Washington State Department of Labor & Industries

Cranes, Rigging, and Personnel Lifting
Stakeholder draft, December 18, 2019

WAC 296-155-52900 through 296-155-54410

WAC 296-155-52900 Scope.

(1) Except as provided in subsection (3) of this section, this part applies to the following:

(a) Power-operated cranes and derricks used in construction and/or tree trimming and tree removal work, that can hoist, lower and horizontally move a suspended load (with or without attachments). Such equipment includes, but is not limited to: Articulating boom 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); multipurpose machines when configured to hoist and lower (by means of a winch or hook) and horizontally move a suspended load; industrial cranes (such as carry-deck cranes); cranes being used as 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/bridge and gantry cranes; straddle cranes; side-boom tractors; derricks; and variations of such equipment; and

(b) Personnel lifting with attached or suspended platforms using cranes or derricks (WAC 296-155-547).

Commented [SBS(1]: In addition to removing the tree trimming work exemption, adding it to the scope.

(2) Attachments. This standard applies to equipment included in subsection (1) of this section 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;
- Draglines;
- Personnel platforms;

- Augers or drills; and
- Pile driving equipment.

(3) The equipment listed below are exempted from WAC 296-155-531 and 296-155-532 (Crane certifier accreditation and crane certification) through 296-155-53300 (Operator qualifications and certification):

~~(a) Cranes having a maximum rated capacity of one ton or less. See WAC 296-155-53414 for additional requirements.~~

(~~b~~a) Powered industrial trucks (forklifts) when configured to hoist and lower (by means of a winch or hook) and horizontally move a suspended load are exempted from WAC 296-155-532 crane certification. Operators must follow the requirements in chapter 296-863 WAC, Forklifts and other powered industrial trucks. When the equipment is configured with a winch, operator qualification and evaluation requirements also apply.

(~~c~~b) Service cranes with booms that rotate manually.

(4) The equipment listed below are exempt from this part:

(a) Equipment included in subsection (1) of this section while it has been converted or adapted for nonhoisting/lifting use. Such conversions/adaptations include, but are not limited to, power shovels, excavators and concrete pumps.

(b) Power shovels, excavators, wheel loaders, backhoes, loader backhoes, track loaders. This machinery is also excluded when used with chains, slings or other rigging to lift suspended loads.

(c) Automotive wreckers and tow trucks when used to clear wrecks and haul vehicles.

(d) Equipment originally designed as vehicle-mounted aerial devices (for lifting personnel) and self-propelled elevating work platforms.

(e) Hydraulic jacking systems, including telescopic/hydraulic gantries.

(f) Stacker cranes.

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

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

(i) Dedicated drilling rigs.

Commented [SBS(2]: OSHA currently has this in their scope, making a PIT operator in this scenario required to be crane certified. From my understanding, their intent is for that to only apply when there is a winch being used.

Commented [SBS(3]: New language to accommodate OSHA's new operator evaluation language.

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

~~(k) Tree trimming and tree removal work.~~

(~~j~~k) Anchor handling or dredge-related operations with a vessel or barge using an affixed A-frame.

(~~m~~l) Roustabouts.

(~~n~~m) Machines equipped with a boom that is limited to up and down movement only and does not rotate.

(~~o~~n) Conveyors.

(~~p~~o) Pump hoists with booms that do not rotate.

(q) Cranes and their operators used on-site in manufacturing facilities or powerhouses for occasional or routine maintenance and repair work.

(r) Helicopter cranes.

(s) Permanently installed overhead/bridge, gantry cranes, semi-gantry, cantilever gantry, wall cranes, storage bridge cranes, and others having the same fundamental characteristics.

(t) Digger derricks when used for activities that are covered under chapter 296-45 WAC, Safety standards for electrical workers, or chapter 296-32 WAC, Safety standards for telecommunications. Cranes other than digger derricks when used for activities that are covered under chapter 296-45 WAC, Safety standards for electrical workers, or chapter 296-32 WAC, Safety standards for telecommunications are **NOT** exempt.

(u) Powered industrial trucks (forklifts) except when configured to hoist and lower (by means of a winch or hook) and horizontally move a suspended load.

Note: Rigging requirements for material handling is located in Part F-1 of this chapter.

(5) Digger derricks that do not meet the exemption criteria in subsection (4) of this section must comply with WAC 296-155-531 (crane certifier accreditation and crane certification) through WAC 296-155-53300 (Operator qualifications and certification) 180 days after the effective date of this section.

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

Commented [ICD(4]: DOSH change. There have been fatalities and injuries in this industry, along with the finding of cranes that should not be used.

Commented [SBS(5]: Remove underlined

(7) Work covered by chapter 296-45 WAC, Safety standards for electrical workers is deemed in compliance with WAC 296-155-53408.

(8) WAC 296-155-53400 (35) through (39) does not apply to cranes designed for use on railroad tracks, when used on railroad tracks that are used as part of the general railroad system of transportation that is regulated pursuant to the Federal Railroad Administration under C.F.R. 49, Part 213, and that comply with applicable Federal Railroad Administration requirements. See WAC 296-155-53400(39).

WAC 296-155-52902 Definitions.

Accredited crane certifier. A crane inspector who has been accredited by the department.

A/D director (assembly/disassembly) director. An individual who meets the requirements in this part for an A/D director, irrespective of the person's formal job title or whether the person is nonmanagement or management personnel.

Angle of loading. The acute angle between horizontal and the leg of the rigging, often referred to as horizontal angle. See Figures 18 and 33.

Anti two-block device. A device that, when activated, disengages all crane functions whose movement can cause two-blocking.

Apprentice operator or **trainee.** A crane operator who has not met requirements established by the department under RCW 49.17.430.

Articulating boom crane. A crane whose boom consists of a series of folding, pin connected structural members, typically manipulated to extend or retract by power from hydraulic cylinders.

Assembly/disassembly. The assembly and/or disassembly of components or attachments covered under this part. With regard to tower cranes, "erecting and climbing" replaces the term "assembly," and "dismantling" replaces the term "disassembly." Regardless of whether the crane is initially erected to its full height or is climbed in stages, the process of increasing height of the crane is an erection process.

Assist crane. A crane used to assist in assembling or disassembling a crane.

Attachments. Any device that expands the range of tasks that can be done by the crane/derrick. Examples include, but are not limited to: An auger, drill, magnet, pile-driver, and boom-attached personnel platform.

Audible signal. A signal made by a distinct sound or series of sounds. Examples include, but are not limited to, sounds made by a bell, horn, or whistle.

Basket hitch. A method of rigging a sling in which the sling is passed around the load and both loop eyes or end fittings are attached to the lifting device.

Below-the-hook lifting device. A device used for attaching loads to a hoist. The device may contain components such as slings, hooks, rigging hardware, and lifting attachments.

Bird caging. The twisting of fiber or wire rope in an isolated area of the rope in the opposite direction of the rope lay, thereby causing it to take on the appearance of a bird cage.

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

Boatswain's chair. A single-point adjustable suspension scaffold consisting of a seat or sling (which may be incorporated into a full body harness) designed to support one employee in a sitting position.

Bogie. See "travel bogie."

Boom (other than tower crane). An inclined spar, strut, or other long structural member which supports the upper hoisting tackle on a crane or derrick. Typically, the length and vertical angle of the boom can be varied to achieve increased height or height and reach when lifting loads. Booms can usually be grouped into general categories of hydraulically extendible, cantilevered type, latticed section, cable supported type or articulating type.

Boom (tower cranes). On tower cranes: If the "boom" (i.e., principal horizontal structure) is fixed, it is referred to as a jib; if it is moveable up and down, it is referred to as a boom.

Boom angle indicator. A device which measures the angle of the boom relative to horizontal.

Boom hoist limiting device. Includes boom hoist disengaging device, boom hoist shut-off, boom hoist disconnect, boom hoist hydraulic relief, boom hoist kick-outs, automatic boom stop device, or derricking limiter. This type of device disengages boom hoist power when the boom reaches a predetermined operating angle. It also sets brakes or closes valves to prevent the boom from lowering after power is disengaged.

Boom length indicator. Indicates the length of the permanent part of the boom (such as ruled markings on the boom) or, as in some computerized systems, the length of the boom with extensions/attachments.

Boom stop. Includes boom stops (belly straps with struts/standoff), telescoping boom stops, attachment boom stops, and backstops. These devices restrict the boom from moving above a certain maximum angle and toppling over backward.

Boom suspension systems. A system of pendants, running ropes, sheaves, and other hardware which supports the boom tip and controls the boom angle.

Braided wire rope. A wire rope formed by plaiting component wire ropes.

Bridle wire rope sling. A sling composed of multiple legs with the top ends gathered in a fitting that goes over the lifting hook.

Builder. The builder/constructor of derricks.

Cable laid endless sling-mechanical joint. A wire rope sling made endless from one continuous length of cable laid rope with the ends joined by one or more metallic fittings.

Cable laid grommet-hand tucked. An endless wire rope sling made from one continuous length of rope formed to make a body composed of 6 ropes around a rope core. The rope ends are tucked into the body, thus forming the core. No sleeves are used.

Center of gravity. The center of gravity of any object is the point in the object around which its weight is evenly distributed. If you could put a support under that point, you could balance the object on the support.

Certified crane inspector. A crane certifier accredited by the department.

Certified welder. A welder who meets nationally recognized certification requirements applicable to the task being performed.

Choker hitch. A method of rigging a sling in which the sling is passed around the load, then through one loop eye, end fitting, or other device, with the other loop eye or end fitting attached to the lifting device. This hitch can be done with a sliding choker hook or similar device.

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

Come-a-long. A mechanical device typically consisting of a chain or cable attached at each end that is used to facilitate movement of materials through leverage.

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

Construction work. (For the purposes of this part) all or any part of excavation, construction, erection, alteration, repair, demolition, and dismantling of buildings and other structures and all related operations; the excavation, construction, alteration, and repair of sewers, trenches, caissons, conduits, pipelines, roads, and all related operations; the moving of buildings and other structures, and the construction, alteration, repair, or removal of wharfs, docks, bridges, culverts, trestles, piers, abutments,

or any other related construction, alteration, repair, or removal work. Construction work does not include the normal day-to-day activities at manufacturing facilities or powerhouses.

Controlled load lowering. Lowering a load by means of a mechanical hoist drum device that allows a hoisted load to be lowered with maximum control using the gear train or hydraulic components of the hoist mechanism. Controlled load lowering requires the use of the hoist drive motor, rather that the load hoist brake, to lower the load.

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

Counterjib (counterweight jib). A horizontal member of the tower crane on which the counterweights and usually the hoisting machinery are mounted.

Counterweight. Weight used to supplement the weight of equipment in providing stability for lifting loads by counterbalancing those loads.

Crane. Power-operated equipment used in construction that can hoist, lower, and horizontally move a suspended load. "Crane" includes, but is not limited to: Articulating boom 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; multipurpose machines when configured to hoist and lower by means of a winch or hook and horizontally move a suspended load; industrial cranes, such as carry-deck cranes; dedicated pile drivers; service/mechanic trucks with a hoisting device; a crane on a monorail; tower cranes, such as 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.

Crane/derrick type. Cranes or derricks as established by American Society of Mechanical Engineers (ASME). Crane operator means an individual engaged in the operation of a crane.

Crane level indicator. A device for determining true horizontal (also see safety devices).

Crawler crane. Equipment that has a type of base mounting which incorporates a continuous belt of sprocket driven track.

Critical lift. A lift that:

- Exceeds 75 percent of the crane or derrick rated load chart capacity; or
- Requires the use of more than one crane or derrick.

Cross rod. A wire used to join spirals of metal mesh to form a complete fabric. See Figure 22.

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

Dedicated channel. A line of communication assigned by the employer who controls the communication system to only one signal person and crane/derrick or to a coordinated group of cranes/derricks/signal persons.

Dedicated drilling rig. A machine which creates bore holes and/or shafts in the ground.

Dedicated pile-driver. A machine that is designed to function exclusively as a pile-driver. These machines typically have the ability to both hoist the material that will be pile-driven and to pile-drive that material.

Dedicated spotter (power lines). To be considered a dedicated spotter, the requirements of WAC 296-155-53302 (Signal person qualifications) must be met and his/her sole responsibility is to watch the separation between the power line and the equipment, the load line and load (including rigging and lifting accessories), and ensure through communication with the operator that the applicable minimum approach distance is not breached.

Derrick. An apparatus consisting of a mast or equivalent member held at the end by guys or braces, with or without a boom, for use with a hoisting mechanism and operating ropes.

Design factor. The ratio between nominal or minimum breaking strength and rated load.

Digger derrick. A multipurpose vehicle-mounted machine which is primarily designed to accommodate components that dig holes, set poles, and position materials and apparatus.

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

Dismantling. Includes dismantling (such as dismantling to shorten a boom or substitute a different component).

Drum rotation indicator. A device on a crane or hoist which indicates in which direction and at what relative speed a particular hoist drum is turning.

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

Employer-made equipment. Floating cranes/derricks designed and built by an employer for your own use.

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

Equipment criteria. Instructions, recommendations, limitations and specifications.

Fabric (metal mesh). The flexible portion of the sling exclusive of end fittings consisting of a series of transverse spirals and cross rods.

Fall protection equipment. Guardrail systems, safety net systems, personal fall arrest systems, positioning device systems or fall restraint systems.

Fall restraint system. A fall protection system that prevents the user from falling any distance. The system is comprised of either a body belt or body harness, along with an anchorage, connectors, and other necessary equipment. The other components typically include a lanyard, and may also include a lifeline and other devices.

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

Flange points. A point of contact between rope and drum flange where the rope changes layers.

Floating cranes/derricks. Equipment designed by the manufacturer (or employer) for marine use by permanent attachment to a barge, pontoons, vessel or other means of flotation.

Free fall (of the load line). When only the brake is used to regulate the descent of the load line (the drive mechanism is not used to drive the load down faster or retard its lowering).

