper limit. *Temporary alternative measure:* The operator shall reduce the hoist speed when approaching the upper limit.

(v) *Wind speed indicator.* A device shall be provided to display the wind speed and shall be mounted above the upper rotating structure on tower cranes. On self erecting cranes, it shall be mounted at or above the jib level. *Temporary alternative measures:* Use of wind speed information from a properly functioning indicating device on another tower crane on the same site, or a qualified person estimates the wind speed.

(vi) *Load indicating device.* Cranes manufactured [1 year after the effective date of this standard] shall have a device that displays the magnitude of the load on the hook. Displays that are part of load moment limiting devices that display the load on the hook meet this requirement. *Temporary alternative measures:* No alternative measure is required. (NOTE: in all cases, irrespective of the presence or absence of a properly functioning load related operational aid, the determination of load weight through the measures specified in Section 1406(o)(3)(load weight) is required).

(e) *Inspections.*

(1) Section 1415 (Inspections) applies to tower cranes, except that the term “assembly” is replaced by “erection.”

(2) *Post-erection inspection.* In addition to the requirements in paragraph 1415(d), the following requirements shall be met:

(i) A load test using certified weights, or scaled weights using a certified scale with a current certificate of calibration, shall be conducted after each erection.

(ii) The load test shall be conducted in accordance with the manufacturer’s instructions. Where these instructions are unavailable, a registered professional engineer familiar with the type of equipment involved shall develop written load test procedures.

(3) *Monthly.* The following additional items shall be included:

(i) 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 upper-most brace support. [Note that as originally discussed this was going to be part of the shift inspection. Is this OK as monthly?].

(ii) The upper-most tie-in, braces, floor supports and floor wedges where the tower crane is supported by the structure, for loose or dislodged components.

1438 Derricks

(a) This Section contains supplemental requirements for derricks, whether temporarily or permanently mounted; all Sections of this Subpart apply to derricks unless specified otherwise. 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.

(b) *Operation – procedures.*

(1) Section 1406 (Operation – procedures) applies except for paragraph (c) (accessibility).

(2) *Load chart contents.* Load charts shall contain at least the following information:

(i) Load ratings at corresponding ranges of boom angle or operating radii.

(ii) Specific lengths of components to which the load ratings apply.

(iii) Required parts for hoist reeving.

(iv) Size and construction of rope shall be included on the load chart or in the operating manual.

(3) *Load chart location.*

(i) *Permanent installations.* For permanently installed derricks with fixed lengths of boom, guy, and mast, a load chart shall be posted where it is visible to personnel responsible for the operation of the equipment.

(ii) *Non-permanent installations.* For derricks that are not permanently installed, the load chart shall be readily available at the job site to personnel responsible for the operation of the equipment.

(c) Construction.

(1) *General requirements.*

(i) Derricks shall be constructed to meet all stresses imposed on members and components when installed and operated in accordance with the manufacturer's/ builder's procedures and within its rated capacity.

(ii) Welding of load sustaining members shall conform to recommended practices in ANSI/AWS D14.3 or D1.1.

(2) *Guy derricks.*

(i) The minimum number of guys shall be 6, with equal spacing, except where a qualified person or derrick manufacturer approves variations from these requirements and revises the rated capacity to compensate for such variations.

(ii) Guy derricks shall not be used unless the employer has the following guy information:

(A) The number of guys.

(B) The spacing around the mast.

(C) The size, grade, and construction of rope to be used for each guy.

(iii) For guy derricks manufactured after December 18, 1970, in addition to the information required in paragraph (ii), the employer shall have the following guy information:

- (A) The amount of initial sag or tension.
- (B) The amount of tension in guy line rope at anchor.

(iv) The mast base shall permit the mast to rotate freely with allowance for slight tilting of the mast caused by guy slack.