Free rated load test. Testing stability and operation of crane, carrier, wheels, tires, tracks, brakes, etc., under load, when lifting without outriggers and/or traveling with the load are permitted at the activity for the type of crane being tested.

Free surface effect. The uncontrolled transverse movement of liquids in compartments which reduce a vessel's transverse stability.

Functional testing. The testing of a crane, typically done with a light load or no load, to verify the proper operation of a crane's primary function, i.e., hoisting, braking, booming, swinging, etc. A functional test is contrasted to testing the crane's structural integrity with heavy loads.

Gin pole derrick. A boom without a mast which has guys arranged from its top to permit leaning the mast in one or more directions. The load is lifted and lowered by ropes reeved through sheaves or blocks at the top of the mast and the lower block.

Ground conditions. The ability of the ground to support the crane/derrick (including slope, compaction, and firmness).

Ground crew. Those individuals who are involved in the personnel lift, other than the hoisting equipment operator and the platform occupants. These individuals include riggers, signal persons, and supervision.

Gudgeon pins. A pin connecting the mast cap to the mast allowing rotation of the mast.

Guy. A rope used to steady or secure the mast, boom, or other member in the desired position.

Hairpin anchors. A hairpin-shaped, guy-supporting anchor that is placed in footings or walls before concrete is poured and held in place by the cured concrete.

Hitch (hitched). A method of rigging (attaching) a sling temporarily to a load or object for the purpose of lifting.

Hoist. A mechanical device for lifting and lowering loads by winding rope onto or off a drum.

Hoisting. The act of raising, lowering or otherwise moving a load in the air with equipment covered by this standard. As used in this standard, "hoisting" can be done by means other than wire rope/hoist drum equipment.

Hoisting equipment. A machine for lifting and lowering a load and moving it horizontally. The machine may be fixed or mobile and be driven manually, by power, or by a combination of both.

Hook latch. A mechanical device used to close the throat opening of a hook.

Insulating link/device. An insulating device listed, labeled, or accepted by a nationally recognized testing laboratory in accordance with 29 C.F.R. 1910.7.

Intermediate rail. The middle member of a barrier along the edges of a platform, located approximately one-half the distance between the platform floor and top rail.

Jib. An extension attached to the boom point to provide added boom length for lifting specified loads. The jib may be in line with the boom or offset to various angles in the vertical plane of the boom. For tower cranes, see boom (tower cranes).

Jib stop (also referred to as a jib backstop). The same type of device as a boom stop but is for a fixed or luffing jib.

Land crane/derrick. Equipment not originally designed by the manufacturer for marine use by permanent attachment to barges, pontoons, vessels, or other means of flotation.

Lift director. A qualified person that has taken and passed a written test, based on the directions laid out in WAC 296-155-53301. A qualification cannot exceed a 5-year period; this qualification must be renewed every 5 years to ensure lift directors maintain qualified status. At a minimum, this renewal must include a documented written exam. A lift director must also be a current qualified rigger.

Commented [SBS(6]: New definition for existing required person.

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

Live boom. A boom whose lowering is controlled by a brake without the aid of other lowering retarding devices (free-fall capable).

Live load line. A load line whose lowering is controlled by a brake without the aid of other lowering retarding devices (free-fall capable).

Load. The weight of the object being lifted or lowered, including the weight of the load-attaching equipment such as the load block, ropes, slings, shackles, and any other auxiliary attachment.

Load moment (or rated capacity) indicator. A system which aids the equipment operator by sensing the overturning moment on the equipment, i.e., load X radius. It compares this lifting condition to the equipment's rated capacity, and indicates to the operator the percentage of capacity at which the equipment is working. Lights, bells, or buzzers may be incorporated as a warning of an approaching overload condition.

Load moment (or rated capacity) limiter. A system which aids the equipment operator by sensing the overturning moment on the equipment, i.e., load X radius. It compares this lifting condition to the equipment's rated capacity, and when the rated capacity is reached, it shuts off power to those equipment functions which can increase the severity of loading on the equipment, e.g., hoisting, telescoping out, or luffing out. Typically, those functions which decrease the severity of loading on the equipment remain operational, e.g., lowering, telescoping in, or luffing in.

Load ratings. A set of rated loads for stipulated hoisting equipment configurations and operating conditions.

Load sustaining/bearing parts. Those parts of a crane that support the crane or load and upon failure could cause dropping, uncontrolled shifting, or uncontrolled movement of the crane or load.

Locomotive crane. A crane mounted on a base or car equipped for travel on a railroad track.

Luffing boom. A member hinged to the rotating superstructure and used for supporting the hoisting tackle.

Luffing jib limiting device. Similar to a boom hoist limiting device, except that it limits the movement of the luffing jib.

Marine worksite. A construction worksite located in, on or above the water.

Master coupling link. An alloy steel welded coupling link used as an intermediate link to join alloy steel chain to master links.

Master link. Forged or welded steel link used to support all members (legs) of an alloy steel chain sling or wire rope sling.

Mechanical coupling link (alloy steel chain). A nonwelded, mechanically closed link used primarily to attach fittings to alloy steel chain.

Mobile cranes. A lifting device incorporating a cable suspended latticed boom or hydraulic telescopic boom designed to be moved between operating locations by transport over the road.

Moving point-to-point. The times during which an employee is in the process of going to or from a work station.

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

Multiple lift rigging. A rigging assembly manufactured by wire rope rigging suppliers that facilitates the attachment of up to 5 independent loads to the hoist rigging of a crane.

Nationally recognized accrediting agency. An organization that, due to its independence and expertise, is widely recognized as competent to accredit testing organizations.

Nonconductive. Because of the nature and condition of the materials used, and the conditions of use (including environmental conditions and condition of the material), the object in question has the property of not becoming energized (that is, it has high dielectric properties offering a high resistance to the passage of current under the conditions of use).

Nonstandard tower crane base. Any deviation from the structural support or base configuration recommended by the crane manufacturer.

Occasional or routine maintenance and repair work. Regular, customary and foreseeable work necessary to keep equipment in good repair and/or condition. This also includes regular, customary and foreseeable work necessary to return equipment to sound condition after damage.

Operational aid. An accessory that provides information to facilitate operation of a crane or that takes control of particular functions without action of the operator when a limiting condition is sensed. Examples of such devices include, but are not limited to, the following: Anti-two-block device, rated capacity indicator, rated capacity (load) limiter, boom angle or radius indicator, lattice boom hoist disconnect device, boom length indicator, drum rotation indicator, load indicator, and wind speed indicator.

Operational controls. Levers, switches, pedals and other devices for controlling equipment operation.

Operator. A person who is operating the equipment.

Outriggers. Extendable or fixed members attached to the mounting base, which rests on supports at the outer ends, used to support the crane.

Overhead/bridge and gantry cranes. Includes overhead/bridge cranes, cranes on monorails, under hung 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.

Pendants. Includes both wire and bar types. Wire type: A fixed length of wire rope with mechanical fittings at both ends for pinning segments of wire rope together. Bar type: Instead of wire rope, a bar is used. Pendants are typically used in a latticed boom crane system to easily change the length of the boom suspension system without completely changing the rope on the drum when the boom length is increased or decreased.

Personal fall arrest system. A system used to arrest an employee in a fall from a working level. It consists of an anchorage, connectors, and a body harness and may include a lanyard, deceleration device, lifeline, or suitable combination of these.

Personnel lifting. Raising, lowering, or transporting personnel using a crane/derrick.

Personnel platform - Boom attached. A platform attached to the boom of the crane.

Personnel platform - Suspended. A platform attached to a crane/derrick using wire rope, chain, or a jointed attachment and that has no installed motion controls for the platform itself.

Personnel platform suspension system. The rope or chain slings and other components, including fastening devices, used to connect the crane/derrick to the personnel platform.

Platform occupant. A person who is within the guardrail barrier while the personnel platform is in a hoisted position.

Platform rating. The maximum capacity of a personnel lifting platform, established by the platform manufacturer, in terms of total weight and the number of occupants allowed.

Portal crane. A type of crane consisting of a rotating upper structure, hoist machinery, and boom mounted on top of a structural gantry which may be fixed in one location or have travel capability. The gantry legs or columns usually have portal openings in between to allow passage of traffic beneath the gantry.

Power controlled lowering. A system or device in the power train, other than the load hoist brake, that can regulate the lowering rate of speed of the load hoist mechanism.

Powerhouse. A plant wherein electric energy is produced by conversion from some other form of energy (e.g., chemical, nuclear, solar, mechanical, or hydraulic) by means of suitable apparatus. This includes all generating station auxiliaries and other associated equipment required for the operation of the plant. Not included are stations producing power exclusively for use with communication systems.

Power lines. Electrical distribution and electrical transmission lines.

Procedures. Include, but are not limited to: Instructions, diagrams, recommendations, warnings, specifications, protocols, and limitations.

Proximity alarm. A device that provides a warning of proximity to a power line that has been listed, labeled or accepted by a nationally recognized testing laboratory in accordance with 29 C.F.R. 1910.7.

Qualified crane operator. A crane operator who meets the requirements established by the department under RCW 49.17.430, along with having a current evaluation for the equipment they will be operating.

Commented [SBS(7]: Added language including the evaluation

Qualified evaluator (not a third party). A person employed by the signal person's or the rigger's employer (as applicable) who has demonstrated that he/she is competent in accurately assessing whether individuals meet the qualification requirements in this part for a signal person or a rigger.

Commented [SBS(8]: Possibly add in lift director as well? Example: …employed by the lift director, signal person's, or the rigger's employer…

Qualified evaluator (third party). An entity that, due to its independence and expertise, has demonstrated that it is competent in accurately assessing whether individuals meet the qualification requirements in this part for a signal person or a rigger.

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

Qualified rigger. A rigger who meets the requirements in WAC 296-155-53306.

Qualified signal person. A signal person who meets the requirements in WAC 296-155-53302.

Range control limit device. A device that can be set by an equipment operator to limit movement of the boom or jib tip to a plane or multiple planes.

Range control warning device. A device that can be set by an equipment operator to warn that the boom or jib tip is at a plane or multiple planes.

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

Rated capacity indicator. See load moment indicator.

Rated capacity limiter. See load moment limiter.

Repetitive pickup points. Refer to, when operating on a short cycle operation, the rope being used on a single layer and being spooled repetitively over a short portion of the drum.

Rotation resistant rope. A type of wire rope construction which reduces the tendency of a rope to rotate about its axis under load. Usually, this consists of an inner system of core strands laid in one direction covered by an outer system of strands laid in the opposite direction.

RPE. A registered professional engineer licensed under RCW 18.43.040(1).

RPSE. A registered professional structural engineer licensed under RCW 18.43.040(1).

Running wire rope. A wire rope that moves over sheaves or drums.

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

Safety devices. Examples of safety devices are, but are not limited to, the following: Horn, boom/jib or trolley stops, crane level indicator, hydraulic holding device/check valve, rail clamps, rail stops, brakes, deadman control or forced neutral return control, emergency stop switch, guards, handrails, audible and visual alarms, etc.

Safety or health standard. A standard adopted under this chapter.

Section. A section of this part, unless otherwise specified.

Side-boom crane. A track-type or wheel-type tractor having a boom mounted on the side of the tractor, used for lifting, lowering, or transporting a load suspended on the load hook. The boom or hook can be lifted or lowered in a vertical direction only.

Sling. An assembly to be used for lifting when connected to a lifting mechanism. The upper portion of the sling is connected to the lifting mechanism and the lower supports the load, as described in this part.

Special hazard warnings. Warnings of site-specific hazards (for example, proximity of power lines).

Spiral. A single transverse coil that is the basic element from which metal mesh is fabricated.

Stability (flotation device). The tendency of a barge, pontoons, vessel, or other means of flotation to return to an upright position after having been inclined by an external force.

Stabilizer. An extendable or fixed member attached to the mounting base to increase the stability of the crane, but that may not have the capability of relieving all of the weight from the wheels or tracks.

Standard method. The hand signals established in the applicable ASME B30 series and WAC 296-155-56400, Mobile crane hand signal chart.

Standing wire rope. A supporting wire rope which maintains a constant distance between the points of attachment to the two components connected by the wire rope.

Superstructure. See upperworks.

Supporting materials. Blocking, mats, cribbing, marsh buggies (in marshes/wetlands), or similar supporting materials or devices.

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

Tender. An individual responsible for monitoring and communication with a diver.

Tilt up or tilt down operation. Raising/lowering a load from the horizontal to vertical or vertical to horizontal.

Toe board. A vertical barrier at foot level, along the edges of the platform, to protect against material from falling over the edge.

Top rail. The top member of a barrier along the edges of a platform to protect against persons from falling off the platform.

Tower crane. A type of lifting structure which utilizes a vertical mast or tower to support a working boom (jib) in an elevated position. Loads are suspended from the working boom. While the working boom may be of the fixed type (horizontal or angled) or have luffing capability, it can always rotate to swing loads, either by rotating on the top of the tower (top slewing) or by the rotation of the tower (bottom slewing). The tower base may be fixed in one location or ballasted and moveable between locations. Mobile cranes that are configured with a luffing jib and/or tower attachments are not considered tower cranes under this part.

Travel. The function of the hoisting equipment moving under its own power from one location to another.

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

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

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

Unavailable procedures. Procedures that are no longer available from the manufacturer, or have never been available from the manufacturer.

Upperstructure. See upperworks.

Upperworks. The revolving frame of equipment on which the operating machinery (and many cases the engine) are mounted along with the operator's cab. The counterweight is typically supported on the rear of the upperstructure and the boom or other front end attachment is mounted on the front.

Up to. Means "up to and including."

Vertical hitch. A method of rigging a sling in which the load is attached to the loop eye or end fitting at one end of the sling and the loop eye or end fitting at the other end is attached to the lifting device. Any hitch less than 5 degrees from the vertical may be considered a vertical hitch.

Wire rope. A flexible rope constructed by laying steel wires into various patterns of multiwired strands around a core system to produce a helically wound rope.

Working load. The external load applied to the hoisting equipment, including the personnel lifting platform, its contents, and the load attaching equipment, such as lowered load block, shackles, and slings.

WAC 296-155-53100 Accreditation of crane certifiers of cranes and ~~derricks~~ equipment – requirements.

(1) Any person engaging in the testing, examination or inspection for the certification of a crane, used in lifting at a construction site, must apply for and obtain a certificate of accreditation from the department pursuant to this rule. For the purposes of this rule an "accredited crane certifier" refers to any individual holding a certificate of accreditation pursuant to this regulation.

~~(2) Any person authorized by the department to certify maritime cranes prior to the effective date of this rule may continue to perform services under this regulation until January 1, 2012. Any accredited crane certifier desiring to continue providing services pursuant to this rule must have applied for and obtained a certificate of accreditation under these rules from the department prior to January 1, 2012. Maritime certifiers wishing to perform construction crane certifications must notify the department that they will perform construction crane certifications. In addition, the maritime certifier must specify which cranes they are qualified to inspect under their maritime certificate. The department may issue these individuals a provisional accreditation specifying the crane types they are authorized to inspect which will be~~

Commented [ICD(9]: Bill – the language you wanted me to remove has already been removed, probably with the eRules filing.

Commented [SBS(10R9]: I still see it on the Washington State Legislature page, updated on 4-19-16

Commented [SBS(11]: Removed the second portion of this code, which made outdated in effect references

~~valid through December 31, 2011, or upon expiration of their maritime certification, whichever is earlier. Any provisionally accredited crane certifier desiring to continue providing services pursuant to this rule must have applied for and obtained a certificate of accreditation under these rules from the department prior to January 1, 2012.~~

(~~3~~2) Crane certifiers accredited by any other state or governmental entity may be authorized to inspect cranes in Washington state provided the certifier submits an application and resume along with the certificate of accreditation from that state or governmental entity, and the types of cranes they are authorized to inspect. The department may issue these individuals a provisional accreditation specifying the crane types they are authorized to inspect which will be valid through December 31, 2011, or upon expiration of their out-of-state certification, whichever is earlier. Any provisionally accredited crane certifier desiring to continue providing services pursuant to this rule must have applied for and obtained a certificate of accreditation under these rules from the department prior to January 1, 2012.

Commented [SBS(12]: Remove the underlined portion

(~~4~~2) No person that has modified, altered, or repaired a crane which affected a load sustaining member of the crane may conduct the certifying inspection and proof load testing of that particular crane within the same certification period.

WAC 296-155-53114 Issuance of temporary and annual certificates of operation.

(1) Accredited crane certifiers will issue a temporary certificate of operation if upon inspection and load proof testing no deficiencies were found that would affect the safe operation of the crane. The certifier must issue the temporary certificate within 8 hours upon completion of the inspection.

Commented [SBS(13]: Adding a timeframe for temporary cert issuance.

(7) The temporary or annual certificate of operation must be posted in the operator's cab or with the operator's manual. An accessible digital copy in the operator's cab or with the operator's manual will satisfy this requirement.

Commented [SBS(14]: Allowing for a QR code or similar annual inspection

WAC 296-155-53200 General inspection criteria, wire rope inspection and removal criteria, and preproof load test requirements for all cranes.

WAC 296-155-53200 General inspection criteria, wire rope inspection and removal criteria, and preproof load test requirements for all cranes.

(1) The accredited crane certifier must review the following documents as part of the crane certification process:

(a) Crane maintenance records of critical components to ensure maintenance of these components has been performed in accordance with the manufacturer's recommendations.
(b) Crane monthly and annual inspection documentation.
(c) Any red tags issued to the equipment. A red tag must be lifted prior to the equipment being certified.

Commented [SBS(15]: New language aiming to have a crane completely put into a safe and operational order prior to being allowed to be certified.

(7) **Prior to performing a proof load test:**

(a) A safe test area must be selected and all traffic and unauthorized personnel and equipment must be cleared from test area. This test area must be roped off or otherwise secured to prevent entry of unauthorized personnel and equipment;
(b) Rigging gear must be inspected by a qualified person prior to using for load test of crane;
(c) You must ensure all load test personnel understand the safety procedures of the test;
(d) Proof load tests, with the exception of tower cranes, are overload tests and extreme caution must be observed at all times. Personnel must remain clear of suspended loads and areas where they could be struck in the event of boom failure. The test load must be raised only to a height sufficient to perform the test;
(e) During tests, safe operating speeds must be employed. Rated speeds in accordance with manufacturer's specifications need not be attained. Emphasis must be placed on the ability to safely control loads through all motions at normal speeds;
(f) Proof load tests require the use of freely suspended certified weights, or scaled weights using a certified scale with a current certificate of calibration; however, line pull test can be accomplished using a static test; and a certified scale with a current certificate of calibration;
(g) Proof load tests must not exceed the manufacturer's specifications. Where these specifications are unavailable, a registered professional engineer
(h) Any hoist line not proof load tested is not considered certified. The proof test load includes the weight of (or deduction values for) the hook, block, slings, and auxiliary lifting devices (and for some cranes hoist wire rope not accounted for in load charts), and the combined weight deduction values must be subtracted from the nominal test load in order to determine the amount of test weights to be used. Follow original equipment manufacturer (OEM) load chart instructions for weight deduction values.

Commented [SBS(16]: New language to help give guidance on how to properly do a proof load test.

WAC 296-155-53202 Additional inspection criteria and proof load testing--Mobile cranes.

(4) **Annual and quadrennial proof load testing.**

Commented [SBS(17]: Remove the underlined since this doesn't apply to construction

WAC 296-155-533 Qualifications and certification.

WAC 296-155-53300 Operator qualifications and certification.

(1) Prior to operating any crane/equipment covered under chapter 296-155 WAC, Part L, with the exception of the trainee/apprentice requirements outlined in subsection (2) of this section and those cranes/equipment exempt in WAC 296-155-52900(3), ~~you~~ the employer must ensure that the operator meets the following requirements:

(a) Has been trained and evaluated in accordance with WAC 296-155-53300(3) and ~~H~~has a valid crane/equipment operator certificate, for the type of crane/equipment to be operated, issued by a crane/equipment operator testing organization which has an accredited program, accredited by a nationally recognized accrediting agency. The operator certification must include a successful passing of a written and practical examination for each crane/equipment category listed in Table 3 and by crane/equipment type for mobile cranes/equipment.

(i) Provide certification based on equipment type, or type and capacity.

(ii) Have procedures for operators to re-apply and be re-tested in the event an operator applicant fails a test or is decertified.

(iii) Have testing procedures for re-certification designed to ensure that the operator continues to meet the technical knowledge and skills requirements in paragraphs (1)(b) and (1)(c) of this section.

(iv) Have its accreditation reviewed by the nationally recognized accrediting agency at least every 3 years.

Commented [ICD(18]: Need to look at organization and flow

(b) A determination through a written test that:

(i) The individual knows the information necessary for safe operation of the specific type of crane/~~derrick~~ equipment the individual will operate, including all of 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 crane/~~derrick~~ equipment.

(C) Procedures for preventing and responding to power line contact.

(D) Technical knowledge similar to the subject matter criteria listed in WAC 296-155-56420 of this part applicable to the specific type of crane/~~derrick~~ equipment the individual will operate. Use of WAC 296-155-56420 criteria meets the requirements of this provision.

(E) Technical knowledge applicable to:
(I) The suitability of the supporting ground and surface to handle expected loads.
(II) Site hazards.
(III) Site access.
(F) This part, 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 (i) of this subsection.

(iii) Language and literacy requirements. Tests under this section may be administered verbally, with answers given verbally, where the operator candidate:
(A) Passes a written demonstration of literacy relevant to the work.
(B) Demonstrates the ability to use the type of written manufacturer procedures applicable to the class/type of equipment for which the candidate is seeking certification.

Commented [SBS(19)]: OSHA language. Not sure on placement or wording.

(iv) Tests under this section may be administered in any language the operator candidate understands, and the operator's certification documentation must note the language in which the test was given. The operator is only permitted to operate equipment that is furnished with materials required by this subpart, such as operations manuals and load charts, that are written in the language of the certification.

(c) A determination through a practical test that the individual has the skills necessary for safe operation of the crane/~~derrick~~equipment, including the following:
(i) Ability to recognize, from visual and auditory observation, the items listed in WAC 296-155-53405(2).
(ii) Operational and maneuvering skills.
(iii) Application of load chart information.
(iv) Application of safe shut-down and securing procedures.

Notes: • An operator's certificate issued by the accredited testing agency is valid for a 5-year period, and must be renewed to ensure operators maintain qualified operator status.
• For self-erecting tower cranes, the department will accept a tower crane certification issued by a nationally accrediting testing agency.
• For derricks, the department will accept, at a minimum, a lattice boom truck or crawler mobile crane operator's certificate.
• An operator will be deemed certified to operate a crane if the operator is certified under (a) of this subsection for the type and capacity of the crane or for higher-capacity crane of the same type.
• For PIT operators, the department will accept a fixed cab crane certification issued by a nationally accrediting testing agency.

Commented [SBS(20)]: Removed qualified and replaced with certified. Another option is to keep "qualified" but then also add in that the operator must also be evaluated.

(d) No cost to employees. Whenever operator certification/licensure or re-certification is required under this section, the employer must provide the certification/licensure at no cost to employees.

Commented [ICD(21]: Are the new (d) and (e) in the right location? Yes

(e) Provision of testing and training. A testing entity is permitted to provide training as well as testing services as long as the criteria of the accrediting agency for an organization providing both services are met.

(~~d~~f) If no accredited testing agency offers certification examinations for a particular type of equipment, an operator will be deemed to have complied with the certification requirements of this section for that equipment if the operator has been certified for the type that is most similar to that equipment by a nationally accredited testing agency. The operator's certificate must state the type of equipment for which the operator is certified.

Commented [SBS(22]: Using mostly the new OSHA language

Note: *For powered industrial truck (PIT) operators, the department will accept a fixed cab crane certification issued by a nationally accrediting testing agency.*

(~~e~~g) Has crane hours of experience as shown in Table 3; and

(~~f~~h) Pass a substance abuse test conducted by a recognized laboratory at least every 5 years.

Exemption: When it is necessary in the performance of their duties, manufacture representatives, factory representatives and maintenance personnel are not required to be certified crane operators.

Crane Operator Experience for Cranes Used in the Construction Industry
Table 3

The 5 Categories of Cranes and their Types	Number of Hours of Actual Crane Operating Experience	Number of Hours of Crane Related Experience
(1) Mobile Cranes		
(a) Lattice Boom Crawler Cranes (LBC)	300 tons and above 1000 Hours	300 tons and above 1000 Hours
	Under 300 tons 500 Hours	Under 300 tons 500 Hours
(b) Lattice Boom Truck Cranes (LBT)	300 tons and above 1000 Hours	300 tons and above 1000 Hours
	Under 300 tons 500 Hours	Under 300 tons 500 Hours
(c) Large Telescopic Boom Cranes (Swing Cab) (TLL) (including digger derricks)	Over 130 tons 750 Hours	Over 130 tons 750 Hours

	Over 40 tons to 130 tons 250 Hours	Over 40 tons to 130 tons 250 Hours
	40 tons and under 40 Hours	40 tons and under 40 Hours
(d) Small Telescopic Boom Cranes (Fixed Cab) (TSS) (including digger derricks)	15 tons and above 40 Hours	15 tons and above 40 Hours
	Over 5 tons and under 15 tons 20 Hours	Over 5 tons and under 15 tons 20 Hours
	5 tons and under 8 hours	5 tons and under 16 hours
(2) Articulating Boom Cranes	20 Hours	20 Hours
(3) Tower Cranes		
(a) Hammerhead	500 Hours	500 Hours
(b) Luffer	500 Hours	500 Hours
(c) Self-Erecting	50 Hours	50 Hours
(4) Overhead/Bridge and Gantry Cranes		
(a) Cab Operated	40 Hours	40 Hours
(b) Pendant/Remote	40 Hours	40 Hours
(5) Derricks (not including digger derricks)	20 Hours	500 Hours
Hours of actual crane operating experience. For all cranes: Time while the operator is at the controls of the crane; and/or has direct control of that crane; and/or a combination of operating hours within the same crane type. For mobile cranes: It also includes time while installing/removing boom sections, luffing boom, jib, extending and retracting outriggers/stabilizers, leveling crane, and replacing hoisting rope. For tower cranes: It includes time while jumping (increasing the height of the tower/mast). **Note:** Additional actual crane operator experience may account for crane related experience.		
Hours of crane related experience: Time as a signalperson/bellman, oiler, crane mechanic, crane inspector, formal classroom training, crane simulator operation, and a combination of operating hours on other categories of cranes.		

Note: Cranes and other lifting machines covered under this part that are exempt can be found in WAC 296-155-52900(3).

(2) Prequalification/certification training period. An employee who is not a qualified crane operator as outlined in subsection (1) of this section is permitted to operate the crane as part of his/her training providing the following requirements are met:

(a) Prior to operating the equipment, the employer must provide each ~~The employee ("~~trainee/apprentice~~") must be provided~~ with sufficient training, through a combination of formal and practical instruction, to ensure that the trainee develops the skills, knowledge, and ability to recognize and avert risk necessary to operate the equipment safely for assigned work ~~prior to operating the crane to enable the trainee to operate the crane safely~~under limitations established by this section (including continuous supervision) and any additional limitations established by the employer.

(b) The tasks performed by the trainee/apprentice while operating the crane must be within the trainee's ability, as determined by the supervising qualified crane operator.

(c) Qualified crane/~~derrick~~ equipment operator. While operating ~~the~~ crane/~~derrick~~equipment covered within Part L, the trainee/apprentice must be continuously supervised by a qualified crane/~~derrick~~ equipment operator who meets the following requirements:

(i) The qualified crane/~~derrick~~ equipment operator is an employee or agent of the trainee's/apprentice's employer.