(v) The mast cap shall:

- (A) Permit the mast to rotate freely.
- (B) Withstand tilting and cramping caused by the guy loads.
- (C) Be secured to the mast to prevent disengagement during erection.
- (D) Be provided with means for attaching guy ropes.

(3) *Stiffleg derricks.*

(i) The mast shall be supported in the vertical position by at least two stifflegs; one end of each shall be connected to the top of the mast and the other end securely anchored.

(ii) The stifflegs shall be capable of withstanding the loads imposed at any point of operation within the rated load chart range.

(iii) The mast base shall:

- (A) Permit the mast to rotate freely (when necessary).
- (B) Permit deflection of the mast without binding.

(iv) The mast shall be prevented from lifting out of its socket when the mast is in tension.

(v) The stiffleg connecting member at the top of the mast shall:

- (A) Permit the mast to rotate freely (when necessary).
- (B) Withstand the loads imposed by the action of the stifflegs.
- (C) Be secured so as to oppose separating forces.

(4) *Gin pole derricks.*

(i) Guy lines ~~should~~ shall be sized and spaced so as to make the gin pole stable in both boomed and vertical positions. *Exception:* Where the size and/or spacing of guy lines do not result in the gin pole being stable in both boomed and vertical positions, the employer shall ensure that the derrick is not used in an unstable position.

(ii) The base of the gin pole shall permit movement of the pole (when necessary).

(iii) The gin pole shall be anchored at the base ~~Provide means to~~ against horizontal forces (~~when required~~ when such forces are present).

(5) *Chicago boom derricks.* The fittings for stepping the boom and for attaching the topping lift shall be arranged to:

(i) Permit the derrick to swing at all permitted operating radii and mounting heights between fittings.

(ii) Accommodate attachment to the upright member of the host structure.

(iii) Withstand the forces applied when configured and operated in accordance with the manufacturer's/ builder's procedures and within its rated capacity.

(iv) Prevent the boom or topping lift from lifting out under tensile forces.

(d) *Anchoring and guying.*

(i) Load anchoring data developed by the manufacturer or a qualified person shall be used.

(ii) *Guy derricks.*

(A) The mast base shall be anchored.

(B) The guys shall be secured to the ground or other firm anchorage.

(C) The anchorage and guying shall be designed to withstand maximum horizontal and vertical forces encountered when operating within rated capacity with the particular guy slope and spacing specified for the application.

(iii) *Stiffleg derricks.*

(A) The mast base and stifflegs shall be anchored.

(B) The mast base and stifflegs shall be designed to withstand maximum horizontal and vertical forces encountered when operating within rated capacity with the particular stiffleg spacing and slope specified for the application.

(e) *Swingers and hoists.*

(1) The boom, swinger mechanisms and hoists shall be suitable for the derrick work intended and shall be anchored to prevent displacement from the imposed loads.

(2) Base-mounted drum hoists.

(i) Base mounted drum hoists shall meet the requirements in the following sections of ANSI B30.7 (2001):

(i) Sections 7-1.1 (Load ratings and markings).

(ii) Section 7-1.2 (Construction), except: 7-1.2.13 (Operator's cab); 7-1.2.15 (Fire extinguishers).

(iii) Section 7-1.3 (Installation).

(iv) Applicable terms in Section 7-0.2 (Definitions).

(ii) *Load tests for new hoists.* The employer shall ensure that new hoists are load tested to a minimum of 110% of rated capacity, but not more than 125% of rated capacity, unless otherwise recommended by the manufacturer. This requirement is met where the manufacturer has conducted this testing.

(iii) *Repaired or modified hoists.* Hoists that have had repairs, modifications or additions affecting the its capacity or safe operation shall be evaluated by a qualified person to determine if a load test is necessary. If it is, load testing shall be conducted in accordance with paragraphs (e)(ii) and (iv).

(iv) *Load test procedure.* Load tests required by paragraphs (e)(ii) or (e)(iii) shall be conducted as follows:

(A) The test load shall be hoisted a vertical distance to assure that the load is supported by the hoist and held by the hoist brake(s).