(ii) The qualified crane/~~derrick~~ equipment operator under this section is familiar with the proper use of the crane's/~~derrick's~~ equipment's controls.

(iii) While supervising the trainee/apprentice, the qualified crane/~~derrick~~ equipment operator performs no tasks that detract from the qualified crane/~~derrick~~ equipment operator's ability to supervise the trainee/apprentice.

(iv) For cranes/equipment other than tower cranes: The qualified crane/~~derrick~~ equipment operator and the trainee/apprentice must be in direct line of sight of each other. In addition, they must communicate verbally or by hand signal.

(v) For tower cranes: The qualified crane operator and the trainee/apprentice must be in direct communication with each other.

(d) The employer may only assign tasks within ~~T~~the trainee/apprentice ability. The trainee/apprentice must not operate the ~~crane~~ equipment in any of the following circumstances:

(i) If any part of the~~crane~~ equipment, load line or load (including rigging and lifting accessories), if operated up to the~~crane's~~ equipment's maximum working radius in the work zone, could get within 20 feet of a power line that is up to 350 kV, or within 50 feet of a power line that is over 350 kV;

(ii) If the ~~crane~~ equipment is used to hoist personnel;

(iii) In a multiple-~~crane~~ equipment or multiple load line lift situations; ~~or~~

(iv) If the equipment is used over a shaft, cofferdam, or in a tank farm;

(~~i~~v) Multiple-lift rigging, as defined in WAC 296-155-52902, can only be accomplished by the trainee/apprentice when the qualified crane operator determines that the trainee's/apprentice's skills are sufficient for this high-skill work; or.

(vi) Critical lifts, as defined in WAC 296-155-52902, can only be accomplished by the trainee/apprentice when the qualified crane operator determines that the trainee's/apprentice's skills are sufficient for this high-skill work.

Commented [ICD(23]: Since we added a number do we want the "or" to be moved to the end of (v)? Yes Done

Commented [SBS(24]: OSHA language

(e) Retraining. The employer must provide retraining in relevant topics for each operator when, based on the performance of the operator or an evaluation of the operator's knowledge, there is an indication that retraining is necessary.

Commented [ICD(25]: Is this in the right spot? Or does it need to be a (4)? Keep here

(3) Evaluation.

(a) Through an evaluation, the employer must ensure that each operator is qualified by a demonstration of:

(i) The skills and knowledge, as well as the ability to recognize and avert risk, necessary to operate the equipment safely, including those specific to the safety devices, operational aids, software, and the size and configuration of the equipment. Size and configuration includes, but is not limited to, lifting capacity, boom length, attachments, luffing jib, and counterweight set-up.

(ii) The ability to perform the hoisting activities required for assigned work, including, if applicable, blind lifts, personnel hoisting, and multi-crane/equipment lifts.

(iii) The ability to travel the equipment (if equipment has ability to travel) complete proper set-up of crane into ready to use status for configurations required for assigned work (on rubber, extend outriggers for load charts used, extend tracks for load charts used)

Commented [ICD(26]: The additional language will add around 5-10 minutes on average to the new mandated evaluation requirement, which only needs to happen once.

(b) For operators employed prior to December 10, 2018, the employer may rely on its previous assessments of the operator in lieu of conducting a new evaluation of that operator's existing knowledge and skills.

Commented [ICD(27]: Need to look at date

Commented [SBS(28R27]: If we keep the date we are consistent with OSHA

(c) The evaluation required under paragraph (3) of this section must be conducted by an individual who has the knowledge, training, and experience necessary to assess equipment operators. This individual must have been certified for the type of crane/equipment they are evaluating on in accordance with the requirements in WAC 296-155-53300.

Commented [ICD(29]: Last sentence DOSH added

(d) The evaluator must be an employee or agent of the employer. Employers that assign evaluations to an agent retain the duty to ensure that the requirements in paragraph (3) are satisfied. Once the evaluation is completed successfully, the employer may allow the operator to operate other equipment that the employer

can demonstrate does not require substantially different skills, knowledge, or ability to recognize and avert risk to operate.

(e) The employer must document the completion of the evaluation. This document must provide: The operator's name; the evaluator's name and signature; the date; and the make, model, and configuration of equipment used in the evaluation. The employer must make the document available at the worksite while the operator is employed by the employer. For operators assessed per paragraph (3)(b) of this section, the documentation must reflect the date of the employer's determination of the operator's abilities and the make, model and configuration of equipment on which the operator has previously demonstrated competency.

(f) When an employer is required to provide an operator with retraining under paragraph (2)(e) of this section, the employer must re-evaluate the operator with respect to the subject of the retraining.

(4) *Language and literacy requirements.*

(a) Tests under this section may be administered verbally, with answers given verbally, where the operator candidate:

(i) Passes a written demonstration of literacy relevant to the work.

(ii) Demonstrates the ability to use the type of written manufacturer procedures applicable to the class/type of equipment for which the candidate is seeking certification.

(b) Tests under this section may be administered in any language the operator candidate understands, and the operator's certification documentation must note the language in which the test was given. The operator is only permitted to operate equipment that is furnished with materials required by this subpart, such as operations manuals and load charts, that are written in the language of the certification.

(3) You must obtain documentation showing hours of crane operator experience and crane related experience separated out by crane type and capacity.

Note: You may accept a signed declaration from the crane operator attesting to actual hours of crane operator experience and crane related experience separated out by crane type and capacity. For sample declaration form see WAC 296-155-56425.

(4) The department may recognize crane operator certification from another state or territory of the United States as equivalent to qualified crane operator requirements if the department determines that the other jurisdiction's credentialing standards are substantially similar to the qualified crane operator requirements.

(5) Crane operator experience and crane related experience must be documented and separated out by crane type and capacity; this documentation need only show the minimum amount of hours as outlined in Table 3 above. If you are documenting crane operating and/or related crane experience hours, you must provide a copy of the hours to the operator as soon as practical, if requested.

WAC 296-155-53301 Lift Director qualifications.

(1) The lift director must meet the qualification requirements prior to using a crane to perform hoisting activities. A lift director is required to be present and directly oversees all work that is being performed by a crane and the associated rigging crew. This requirement must be met by using either Option (1) or Option (2).

(a) Option (1) - Third-party qualified evaluator. The lift director has documentation from a third-party qualified evaluator showing that the lift director meets the qualification requirements listed in subsection (3) of this section.

(b) Option (2) - Employer's qualified evaluator. You have your qualified evaluator assess the individual and determine that the individual meets the qualification requirements listed in subsection (3) of this section and provides documentation of that determination. An assessment by an employer's qualified evaluator under this option is not portable meaning other employers are not permitted to use this qualification to meet the requirements of this section.

(c) You must make the documentation for whichever option is used available at the site while the lift director is employed by the employer.

(d) The lift director must also be a current qualified rigger and meet the definition of a qualified rigger found in WAC 296-155-53306.

(2) If subsequent actions by the lift director indicate that the individual may not meet the qualification requirements listed in subsection (3) of this section, you must not allow the individual to continue working as a lift director until retraining is provided and a reassessment

is made in accordance with subsection (1) of this section that confirms that the individual meets the qualification requirements.

(3) Qualification requirements. Each lift director must:

(a) Know, understand, and follow each duty listed in section WAC 296-155-53401(6).

(b) Know and understand the type of sling and hitch used. For example, if synthetic web slings are used, the lift director must know and understand the removal criteria for this type of sling and how to properly use the sling.

(c) Be competent in the application of the type of hitches used.

(d) Have an understanding of slings, rigging hardware and below-the-hook lifting devices (as applicable); their limitations, rigging practices, associated hazards and inspection requirements.

(e) Know and understand load weight estimation, center of gravity, effect of angles on rigging components, load turning, knots/tag lines, chain hoist/come-a-long usage, winch and block usage, and basic hand signals, as applicable.

(f) Know and understand the relevant requirements of WAC 296-155-53408, WAC 296-155-53401, WAC 296-155-556 through 296-155-56220 and this section.

(g) Demonstrate that they meet the requirements in (a) through (f) of this subsection through a written test and through a practical test. All tests must be documented.

(4) Qualification period. A lift director qualification cannot exceed a 5-year period; this qualification must be renewed every 5 years to ensure lift directors maintain qualified status. This renewal must include a documented written exam.

WAC 296-155-53302 Signal person qualifications.

(1) The signal person must meet the qualification requirements (subsection (3) of this section) prior to giving any signals to a crane/derrick operator. This requirement must be met by using either Option (1) or Option (2).

(a) 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 listed in subsection (3) of this section.

(b) Option (2) - Employer's qualified evaluator. You have your qualified evaluator assess the individual and determine that the individual meets the qualification requirements listed in subsection (3) of this section and provides documentation of that determination. An assessment by an employer's qualified evaluator under this option is not portable meaning other employers are not permitted to use this qualification to meet the requirements of this section.

(c) You must make the documentation for whichever option is used available at the site while the signal person is employed by the you. The documentation must specify each type of signaling (e.g., hand signals, radio signals, etc.) for which the signal person meets the requirements of subsection (3) of this section.

(2) If subsequent actions by the signal person indicate that the individual may not meet the qualification requirements listed in subsection (3) of this section, you must not allow the individual to continue working as a signal person until retraining is provided and a reassessment is made in accordance with subsection (1) of this section that confirms that the individual meets the qualification requirements.

(3) Qualification requirements. Each signal person must:

(a) Know and understand the type of signals used. For example, if hand signals are used, the signal person must know and understand the standard method for hand signals.

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

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

(d) Know and understand the relevant requirements of WAC 296-155-53406 and this section.

(e) Demonstrate that they meet the requirements in (a) through (d) of this subsection through an oral or written test, and through a practical test. All tests must be documented.

(4) Qualification period. A signal person qualification cannot exceed a 5-year period; this qualification must be renewed every 5 years to ensure signal persons maintain qualified status. At a minimum, this renewal must include a documented written or oral or practical exam.

WAC 296-155-53304 Repair, inspection, and maintenance employee qualifications.

(1) Repair, inspection, and maintenance personnel are permitted to operate the crane/derrick only where all of the following requirements are met:

(a) The operation is limited to those functions necessary to perform maintenance, inspect or verify the performance of the crane/derrick.

(b) The personnel either:

(i) Operate the crane/derrick under the direct supervision of an operator who meets the requirements of WAC 296-155-53300, Operator qualification and certification; or

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

(2) Maintenance and repair personnel must meet the definition of a qualified person with respect to the crane/derrick and maintenance/repair tasks performed.

WAC 296-155-53306 Rigger qualifications.

(1) The rigger must meet the qualification requirements (subsection (3) of this section) prior to performing hoisting activities for assembly and disassembly work (WAC 296-155-53402 (19)(a)). A qualified rigger is required whenever 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 (WAC 296-155-53400 (43)(c)). This requirement must be met by using either Option (1) or Option (2).

(a) Option (1) - Third-party qualified evaluator. The rigger has documentation from a third-party qualified evaluator showing that the rigger meets the qualification requirements listed in subsection (3) of this section.

(b) Option (2) - Employer's qualified evaluator. You have your qualified evaluator assess the individual and determine that the individual meets the qualification requirements listed in subsection (3) of this section and provides documentation of that

determination. An assessment by an employer's qualified evaluator under this option is not portable meaning other employers are not permitted to use this qualification to meet the requirements of this section.

(c) You must make the documentation for whichever option is used available at the site while the rigger is employed by the employer. The documentation must specify each type of rigging for which the rigger meets the requirements of subsection (3) of this section.

(2) If subsequent actions by the rigger indicate that the individual may not meet the qualification requirements listed in subsection (3) of this section, you must not allow the individual to continue working as a rigger until retraining is provided and a reassessment is made in accordance with subsection (1) of this section that confirms that the individual meets the qualification requirements.

(3) Qualification requirements. Each rigger must:

(a) Know and understand the requirements located in ASME B30.7-2016, Base-Mounted Drum Hoists, B30.9-2018, Slings, B30.10-2014, Hooks, B30.16-2017, Overhead Hoists (Underhung), B30.20-2018, Below-the-Hook Lifting Devices, B30.21-2014, Manually Lever Operated Hoists and B30.26-2015, Rigging Hardware, as applicable.

Commented [SBS(30]: New ASME references

(b) Know and understand the type of sling and hitch used. For example, if synthetic web slings are used, the rigger must know and understand the removal criteria for this type of sling and how to properly use the sling.

(c) Be competent in the application of the type of hitches used.

(d) Have a basic understanding of slings, rigging hardware and below-the-hook lifting devices (as applicable); their limitations, rigging practices, associated hazards and inspection requirements.

(e) Know and understand load weight estimation, center of gravity, effect of angles on rigging components, load turning, knots/tag lines, chain hoist/come-a-long usage, winch and block usage, and basic hand signals, as applicable.

(f) Know and understand the relevant requirements of WAC 296-155-556 through 296-155-56220 and this section.

(g) Demonstrate that they meet the requirements in (a) through (e) of this subsection through a written test and through a practical test. All tests must be documented.

Notes: • The provisions of subsection (3)(g) of this section are not required until February 1, 2013.
• This section does not require that each and every worker associated with the rigging of a component or structure to be a "fully qualified rigger" as defined in this section, the requirement is for at least one of the workers to be a fully qualified rigger. However, all other associated workers must be qualified by training or experience to perform their assigned tasks (WAC 296-155-035(2)).

Commented [SBS(31]: Delete since this is already in effect

(4) Qualification period. A rigger qualification cannot exceed a 5-year period; this qualification must be renewed every 5 years to ensure riggers maintain qualified status. At a minimum, this renewal must include a documented written exam.

WAC 296-155-534 General requirements for all cranes and derricks.

WAC 296-155-53400 General requirements.

(1) All cranes and derricks covered under this part, except for those exempted in WAC 296-155-52900(3), must be certified annually by an accredited certifier recognized by the department, for detailed information about this certification see WAC 296-155-532.