(B) The test load shall be lowered, stopped and held with the brake(s).

(C) The hoist shall not be used unless a competent person determines that the test has been passed.

(f) *Operational aids.*

(1) Section 14XX (Operational aids) applies, except for paragraph 14XX (d)(1) (Boom hoist limiting device) and (e)(1) (Boom angle or radius indicator).

(2) *Boom angle aid.* The employer shall ensure that either:

(i) The boom hoist cable shall be marked with caution and stop marks. The stop marks shall correspond to maximum and minimum allowable boom angles. The caution and stop marks shall be in view of the operator, or a spotter who is in direct communication with the operator, or

(ii) An electronic or other device that signals the operator in time to prevent the boom from moving past its maximum and minimum angles, or automatically prevents such movement, is used.

(3) *Load weight/capacity devices.* Derricks manufactured [1 year after the effective date of this Subpart] with a maximum rated capacity over 6000 pounds shall have at least one of the following: load weighing device, load moment indicator, rated capacity indicator, or rated capacity limiter. *Temporary alternative measures:* No alternative measure is required.

(g) *Post-assembly approval and testing – new or reinstalled derricks.*

(1) *Anchorage.*

(i) Anchorages, including the structure to which the derrick is attached (if applicable), shall be approved by a qualified person.

(ii) If using a rock or hairpin anchorage, the qualified person shall determine if any special testing of the anchorage is needed. If so, it shall be tested accordingly.

(2) *Functional test.* Prior to initial use, new or reinstalled derricks shall be tested by a competent person with no hook load to verify proper operation. This test shall include:

(i) Lifting and lower the hook(s) through the full range of hook travel.

(ii) Raising and lowering the boom through the full range of boom travel.

(iii) Swinging in each direction through the full range of swing.

(iv) Actuating the anti two-block and boom hoist limit devices (if provided).

(v) Actuating locking, limiting and indicating devices (if provided).

(3) *Load test.* Prior to initial use, new or reinstalled derricks shall be load tested by a competent person. The test load shall meet the following requirements:

(i) Test loads shall be at least 100% and no more than 110% of the rated load, unless otherwise recommended by the manufacturer or qualified person, but in no event shall the test load be less than the maximum anticipated load.

(ii) The test shall consist of:

(A) 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).

(B) Swinging the derrick, if applicable, the full range of its swing, at the maximum allowable working radius for the test load.

(C) Booming the derrick up and down within the allowable working radius for the test load.

(D) Lowering, stopping and holding the load with the brake(s).

(iii) The derrick shall not be used unless the competent person determines that the test has been passed.

(4) *Documentation.* Tests conducted under this paragraph shall be documented. The document shall contain the date, test results and the name of the tester. The document shall be retained until the derrick is re-tested or dismantled, whichever occurs first.

(h) *Load testing repaired or modified derricks.* Derricks that have had repairs, modifications or additions affecting the derrick's capacity or safe operation shall be evaluated by a qualified person to determine if a load test is necessary. If it is, load testing shall be conducted and documented in accordance with paragraphs (g).

(i) [Reserved]

(j) *Power failure procedures.* If power fails during operations, the derrick operator shall safely stop operations. This shall include:

(1) Setting all brakes or locking devices.

(2) Moving all clutch and other power controls to the off position.

(k) *Use of winch heads.*

(1) Ropes shall not be handled on a winch head without the knowledge of the operator.

(2) While a winch head is being used, the operator shall be within reach of the power unit control lever.

(l) [Reserved]

(m) *Securing the boom.*

(1) When the boom is being held in a fixed position, dogs, pawls, or other positive holding mechanisms on the boom hoist shall be engaged.

(2) When taken out of service for 30 days or more, the boom shall be secured by one of the following methods:

(i) Laid down.

(ii) Secured to a stationary member, as nearly under the head as possible, by attachment of a sling to the load block.

(iii) For guy derricks, lifted to a vertical position and secured to the mast.

(iv) For stiffleg derricks, secured against the stiffleg.

(n) The process of jumping the derrick shall be supervised by the A/D supervisor.

~~(o) Derrick operations shall be supervised by a competent person. [Should there be a requirement like this for cranes derricks?]~~

(o) *Inspections.* In addition to the requirements in Section 1415, the following additional items shall be included in the inspections:

(1) *Daily:* Guys for proper tension.

(2) *Annual.*

(i) Gudgeon pin for cracks, wear, and distortion.

(ii) Foundation supports for continued ability to sustain the imposed loads.

1439 Overhead & Gantry Cranes

(a) *Permanently installed overhead and gantry cranes.*

(1) This paragraph applies 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.

(2) The requirements of 29 CFR 1910.179, except for 1910.179 (b)(1), apply to the equipment identified in paragraph (a)(1).

(b) *Overhead and gantry cranes that are not permanently installed in a facility.*

(1) This paragraph 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, irrespective of whether it travels on tracks, wheels, or other means.

(2) The following requirements apply to equipment identified in paragraph (b)(1):

(i) Sections 1400, 1402-1412, 1415 -1430, 1432, 1433, 1435(d), 1436, 1440; of this standard.

(ii) The following portions of 29 CFR 1910.179:

(A) Paragraphs (b)(5),(6),(7); (e)(1),(3),(5),(6); (f)(1),(4); (g); (h)(1),(3); (k); and (n).

(B) Definitions in 1910.179(a) that do not differ from those in Section 14XX of this Subpart.

(C) 1910.179 (b)(2) applies only to equipment identified in paragraph (1) manufactured before September 19, 2001.

(iii) For equipment manufactured on or after September 19, 2001, the following sections of ASME B.30.2 (2001) apply: 2-1.3.1; 2-1.3.2; 2-1.4.1; 2-1.6; 2-1.7.2; 2-1.8.2; 2-1.9.1; 2-1.9.2; 2-1.11; 2-1.12.2; 2-1.13.7; 2-1.14.2; 2-1.14.3; 2-1.14.5; 2-1.15.; 2-3.5

1440 Dedicated pile drivers.

(a) The provisions of this standard apply to dedicated pile drivers, except as specified in this Section.

(b) Paragraph 14XX (d)(3) (anti two-block device) does not apply. (NOTE: under 1425(d)(4)(iv), an anti two-block device is required when hoisting personnel).

(c) Paragraph 14XX (e)(4) (Load weight/capacity devices) applies only to dedicated pile drivers manufactured after January 1, 2008.

(d) In Section 1432, only paragraphs (e) and (f) apply to dedicated pile drivers.

14XX Supplemental Requirements for Sideboom Cranes

[.550 (a)(18): “Sideboom cranes mounted on wheel or crawler tractors shall meet the requirements of SAE j743A-1964].

[We suggest that we apply the design, construction, use and inspection items of: ASME B30.14-1996, with the B30.14c-2001 Addenda and the most recent SAE standard, that are specific to sideboom cranes and not addressed in, and not in conflict with, 1400-1441].

1440 Definitions

APPENDIX A – USE OF NON-STANDARD SIGNALS

The follow is an example of a situation where the use of the Standard Method for hand signals is infeasible: Due to background lighting conditions behind the signal person, there is insufficient contrast between the person’s hand and the sky color. This prevents the operator from being able to clearly see the signal person’s hand when extended out to either side.

APPENDIX B – CHECKLIST FOR DETERMINING IF HOISTING PERSONNEL IS PERMISSIBLE

APPENDIX C – ASSEMBLY/DISASSEMBLY – SAMPLE PROCEDURES FOR MINIMIZING THE RISK OF UNINTENDED DANGEROUS BOOM MOVEMENT.