(2) All crane and derrick operators covered under this part, except for those exempted in WAC 296-155-52900(3), must be qualified as required by WAC 296-155-533.

(3) (a) Cranes must meet the requirements for design, construction, installation and testing as prescribed in the applicable ASME standard at the time the crane or derrick was manufactured.

(b) Where manufacturer's specifications are not available the limitations assigned to the crane must be based on the determinations of a registered professional engineer (RPE), competent in this field and such determinations must be appropriately documented and recorded.

(c) Attachments used with cranes must not exceed the capacity, rating, or scope recommended by the manufacturer or RPE.

(4) Unavailable operation procedures.
(a) Where the manufacturer procedures are unavailable, you must develop and ensure compliance with all procedures necessary for the safe operation of the crane/derrick and attachments.

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

(c) Procedures related to the capacity of the crane/derrick must be developed and signed by a registered professional engineer familiar with this equipment.

(5) Warning decals and placards must be installed and legible as prescribed by this part and the crane manufacturer.

(6) The procedures applicable to the operation of the crane/derrick including a legible and applicable operator's manual and load rating chart, written in the English language with customary grammar and punctuation, must be in the operator's cab or station when the crane is in operation. Where rated capacities are available in the cab only in electronic form: In the event of a failure which makes the rated capacities inaccessible, the operator must immediately cease operations or follow safe shut-down procedures until the rated capacities (in electronic or other form) are available.

(7) Rated capacity and related information. The information available in the operator's cab or station (see WAC 296-155-53400(6)) regarding "rated capacity" and related information must include, at a minimum, the following information:

(a) A complete range of the manufacturer's rated capacities, as follows:
(i) At all manufacturer approved operating radii, boom angles, work areas, boom lengths and configurations, jib lengths and angles (or offset).
(ii) Alternate ratings for use and nonuse of optional equipment which affects rated capacities, such as outriggers, stabilizers, and extra counterweights.
(iii) When available from the manufacturer load ratings where structural competence governs lifting performance must be identified.

(b) A work area chart for which capacities are listed in the load chart.

Note: An example of this type of chart for mobile cranes is in WAC 296-155-56435.

(c) The work area figure and load chart must clearly indicate the areas where no load is to be handled.

(d) Recommended reeving for the hoist lines must be shown.

(e) Recommended parts of hoist reeving, size, and type of wire rope for various crane loads.

(f) Recommended boom hoist reeving diagram, where applicable; size, type, and length of wire rope.

(g) Tire pressure (where applicable).

(h) Caution or warnings relative to limitations on cranes and operating procedures, including an indication of the least stable direction.

(i) Position of the gantry and requirements for intermediate boom suspension (where applicable).

(j) Instructions for boom erection and conditions under which the boom, or boom and jib combinations, may be raised or lowered.

(k) Whether the hoist holding mechanism is automatically or manually controlled, whether free fall is available, or any combination of these.

(l) The maximum telescopic travel length of each boom telescopic section.

(m) Whether sections are telescoped manually or with power.

(n) The sequence and procedure for extending and retracting the telescopic boom section.

(o) Maximum loads permitted during the boom extending operation, and any limiting conditions or cautions.

(p) Hydraulic relief valve settings specified by the manufacturer.

(8) All manufacturer procedures applicable to the operational functions of cranes/derricks, including its use with attachments must be complied with.

(9) The operator must not engage in any practice or activity that diverts his/her attention while actually engaged in operating the crane/derrick, such as the use of cellular phones (other than when used for signal communications).

(10) A portable fire extinguisher, with a basic minimum extinguisher rating of 10 BC, must be installed in the cab or at the machinery housing. Additional requirements relating to portable fire extinguishers can be found in WAC 296-800-300.

(11) Cabs. Cranes/derricks with cabs must meet the following requirements:

(a) Cabs must 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.

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

(c) Windows.

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

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

(iii) Windows must 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.

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

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

(12) Personal belongings must be stored in such a manner as to not interfere with access or operation of the crane.

(13) Rigging gear, tools, oil cans, waste, and other articles must be stored in the toolbox or another appropriate location, and must not be permitted to lie loose in or about the cab or operator's work station.

(14) Operating controls must be properly marked to indicate the function of the controls in each position.

(15) You must designate a competent person who must inspect the cranes and components daily when used, and periodically during use to make sure it is in safe operating condition. Any deficiencies that effect the safe operation of the crane must be repaired, or defective parts replaced, before continued use.

Note: For additional requirements relating to inspections see WAC 296-155-53405.

(16) Before starting the engine, the operator must verify that all controls are in the proper starting position and that all personnel are in the clear.

(17) While in operation, belts, gears, shafts, pulleys, sprockets, spindles, drums, fly wheels, chains, or other reciprocating, rotating, or other moving parts or equipment must be guarded if such parts are exposed to contact by employees, or otherwise create a hazard. Guarding must meet the requirements of chapter 296-806 WAC, Machine safety.

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

(19) All exhaust pipes, turbochargers, and charge air coolers must be guarded or insulated in areas where contact by employees is possible in the performance of normal duties and are discharged in a direction away from the operator.

(20) Hydraulic and pneumatic lines must be protected from damage to the extent feasible.

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

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

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

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

(23) Whenever internal combustion engine powered crane/derrick exhausts in enclosed spaces, tests must be made and recorded to see that employees are not exposed to unsafe concentrations of toxic gases or oxygen deficient atmospheres. (See chapter 296-62 WAC, General occupational health standards and chapter 296-841 WAC, Airborne contaminants.)

(24) If access to the cab roof is necessary, a ladder or steps must be provided to give access to a cab roof.

(25) All steps, running boards, and ladders must be of substantial construction and in good repair at all times.

(26) Guardrails, handholds, and steps must be provided on cranes for easy access to the cab in accordance with Parts C-1 and J of this chapter.

(27) Platforms and walkways must have antiskid surfaces.

(28) Cranes/derricks fuel tank filler pipe must be located in such a position, or protected in such a manner, as to not allow spill or overflow to run onto the engine, exhaust, or electrical equipment of any crane being fueled. In addition, cranes/derricks must be refueled as follows:

(a) Make sure the engine is turned off before refueling.

(b) When refueling with gasoline using portable containers, make sure only an approved safety-type can with an automatic closing cap and flame arrester is used.

(c) Smoking or open flames is prohibited in the refueling area.

(29) Crane hook ball assemblies and load blocks.

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

(b) Crane hooks must be equipped with latches or self-locking devices unless a qualified person determines that it is safer to hoist and place the load without latches (or with the latches removed/tied back or otherwise disabled) and routes for the loads are preplanned 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.

(c) The latch or self-locking device (when used) must bridge the throat opening of the hook for the purpose of retaining slings or other lifting devices under slack conditions.

(30) Repair or replace a hook when it shows:

(a) Any cracks, nicks, or gouges.

(b) Wear of more than 10% of the original sectional dimension, or as recommended by the manufacturer.

(c) Any visibly apparent bend or twist from the plane of the unbent hook.

(d) Any distortion causing an increase in the throat opening of 5%, not to exceed 1/4 inch or as recommended by the manufacturer.

(e) Repair or replace hook latches or self-locking devices when they become inoperative.

(31) A qualified person must determine if a damaged hook needs to be replaced or can be repaired.

(32) When repairing a hook, the requirements below must be followed:

(a) Unless otherwise recommended by the manufacturer, only a qualified person can repair cracks, nicks and gouges by grinding longitudinally, following the contour of the hook.

Note: The dimension of the hook cannot be reduced more than 10% of its original value, unless otherwise recommended by the manufacturer.

(b) All other repairs must be performed by the hook manufacturer or the qualified person.

(c) Weld repairs or reshaping must not be performed on hooks, unless approved by the manufacturer.

(33) Replacement parts, such as load pins for clevis hooks must be at least equal to the original manufacturer's specifications.

Note: For requirements relating to wedge sockets, see WAC 296-155-56115(2).

(34) Before traveling a crane with a load, it must be determined that this practice is not prohibited by the manufacturer. If not, a qualified person must be responsible for the operation. Decisions such as the necessity to reduce crane ratings, load position, boom location, ground support, travel route, and speed of movement must be in accordance with that person's determination. Specified tire pressure must be maintained. The boom should be carried in line with the direction of travel. Sudden starts and stops should be avoided.

(35) The crane/derrick must not be assembled or used unless ground conditions are firm, drained, and graded to a sufficient extent as determined by a competent person, so that, in conjunction (if necessary) with the use of supporting materials, the crane/derrick manufacturer's specifications for adequate support and degree of level of the crane/derrick are met. The requirement for the ground to be drained does not apply to marshes/wetlands. For additional requirements for self-erecting tower cranes, see WAC 296-155-54100.

(36) The controlling entity must:

(a) Ensure that ground preparations necessary to meet the requirements in subsection (35) of this section are provided.

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

(37) If there is no controlling entity for the project, the requirement in subsection (36)(a) of this section must be met by the employer that has authority at the site to make or arrange for ground preparations needed to meet subsection (35) of this section.

(38) If the assembly/disassembly director or the operator determines that ground conditions do not meet the requirements in subsection (35) of this section, that person's employer must have a discussion with the controlling entity regarding the ground preparations that are needed so that, with the use of suitable supporting materials/devices (if necessary), the requirements in subsection (35) of this section can be met.

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

(40) Multiple crane/derrick coordination. Where any part of a crane/derrick is within the working radius of another crane/derrick, the controlling entity must institute a system to coordinate operations. If there is no controlling entity, the employer (if there is only one employer operating the multiple pieces of equipment), or employers, must institute such a system.

(41) Multiple crane or multiple load line lifts.

(a) Plan development. Before beginning a crane/derrick operation in which more than one crane/derrick will be supporting the load or multiple load lines on one crane will be supporting the load, the operation must be planned. The planning must meet the following requirements:

(i) The plan must be developed by a qualified person.

(ii) The plan must be designed to ensure that the requirements of this part are met.

(iii) Where the qualified person determines that engineering expertise is needed for the planning, you must ensure that it is provided.

(b) Plan implementation.

(i) The multiple-crane/derrick lift or multiple load line lifts must be directed by a person who meets the criteria for both a competent person and a qualified person, or by a competent person who is assisted by one or more qualified persons (lift director).

(ii) The lift director must review the plan in a meeting with all workers who will be involved with the operation.

(42) Work area control. Swing radius hazards.

(a) The requirements in (b) of this subsection apply where there are accessible areas in which the crane'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 crane or another object.

(b) To prevent employees from entering these hazard areas, you must:

(i) Train each employee assigned to work on or near the crane (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: When you can demonstrate that it is neither feasible to erect such barriers on the ground nor on the crane, the hazard areas must be clearly marked by a combination of warning signs (such as Danger-Swing/Crush Zone) and high visibility markings on the crane that identify the hazard areas. In addition, you must train each employee to understand what these markings signify.

(c) Protecting employees 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 (or someone instructed by 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 subsection (43)(c)(i) of this section, the operator must not rotate the superstructure until the operator is informed in accordance with a prearranged system of communication that the employee is in a safe position.

(d) Where any part of a crane/derrick is within the working radius of another crane/derrick, the controlling entity must institute a system to coordinate operations. If there is no controlling entity, the employer (if there is only one employer operating the multiple pieces of equipment), or employers, must institute such a system.

(43) Keeping clear of the load.

(a) Where available, hoisting routes that minimize the exposure of employees to hoisted loads must be used to the extent consistent with public safety.
(i) A load shall not be flown over the top of the public. If a load has the potential to swing over the public then the sidewalk, road, or building must be cleared prior to moving the load in that direction.

Commented [SBS(32]: Added protection for the public, along with employees that may be off of the site but near for break etc.

(b) While the operator is not moving a suspended load, no employee is allowed to be within the fall zone, except for employees:
(i) Engaged in hooking, unhooking or guiding a load; or
(ii) Engaged in the initial attachment of the load to a component structure; or
(iii) Operating a concrete hopper or concrete bucket.

(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, all of the following criteria must be met:
(i) The materials being hoisted must be rigged to prevent unintentional displacement.
(ii) Hooks with self-closing latches or their equivalent must be used, see subsection (29)(b) of this section. "J" hooks are permitted to be used for setting wooden trusses.
(iii) The materials must be rigged by a qualified rigger.

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

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

(i) Employees are not allowed to be directly under the load.

(ii) Only employees' essential to the operation are allowed to be in the fall zone (but not directly under the suspended load).

Note: An employee is essential to the operation if the employee is conducting one of the following operations and you can demonstrate it is infeasible for the employee to perform that operation from outside the fall zone:

- Physically guide the load;
- Closely monitor and give instructions regarding the load's movement; or
- Either detach it from or initially attach it to another component or structure (such as, but not limited to, making an initial connection or installing bracing).

(f) 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 subsections (44) through (47) of this section.

(44) Boom free fall prohibitions.

(a) The use of cranes 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 any part of the area listed in Table 4 located in WAC 296-155-53408, clearance distance to each side of the power line; or any part of the area extending the Table 4 clearance distance to each side of the power line is within the radius of vertical travel of the boom or the load.

(iv) The load is over a shaft, except where there are no employees in the shaft.

(v) The load is over a cofferdam, except where there are no employees in the fall zone of the boom or the load.

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

(b) 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 (a) of this subsection are present and:

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

(ii) The crane is a floating crane or a land crane on a vessel/flotation device.

(45) Preventing boom free fall. Where the use of a crane with a boom that is designed to free fall (live boom) is prohibited (see subsection (44)(a) of this section), the boom hoist must have a

secondary mechanism or device designed to prevent the boom from falling in the event the primary system used to hold or regulate the boom hoist fails, as follows:

(a) Friction drums must 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).

(b) Hydraulic drums must have an integrally mounted holding device or internal static brake to prevent boom hoist movement in the event of hydraulic failure.

(c) Neither clutches nor hydraulic motors must be considered brake or locking devices for purposes of this part.

(d) Hydraulic boom cylinders must have an integrally mounted holding device.

(46) Preventing uncontrolled retraction. Hydraulic telescoping booms must have an integrally mounted holding device to prevent the boom from retracting in the event of hydraulic failure.

(47) 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:

(a) An employee is directly under the load.

(b) An employee is being hoisted.

(c) The load is directly over a power line, or over any part of the area listed in Table 4, located in WAC 296-155-53408, clearance distance to each side of the power line; or any part of the area extending the Table 4 of WAC 296-155-53408, clearance distance to each side of the power line is within the radius of vertical travel of the load.

(d) The load is over a shaft.

(e) The load is over a cofferdam, except where there are no employees in the fall zone of the load.

(48) You must not allow employees must not be allowed to ride on the hook or load.

(49) The hoist rope must not be wrapped around the load.

(50) All loads must be attached to the hook by means of suitable slings or other devices of sufficient lifting capacity.

(51) When moving a load it must be well secured and balanced in the sling or lifting device before it is lifted more than a few inches.

(52) Leaving the crane/derrick unattended. The operator must not leave the controls while the load is suspended, except where all of the following are met:

(a) The operator remains adjacent to the crane/derrick and is not engaged in any other duties.

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

(c) The competent person determines that it is safe to do so and implements measures necessary to restrain the boom hoist and telescoping, load, swing, and outrigger or stabilizer functions.

(d) Barricades or caution lines, and notices, are erected to prevent all employees from entering the fall zone. No employees, including those listed in subsection (43)(b), (d), and (e) of this section, are permitted in the fall zone.

Exemption: The provisions in this section do not apply to working gear (such as slings, spreader bars, ladders, and welding machines) where the weight of the working gear is negligible relative to the lifting capacity of the equipment as positioned, and the working gear is suspended over an area other than an entrance or exit.

Note: For additional requirements relating to leaving the crane unattended for tower, self-erecting, overhead/bridge and derricks see:
- WAC 296-155-53915, Tower cranes—Operations;
- WAC 296-155-54115, Self-erecting tower cranes—Operations;
- WAC 296-155-54215, Overhead/bridge cranes and gantry cranes—Operations;
- WAC 296-155-54320, Derricks—Operations.

(53) While moving the load the lift and swing path must be clear of obstructions.

(54) Before starting to lift the following conditions must be met:

(a) The hoist rope must not be kinked.

(b) Multiple-part lines must not be twisted around each other.

(c) The hook must be brought over the load in such a manner as to minimize swinging.

(d) If the competent person determines that there is slack rope condition requiring respooling of the rope, it must be verified (before starting the lift) that the rope is seated on the drum and in the sheaves as the slack is removed.
(e) The competent person must adjust the crane/derrick and/or operations to address the effect of wind, ice, and snow on equipment stability and rated capacity.

(f) If possible, the load must be free to be lifted; it is neither caught nor attached to other objects.

(55) During lifting operations, care must be taken that there is no sudden acceleration or deceleration of the moving load and that the load boom or other parts of the crane do not contact any obstruction. Rotational speed of the crane/derrick must be such that the load does not swing out beyond the radius at which it can be controlled.

(56) Side loading of booms (jibs) must be limited to freely suspended loads. Cranes must not be used for dragging loads sideways.

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

(58) Modifications or additions which affect the capacity or safe operation of the crane/derrick are prohibited except where the requirements of (a) or (b) of this subsection are met. For recertification requirements see WAC 296-155-53214 (1)(c).

(a) Manufacturer review and approval.
(i) The manufacturer approves the modifications/additions in writing.
(ii) The load charts, procedures, instruction manuals and instruction plates/tags/decals are modified as necessary to accord with the modification/addition.
(iii) The original safety factor of the crane/derrick is not reduced.

(b) Where manufacturer is unavailable or has refused to review a request. The manufacturer is provided a detailed description of the proposed modification/addition,

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 crane/derrick involved:

(A) Approves the modification/addition and specifies the crane/derrick 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 crane/derrick is not reduced.

(c) Manufacturer does not complete the review within 120 days of the request. The manufacturer is provided a detailed description of the proposed modification/addition, is asked to approve the modification/addition, agrees to review the technical merits of the proposal, but fails to complete the review of the proposal within 120 days of the date it was provided the detailed description of the proposed modification/addition, and the requirements of subsection (58)(b)(i) and (ii) of this section are met.

(d) Multiple manufacturers of equipment designed for use on marine worksites. The equipment is designed for marine worksites, contains major structural components from more than one manufacturer, and the requirements of subsection (58)(b)(i) and (ii) of this section are met.

(59) You must not make any modifications or additions which affect the capacity or safe operation of the crane without the manufacturers' written approval. If components of more than one crane manufacturer are being combined, you must obtain written approval from all manufacturers prior to use. If the manufacturer(s) is/are not available a registered professional structural engineer's (RPSE) written approval must be obtained. If such modifications or changes are made, the capacity, operation, and maintenance instruction plates, tags, or decals, must be changed accordingly. In no case must the original safety factor of the crane be reduced.

Note: The provisions in subsections (58) and (59) of this section do not apply to modifications made or approved by the U.S. military.

(60) All applicable controls must be tested by the operator at the start of a new shift, if possible. If any controls fail to operate properly, they must be adjusted or repaired before operations are initiated.

(61) Except for proof load testing required under WAC 296-155-53202 through 296-155-53212, no crane/derrick is permitted to be loaded beyond the specifications of the load rating chart, unless authorized by the crane manufacturer. The operator must not be required to operate the crane/derrick in a manner that would violate this requirement.

(62) Load weight. The operator must verify that the load is within the rated capacity of the crane/derrick by at least one of the following methods:

(a) The weight of the load must be determined from a reliable source recognized by the industry (such as the load's manufacturer), or by a reliable calculation method recognized by the industry (such as calculating a steel beam from measured dimensions and a known per foot weight), or by other equally reliable means. In addition, when requested by the operator, this information must be provided to the operator prior to the lift; or

(b) The operator must begin hoisting the load to determine, using a load weighing device, load moment indicator, rated capacity indicator, or rated capacity limiter. If the load exceeds 75% of the maximum rated capacity at the longest radius that will be used during the lift operation, the operator must not proceed with the lift until it is verified that the weight of the load is in accordance with (a) of this subsection.

(63) Tag lines or restraint lines must be used when rotation or swinging of the load is hazardous or if the load needs guidance. Tag lines are not required when all of the following criteria are met:

- The suspended load can be expected to remain still when in a static (nonmoving) condition or does not swing or rotate in a hazardous manner;
- The movement of the crane or boom cannot be expected to cause the load to swing or rotate in an uncontrolled manner that may create a hazard;
- The operator is in control of the movement of the load and a hazardous condition is not created.

(64) All brakes must be adjusted in accordance with manufacturer procedures to prevent unintended movement.

(65) Safety devices and/or operational aids must not be used as a substitute for the exercise of professional judgment by the operator.

(66) Storm warning. When a local storm warning has been issued, the competent person must determine whether it is necessary to implement manufacturer recommendations for securing the crane/derrick.

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

(68) Tag-out.

(a) Tagging out of service. Where you have taken the crane/derrick out of service, a tag must be placed in the cab or at the operator station stating that the equipment is out of service and is not to be used. Where you have taken a function(s) out of service, a tag must be placed in a conspicuous position stating that the function is out of service and is not to be used.

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

(i) If there is a warning (tag-out or maintenance/do not operate) sign on the crane/derrick or starting control, the operator must not activate the switch or start the crane/derrick 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 around the machine.

(B) The crane/derrick 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 must 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 (b)(i)(A) and (B) of this subsection have been met.

Note: For additional lockout/tagout procedures for electrical circuits, see WAC 296-155-429.

(69) If crane/derrick adjustments or repairs are necessary:

(a) The operator must, in writing, promptly inform the person designated by you to receive such information and, where there are successive shifts, to the next operator; and

(b) You must notify all affected employees, at the beginning of each shift, of the necessary adjustments or repairs and all alternative measures.

(70) All cranes and derricks mounted on barges or other floating structures must meet the requirements as outlined in ASME B30.8-2015 for construction, installation, inspection, maintenance and operation.

Commented [SBS(33]: Newer ASME reference

(71) Swinging locomotive cranes. A locomotive crane must not be swung into a position where railway cars on an adjacent track could strike it, until it is determined that cars are not being moved on the adjacent track and that proper flag protection has been established.

(72) Remote control cranes/derricks. Before an operator leaves the crane/derrick to operate remotely, the operator must ensure that the crane/derrick will be used in accordance with the manufacturer's recommendations. Provisions must be made to prevent simultaneous activation of controls when more than one control station (remote control) is provided.

(73) Remote-operated cranes/derricks must function so that if the control signal for any crane/derrick motion becomes ineffective, the crane/derrick motion must stop.

(74) Remote-operated cranes/derricks must be equipped with an "emergency stop" system, located at the operator's remote station to provide the means to remove power from the crane in the event of a malfunction.

(75) A preventative maintenance program must be established based on the recommendation of the crane/derrick manufacturer. If manufacturer's recommendations are not available, then those of a qualified person must be followed. Dated records must be kept available.

(76) Working with a diver. You must meet the following additional requirements when working with a diver in the water:

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

(b) The operator must remain at the controls of the crane/derrick at all times.

(c) In addition to the requirements in WAC 296-155-53406, Signals, either:

(i) A clear line of sight must be maintained between the operator and dive tender; or
(ii) The signals between the operator and dive tender must be transmitted electronically.

(77) For machines other than tower cranes being used inside of or on multi-level buildings, the employer must ensure that tiebacks are used to secure the machinery and have been reviewed and acknowledged as acceptable by a registered professional structural engineer (RPSE), licensed under chapter 18.43 RCW. These tiebacks must be used during all hoisting activities.

Commented [SBS(34]: New language hoping to help prevent mini cranes from continuing to fall from buildings. Language inspired by NYC's recent rule addition

WAC 296-155-53401 Duties of assigned personnel.

(1) While the organizational structure of various construction activities may differ, the following duties are described here for purposes of assignment. All assignments listed below must be assigned in the worksite organization. (A single individual may perform one or more of these assignments concurrently.)

- Crane owner: Has custodial control of a crane by virtue of lease or ownership. (The leasing of a crane does not relieve ownership duties from the leasor)
- Crane user: Arranges the crane's presence on a worksite and controls its use there.
- Site supervisor: Exercises supervisory control over the worksite on which a crane is being used and over the work that is being performed on that site.
- Lift director: Directly oversees the work being performed by a crane and the associated rigging crew.
- Crane operator: Directly controls the crane's functions.

(2) Duties of the crane owner and crane user. In some situations the owner and the user may be the same entity and therefore would have the same duties assigned. In other cases, the user may lease or rent a crane from the owner without supervisory, operational, maintenance, support personnel, or services from the owner. In these situations, subsection (3)(c) and (d) of this section apply.

(3) The crane owner's duties would include the following:

(a) Providing a crane that meets the requirements of Part L of this chapter as well as specific job requirements defined by the user.

(b) Providing a crane and all necessary components, specified by the manufacturer, that meets the user's requested configuration and capacity.

(c) Providing all applicable load/capacity chart(s) and diagrams.

(d) Providing additional technical information pertaining to the crane, necessary for crane operation, when requested by the crane user.

(e) Providing field assembly, disassembly, operation, maintenance information, and warning decals and placards installed as prescribed by the crane manufacturer. The assembly, disassembly, operation, maintenance information, along with the operator's manual must be provided when requested, and may be in digital format.

Commented [SBS(35]: New language

(f) Ensuring that inspection, testing, and maintenance is performed in accordance with Part L of this chapter and informing the crane user of these requirements.

(g) Using personnel that meet the requirements for a competent and/or qualified person as defined in WAC 296-155-52902 for the purposes of inspections, maintenance, repair, transport, assembly, and disassembly.

(h) Ensuring that work involving the assembly and disassembly of a crane is supervised by an assembly/disassembly director. See WAC 296-155-53402.

Commented [SBS(36]: New language adding another layer of protection

(4) The crane user's duties would include the following:

(a) Complying with the requirements of Part L of this chapter, manufacturer's requirements, and those regulations applicable at the worksite.

(b) Using supervisors for crane activities that meet the requirements for a qualified person as defined in WAC 296-155-52902.

(c) Ensuring that the crane is in proper operating condition prior to initial use at the worksite by:

(i) Verifying that the crane owner has provided documentation that the crane meets the requirements of Part L of this chapter.

(ii) Verifying that inspections have been performed as prescribed in WAC 296-155-53405.

(d) Verifying that the crane has the necessary lifting capacity to perform the proposed lifting operations in the planned configuration.

(e) Using crane operators that meet the requirements of WAC 296-155-53300 and are qualified to perform the tasks that will be required with the crane to which they are assigned to operate.

(f) Ensuring the assigned operator(s) has been notified of adjustments or repairs that have not been completed, prior to commencing crane operations.

(g) Using personnel that meet the requirements for a competent and/or qualified person as defined in WAC 296-155-52902 for the purposes of inspections, maintenance, repair, transport, assembly, and disassembly.

(h) Ensuring that all personnel involved in maintenance, repair, transport, assembly, disassembly, and inspection are aware of their assigned duties, and the associated hazards.

(i) Ensuring that the inspection, testing, and maintenance as required by this part are followed and any other related requirements specified by the crane owner.

(5) The site supervisor's duties would include the following:

(a) Ensuring that the crane meets the requirements of Part L of this chapter prior to initial site usage.
(b) Determining if additional regulations are applicable to crane operations.

(c) Ensuring that a qualified person is designated as the lift director.

(d) Ensuring that crane operations are coordinated with other job site activities that will be affected by or will affect lift operations.

(e) Ensuring that the area for the crane is adequately prepared. The preparation includes, but is not limited to, the following:
(i) Access roads for the crane and associated equipment;
(ii) Sufficient room to assemble and disassemble the crane;
(iii) An operating area that is suitable for the crane with respect to levelness, surface conditions, support capability, proximity to power lines, excavations, slopes, underground utilities, subsurface construction, and obstructions to crane operation;
(iv) Traffic control as necessary to restrict unauthorized access to the crane's working area.

(f) Ensuring that work involving the assembly and disassembly of a crane is supervised by an assembly/disassembly director. See WAC 296-155-53402.

(g) Ensuring that crane operators meet the requirements of WAC 296-155-53300.

(h) Ensuring that conditions which may adversely affect crane operations are addressed. Such conditions include, but are not limited to, the following:

(i) Poor soil conditions;
(ii) Wind velocity or gusting winds;
(iii) Heavy rain;
(iv) Fog;
(v) Extreme cold;
(vi) Artificial lighting.

(i) Allowing crane operation near electric power lines only when the requirements of WAC 296-155-53408 have been met.

(j) Permitting special lifting operations only when equipment and procedures required by this part, the crane manufacturer, or a qualified person, are employed. Such operations include, but are not limited to, the following:

(i) Multiple crane lifts;
(ii) Multiple load line lifts;
(iii) Lifting personnel;
(iv) Pick and carry operations;
(v) Mobile/articulating cranes operating on barges.

(k) Ensuring that work performed by the rigging crew is supervised by a qualified rigger. See WAC 296-155-53406.

(l) Ensuring that crane maintenance is performed by a qualified person. See WAC 296-155-53404.

(m) Notify the crane certification section by email at lnicranes@lni.wa.gov at least one week prior to having any type of tower crane being set up at your site.

Commented [SBS(37]: New notification code for tower cranes

(6) The lift director's duties would include the following:

(a) Being present at the job site and overseeing the lifting operations;

(b) Stopping crane operations if alerted to an unsafe condition affecting those operations;

(c) Ensuring that the preparation of the area needed to support crane operations has been completed before crane operations commence;

(d) Ensuring necessary traffic controls are in place to restrict unauthorized access to the crane's work area;

(e) Ensuring that personnel involved in crane operations understand their assigned duties, and the associated hazards;

(f) Addressing safety concerns raised by the operator or other personnel and deciding if it is necessary to overrule those concerns and directs crane operations to continue. In all cases, the manufacturer's criteria for safe operation and the requirements of this chapter and any other applicable safety and health standards must be adhered to;

(g) Assigning qualified signal person(s) and conveying that information to the crane operator;

(h) Ensuring that signal persons assigned meet the qualification requirements located in WAC 296-155-53302;

(i) Allowing crane operation near electric power lines only when the requirements of WAC 296-155-53408 and any additional requirements determined by the site supervisor have been met;

(j) Ensuring precautions are implemented when hazards associated with special lifting operations are present. Such operations include, but are not limited to, the following:
(i) Multiple crane lifts;
(ii) Multiple load line lifts;
(iii) Lifting personnel;
(iv) Pick and carry operations;
(v) Mobile/articulating cranes operating on barges.
(k) Ensuring that the applicable requirements of WAC 296-155-547 through 296-155-55405 are met when lifting personnel;

(l) Informing the crane operator of the weight of loads to be lifted, as well as the lifting, moving, and placing locations for these loads;

(m) Obtaining the crane operator's verification that this weight does not exceed the crane's rated capacity;

(n) Ensuring that a crane's load rigging is performed by a qualified rigger as defined in WAC 296-155-53306;

(o) Ensuring that the load is properly rigged and balanced before it is lifted more than a few inches.

(7) Whenever the crane operator has doubt or concerns as to the safety of crane operations, the operator must stop the crane's functions in a controlled manner. Lift operations can only resume after safety concerns have been resolved or the continuation of crane operations is directed by the lift director as outlined in subsection (6) of this section. The crane operator's duties would include the following:

(a) Reviewing the requirements for the crane with the lift director before operations;

(b) Knowing what types of site conditions could adversely affect the operation of the crane and consulting with the lift director concerning the possible presence of those conditions;

(c) Understanding and applying the information contained in the crane manufacturer's operating manual;

(d) Understanding the crane functions and limitations as well as its particular operating characteristics;

(e) Using the crane's load/capacity chart(s) and diagrams and applying all notes and warnings related to the charts to confirm the correct crane configuration to suit the load, site, and lift conditions;

(f) Refusing to operate the crane when any portion of the load or crane would enter the prohibited zone of energized power lines except as defined in WAC 296-155-53408;

(g) Performing a daily inspection as specified in WAC 296-155-53405;

(h) Promptly reporting the need for any adjustments or repairs to the appropriate person;

(i) Following applicable lockout/tagout procedures. See WAC 296-155-53400(67);

(j) Not operating the crane when physically or mentally unfit;

(k) Ensuring that all controls are in the off or neutral position and that all personnel are in the clear before energizing the crane or starting the engine;

(l) Not engaging in any practice that will divert their attention while actually operating the crane controls;

(m) Testing the crane function controls that will be used and operating the crane only if those function controls respond properly;

(n) Operating the crane's functions, under normal operating conditions, in a smooth and controlled manner;

(o) Knowing and following the procedures specified by the manufacturer or approved by a qualified person, for assembly, disassembly, setting up, and reeving the crane;

(p) Knowing how to travel the crane;

(q) Observing each outrigger during extension, setting, and retraction or using another worker to observe each outrigger during extension, setting, or retraction;

(r) Ensuring that the load and rigging weight(s) have been provided;

(s) Calculating or determining the net capacity for all configurations that will be used and verifying, using the load/capacity chart(s), that the crane has sufficient net capacity for the proposed lift;

(t) Considering all factors known that might affect the crane capacity and informing the lift director of the need to make appropriate adjustments;

(u) Knowing the standard and special signals as specified in WAC 296-155-53406 and responding to such signals from the person who is directing the lift or a qualified signal person;

(v) If power fails during operations:
- (i) Setting all brakes and locking devices.
- (ii) Moving all clutches or other power controls to the off or neutral position.
- (iii) Landing any load suspended below the hook under brake control if practical.

(w) Before leaving the crane unattended:
- (i) Landing any load suspended below the hook, unless the requirements of WAC 296-155-53400(52) are met.
- (ii) Disengaging the master clutch.

(iii) Setting travel, swing, boom brakes, and other locking devices.
(iv) Putting controls in the off or neutral position.
(v) Stopping the engine. An exception to this may exist when crane operation is frequently interrupted during a shift and the operator must leave the crane. Under these circumstances, the engine may remain running and (w)(i) and (iv) of this subsection must apply. The operator must be situated where any entry to the crane can be observed.
(vi) Considering the recommendations of the manufacturer for securing the crane, when a local weather storm warning exists.

WAC 296-155-53402 Assembly/disassembly.

(1) When assembling and disassembling crane/derrick (or attachments), you must comply with all applicable manufacturer prohibitions and must comply with either:

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

(b) Employer procedures for assembly and disassembly. Written employer procedures may be used only where the assembly/disassembly director reviews the procedures and can demonstrate that the procedures used meet the requirements in subsection (17) of this section.

Commented [SBS(38]: New language requiring the a/d director to review the procedure

Note: You must follow manufacturer procedures when you use synthetic slings during assembly or disassembly of cranes/derricks, see subsection (19) of this section.

(2) Supervision - Competent/qualified person.

(a) Assembly/disassembly must be directed by a person who meets the criteria for both a competent person and a qualified person, or by a competent person who is assisted by one or more qualified persons (assembly/disassembly director).

(b) 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 part, that person is considered the assembly/disassembly director.

(c) The assembly/disassembly director must provide continuous, onsite supervision of the A/D operation, and ensure compliance with the approved A/D plan and relevant rigging plans.

Commented [SBS(39]: New AD Director language

(3) Knowledge of procedures. The assembly/disassembly director must understand the applicable assembly/disassembly procedures.

(4) Review of procedures. The assembly/disassembly director must review the applicable assembly/disassembly procedures immediately prior to the commencement of assembly/disassembly unless the assembly/disassembly director has applied them to the same type and configuration of crane/derrick (including accessories, if any). These procedures must in written format and on site.

(5) Preassembly inspection.

(a) Prior to assembling crane/derrick components or attachments the assembly/disassembly director must inspect these components and attachments to ensure that they meet the manufacturer's recommendations. This inspection must include a visual inspection to ensure that the components and attachments are of sound physical condition and functional within the manufacturer's recommendations.

(b) Documentation of this inspection must remain at the job site while the crane/derrick is in use.

(6) Crew instructions.

(a) Before commencing assembly/disassembly operations, the assembly/disassembly director must ensure 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.

(b) During assembly/disassembly operations, before a crew member takes on a different task, or when adding new personnel during the operations, the requirements in (a)(i) through (iii) of this subsection must be met.

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

(a) Before a crew member goes to a location that is out of view of the operator and is either: In, on, under, or near the crane/derrick (or load) where the crew member could

be injured by movement of the crane/derrick (or load), the crew member must inform the operator that they are going to that location.

(b) Where the operator knows that a crew member went to a location covered by (a) of this subsection, the operator must not move any part of the crane/derrick (or load) until the operator is informed in accordance with a prearranged system of communication that the crew member is in a safe position.

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

(a) When pins (or similar devices) are being removed, employees must not be under the boom, jib, or other components, except where the requirements in (b) of this subsection are met.

(b) Exception. Where you demonstrate that site constraints require one or more employees to be under the boom, jib, or other components when pins (or similar devices) are being removed, the assembly/disassembly director must implement procedures that minimize the risk of unintended dangerous movement and minimize the duration and extent of exposure under the boom. (See WAC 296-155-56430, Assembly/disassembly—Working under the boom, jib or other components—Sample procedures for minimizing the risk of unintended dangerous boom movement.)

(9) Capacity limits. During all phases of assembly/disassembly, rated capacity limits for loads imposed on the crane/derrick, components (including rigging), lifting lugs and crane/derrick accessories must not be exceeded.

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

(a) Site and ground bearing conditions. Site and ground conditions must be adequate for safe assembly/disassembly operations and to support the crane/derrick during assembly/disassembly (see WAC 296-155-53400 (34) through (38) for ground condition requirements).

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

(c) 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 crane/derrick; and
(ii) Prevent dangerous movement and collapse.

(d) Verifying assist crane loads. When using an assist crane, the loads that will be imposed on the assist crane at each phase of assembly/disassembly must be verified in accordance with WAC 296-155-53400(61) before assembly/disassembly begins.

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

(f) Center of gravity.
(i) The center of gravity of the load must be identified if it is necessary for the method used for maintaining stability.
(ii) Where there is insufficient information to accurately identify the center of gravity, measures designed to prevent unintended dangerous movement resulting from an inaccurate identification of the center of gravity must be used. (See WAC 296-155-56430, Assembly/disassembly—Working under the boom, jib or other components—Sample procedures for minimizing the risk of unintended dangerous boom movement.)

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

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

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

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

(k) Loss of backward stability. Backward stability before swinging the upperworks, travel, and when attaching or removing crane/derrick components.

GRAPHIC – Figure 2

(l) Wind speed and weather. The effect of wind speed and weather on the crane/derrick.

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

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

(13) Components and configuration.

(a) The selection of components and configuration of the crane/derrick that affect the capacity or safe operation of this equipment must be in accordance with:

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

(ii) Approved modifications that meet the requirements of WAC 296-155-53400 (58) and (59) (crane/derrick modifications).

(b) Post-assembly inspection. Upon completion of assembly, the crane/derrick must be inspected by the assembly/disassembly director to ensure compliance with (a) of this subsection and as follows:

(i) Upon completion of assembly, the crane/derrick must be inspected by a qualified person to assure that it is configured in accordance with manufacturer's criteria. For tower cranes, this inspection must be done by an accredited crane certifier.

(ii) Where manufacturer's criteria is unavailable, a qualified person must determine if a registered professional engineer (RPE) familiar with the type of crane/derrick involved is needed to develop criteria for the configuration. If an RPE is not needed, you must ensure that the criteria are developed by the qualified person. If an RPE is needed, you must ensure that they are developed by an RPE.

(c) Crane/derrick must not be used until an inspection demonstrates that it is configured in accordance with the applicable criteria.

(d) Documentation of this inspection must remain at the job site while the crane/derrick is in use.

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

(15) Pile driving. Cranes used for pile driving must not have a jib attached during pile driving operations.

(16) The following are additional requirements for dismantling of booms and jibs, including dismantling for changing the length of booms and jibs (applies to both the use of manufacturer procedures and employer procedures):

(a) None of the pins in the pendants are to be removed (partly or completely) when the pendants are in tension. See, for example, Figure 3.

GRAPHIC – Figure 3

(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. See, for example, Figures 4 and 5.

GRAPHIC – Figure 4 & 5

(c) None of the pins (top and bottom) on boom sections located between the uppermost boom section and the crane/derrick body are to be removed (partly or completely) when the boom is being supported by the uppermost boom section resting on the ground (or other support). See, for example, Figure 6.

GRAPHIC – Figure 6

(d) None of the top pins on boom sections located on the cantilevered portion of the boom being removed (the portion being removed ahead of the pendant attachment points) are to be removed

(partly or completely) until the cantilevered section to be removed is fully supported. See, for example, Figures 7 and 8.

GRAPHIC – Figure 7 & 8

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

(a) Prevent unintended dangerous movement, and to prevent collapse, of any parts of the crane/derrick.

(b) Provide adequate support and stability of all parts of the crane/derrick during the assembly/disassembly process.

(c) Position employees involved in the assembly/disassembly operation so that their exposure to movement or collapse is minimized.

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

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

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

(b) The outriggers must be set to remove the crane weight from the wheels, except for locomotive cranes (see (f) of this subsection for use of outriggers on locomotive cranes). This provision does not apply to stabilizers.

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

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

(e) Outrigger and stabilizer blocking must:

(i) Meet the requirements in subsection (10)(b) and (c) of this section.
(ii) Be placed only under the outrigger or stabilizer float/pad of the jack or, where the outrigger or stabilizer is designed without a jack, under the outer bearing surface of the extended outrigger or stabilizer beam.

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

(19) Rigging. In addition to the following requirements in WAC 296-155-556, 296-155-558, 296-155-560 and 296-155-562 and other requirements in this and other standards applicable to rigging, when rigging is used for assembly/disassembly, you must ensure that:

(a) The rigging work is done by a qualified rigger. See WAC 296-155-53306.

(b) Synthetic slings are protected from: Abrasive, sharp or acute edges, and configurations that could cause a reduction of the sling's rated capacity, such as distortion or localized compression. See WAC 296-155-55815(6), 296-155-55820(6) and 296-155-55825(6).

Note: Requirements for the protection of wire rope slings are contained in WAC 296-155-55805.

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

WAC 296-155-53403 Fall protection.

(1) Application.

(a) Subsections (2), (3)(b), (5) and (6) of this section apply to all cranes/derricks covered by this part except tower cranes.

(b) Subsections (3)(a), (4), (7), (10) and (11) of this section apply to all cranes/derricks covered by this part.

(c) Subsections (3)(c) and (9) of this section apply only to tower cranes.

(2) Boom walkways.

(a) Cranes/derricks manufactured after the effective date of this section with lattice booms must 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.

(b) Boom walkway criteria. The walkways must be at least 12 inches wide.

(3) Steps, handholds, ladders, grabrails, guardrails and railings.

(a) All steps, handholds, ladders and guardrails/railings/grabrails must be maintained in good condition.

(b) Cranes/derricks manufactured after the effective date of this section must 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 devices must meet the following criteria:

(i) Steps, handholds, ladders and guardrails/railings/grabrails must meet the criteria of SAE J185 (May 2003) or ISO 11660-2:1994(E) except where infeasible.
(ii) Walking/stepping surfaces, except for crawler treads, must have slip-resistant features/properties (such as diamond plate metal, strategically placed grip tape, expanded metal, or slip-resistant paint).

(c) Tower cranes manufactured after the effective date of this section must be equipped so as to provide safe access and egress between the ground and the cab, machinery platforms, and tower (mast), by the provision of devices such as steps, handholds, ladders, and guardrails/railings/grabrails. These devices must meet the following criteria:

(i) Steps, handholds, ladders, and guardrails/railings/grabrails must meet the criteria of ISO 11660-1:2008(E) and ISO 11660-3:2008(E) or SAE J185 (May 2003) except where infeasible.
(ii) Walking/stepping surfaces must have slip-resistant features/properties (such as diamond plate metal, strategically placed grip tape, expanded metal, or slip-resistant paint).

(4) Personal fall arrest and fall restraint systems must conform to the criteria in WAC 296-155-24510. Body harnesses must be used in personal fall arrest and fall restraint systems.

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

(a) When moving point-to-point:
(i) On nonlattice booms (whether horizontal or not horizontal).
(ii) On lattice booms that are not horizontal.
(iii) On horizontal lattice booms where the fall distance is 10 feet or more.

(b) While at a work station on any part of the crane (including the boom, of any type).

Note: If the equipment is running and the employee is at or near the draw-works, precautions should be taken to ensure the fall protection gear will not become entangled.

(6) For assembly/disassembly work, you must provide and ensure the use of fall protection equipment for employees who are on a walking/working surface with an unprotected side or edge more than 10 feet above a lower level.

Note: If the equipment is running and the employee is at or near the draw-works, precautions should be taken to ensure the fall protection gear will not become entangled.

(7) Anchorage criteria.

(a) Anchorages used for attachment of personal fall arrest equipment must be independent of any anchorage being used to support or suspend platforms and capable of supporting at least 5,000 pounds (22.2 kN) per employee attached, or must be designed, installed, and used as follows:
(i) As part of a complete personal fall arrest system which maintains a safety factor of at least two; and
(ii) Under the supervision of a qualified person.

(b) Positioning devices must be secured to an anchorage capable of supporting at least twice the potential impact load of an employee's fall or 3,000 pounds (13.3 kN), whichever is greater.

(c) Anchorages for personal fall arrest and positioning device systems.
(i) Personal fall arrest systems must 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 criteria in (a) of this subsection would not be met.

(ii) Positioning device systems must be anchored to any apparently substantial part of the crane unless a competent person, from a visual inspection, without an engineering analysis, would conclude that the criteria in (b) of this subsection would not be met.
(iii) Attachable anchor devices (portable anchor devices that are attached to the crane) must meet the anchorage criteria in (a) of this subsection for personal fall arrest systems and (b) of this subsection for positioning device systems.

(8) Anchorages for fall restraint systems. Fall restraint systems must be anchored to any part of the crane that is capable of withstanding twice the maximum load that an employee may impose on it during reasonably anticipated conditions of use.

(9) Tower cranes.

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

Note: If the equipment is running and the employee is at or near the draw-works, precautions should be taken to ensure the fall protection gear will not become entangled.

(b) For erecting, climbing, and dismantling work, you must provide and ensure the use of fall protection equipment for employees who are on a walking/working surface with an unprotected side or edge more than 10 feet above a lower level.

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

(a) 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 subsection (7)(a) of this section.

(b) The crane operator must be at the worksite and informed that the crane is being used for this purpose.

(c) No load is suspended from the load line when the personal fall arrest system is anchored to the crane/derrick's hook (or other part of the load line).

(11) Training. You must train each employee who may be exposed to fall hazards while on, or hoisted by, cranes/derricks covered by this section on all of the following:

(a) The requirements in this part that address fall protection.

(b) The applicable requirements in Parts C-1 and K of this chapter.

WAC 296-155-53404 Wire rope.

(1) Selection and installation criteria.

(a) Original crane/derrick wire rope and replacement wire rope must be selected and installed in accordance with the requirements of this section. Selection of replacement wire rope must be in accordance with the recommendations of the wire rope manufacturer, the crane/derrick manufacturer, or a qualified person.

(b) Wire rope design criteria: Wire rope (other than rotation resistant rope) must comply with either Option (1) or Option (2) of this section, as follows:

(i) Option (1). Wire rope must comply with Section 5-1.7.1 of ASME B30.5-2018 except that section's paragraph (c) must not apply.

(ii) Option (2). Wire rope must be designed to have, in relation to the crane's/derrick's rated capacity, a sufficient minimum breaking force and design factor so that compliance with the applicable inspection provisions in this section will be an effective means of preventing sudden rope failure.

Commented [SBS(40]: Newer ASME reference

(c) Wire rope must be compatible with the safe functioning of the crane/derrick.

(d) Boom hoist reeving.

(i) Fiber core ropes must not be used for boom hoist or luffing attachment reeving, except for derricks.

(ii) Rotation resistant ropes must be used for boom hoist reeving only where the requirements of (e) of this subsection are met.

(e) Rotation resistant ropes.

(i) Definitions.

Type I rotation resistant wire rope (Type I). Type I rotation resistant rope is stranded rope constructed to have little or no tendency to rotate or, if guided, transmits little or no torque. It has at least 15 outer strands and comprises an

assembly of at least 3 layers of strands laid helically over a center in two operations. The direction of lay of the outer strands is opposite to that of the underlying layer.

Type II rotation resistant wire rope (Type II). Type II rotation resistant rope is stranded rope constructed to have resistance to rotation. It has at least 10 outer strands and comprises an assembly of two or more layers of strands laid helically over a center in two or 3 operations. The direction of lay of the outer strands is opposite to that of the underlying layer.

Type III rotation resistant wire rope (Type III). Type III rotation resistant rope is stranded rope constructed to have limited resistance to rotation. It has no more than 9 outer strands, and comprises an assembly of two layers of strands laid helically over a center in two operations. The direction of lay of the outer strands is opposite to that of the underlying layer.

(ii) Requirements.

(A) Types II and III with an operation design factor of less than 5 must not be used for duty cycle or repetitive lifts.

(B) Rotation resistant ropes (including Types I, II and III) must have an operating design factor of no less than 3.5.

(C) Type I must have an operating design factor of no less than 5, except where the wire rope manufacturer and the crane/derrick manufacturer approves the design factor, in writing.

(D) Types II and III must have an operating design factor of no less than 5, except where the requirements of (e)(iii) of this subsection are met.

(iii) When Types II and III with an operation design factor of less than 5 are used (for nonduty cycle, nonrepetitive lifts), the following requirements must be met for each lifting operation:

(A) A qualified person must inspect the rope in accordance with subsection (2)(a) of this section. The rope must 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 rope lay must be considered a hazard.

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

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

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

(A) Rotation resistant ropes must not be used for boom hoist reeving, except where the requirements of (e)(iv)(B) of this subsection are met.
(B) 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, all of the following requirements must be met:

(I) The drum must provide a first layer rope pitch diameter of not less than 18 times the nominal diameter of the rope used.
(II) The requirements in WAC 296-155-53400(44) (irrespective of the date of manufacture of the crane/derrick), and WAC 296-155-53400(45).
(III) The requirements of ANSI/ASME B30.5-2018, Section 5-1.3.2(a), (a)(2) through (a)(4), (b) and (d), except that the minimum pitch diameter for sheaves used in multiple rope reeving is 18 times the nominal diameter of the rope used instead of the value of 16 specified in Section 5-1.3.2(d).
(IV) All sheaves used in the boom hoist reeving system must have a rope pitch diameter of not less than 18 times the nominal diameter of the rope used.
(V) The operating design factor for the boom hoist reeving system must be not less than 5.
(VI) The operating design factor for these ropes must be the total minimum breaking force of all parts of rope in the system divided by the load imposed on the rope system when supporting the static weights of the structure and the load within the crane's/derrick's rated capacity.
(VII) When provided, a power-controlled lowering system must be capable of handling rated capacities and speeds as specified by the manufacturer.

Commented [SBS(41]: Newer ASME reference

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

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

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

(2) Inspection of wire ropes.

(a) Shift inspection.

(i) A competent person must begin a visual inspection prior to each shift the crane/derrick is used, which must be completed before or during that shift. The inspection must consist of observation of accessible wire ropes (running and standing) that are likely to be in use during the shift for apparent deficiencies, including those listed in (a)(ii) of this subsection. Untwisting (opening) of wire rope or booming down is not required as part of this inspection.

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

(I) Distortion of the wire rope structure such as kinking, crushing, unstranding, birdcaging, signs of core failure or steel core protrusion between the outer strands.

(II) Corrosion.

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

(IV) Improperly applied end connections.

(V) Corroded, cracked, bent, or worn end connections (such as from severe service).

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

(I) Visibly broken wires in running wire ropes: 6 randomly distributed broken wires in one rope lay or 3 broken wires in one strand in one rope lay, where a rope lay is the length along the rope in which one strand makes a complete revolution around the rope;

(II) Visibly broken wires in rotation resistant ropes: Two randomly distributed broken wires in 6 rope diameters or 4 randomly distributed broken wires in 30 rope diameters;

(III) Visibly broken wires in pendants or standing wire ropes: More than two broken wires in one rope lay located in rope beyond end connections and/or more than one broken wire at an end connection; and

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

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

(I) In rotation resistant wire rope, core protrusion or other distortion indicating core failure.
(II) Prior electrical contact with a power line.
(III) A broken strand.

(ii) Critical review items. The competent person must give particular attention to all of the following:

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

(iii) Removal from service.

(A) If a deficiency in Category I is identified, an immediate determination must be made by the competent person as to whether the deficiency constitutes a safety hazard. If the deficiency is determined to constitute a safety hazard, operations involving use of the wire rope in question must be prohibited until:
(I) The wire rope is replaced; or
(II) If the deficiency is localized, the problem is corrected by removing the damaged section of the wire rope; the undamaged portion may continue to be used. Joining lengths of wire rope by splicing is prohibited. If a rope is shortened under this subsection, you must ensure that the drum will still have two wraps of wire when the load and/or boom is in its lowest position.
(B) If a deficiency in Category II is identified, operations involving use of the wire rope in question must be prohibited until:
(I) You comply with the wire rope manufacturer's established criterion for removal from service or a different criterion that the wire rope manufacturer has approved in writing for that specific wire rope;
(II) The wire rope is replaced.
(C) 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. If a rope is shortened under this subsection, you must ensure that the drum will still

have two wraps of wire when the load and/or boom is in its lowest position. If a deficiency in category III is identified, operations involving use of the wire rope in question must be prohibited until:

(I) The wire rope is replaced; or

(II) 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. If a rope is shortened under this subsection, you must ensure that the drum will still have two wraps of wire when the load and/or boom is in its lowest position.

(D) Where a wire rope is required to be removed from service under this section, either the crane/derrick (as a whole) or the hoist with that wire rope must be tagged-out, in accordance with WAC 296-155-53400(67), until the wire rope is repaired or replaced.

(b) Monthly inspection.

(i) Each month an inspection must be conducted in accordance with (a) of this subsection (shift inspection).

(ii) The inspection must include any deficiencies that the qualified person who conducts the annual inspection determines under (c)(iii) of this subsection must be monitored.

(iii) Wire ropes on a crane/derrick must not be used until an inspection under this subsection demonstrates that no corrective action under (a)(iii) of this subsection is required.

(iv) This inspection must be documented and be kept and made available upon request. Electronic records are acceptable.

(c) Annual/comprehensive, for cranes and derricks not covered by WAC 296-155-531 through 296-155-53214.

(i) At least every 12 months, wire ropes in use on the crane/derrick must be inspected by a qualified person in accordance with (a) of this subsection (shift inspection).

(ii) In addition, at least every 12 months, the wire ropes in use on the crane/derrick must be inspected by a qualified person, as follows:

(A) The inspection must be for deficiencies of the types listed in (a)(i)(B) of this subsection.

(B) The inspection must be complete and thorough, covering the surface of the entire length of the wire ropes, with particular attention given to all of the following:

(I) Critical review items listed in (a)(ii) of this subsection.

(II) Those sections that are normally hidden during shift and monthly inspections.

(III) Wire rope in contact with saddles, equalizer sheaves or other sheaves where rope travel is limited.

(IV) Wire rope subject to reverse bends.

(V) Wire rope passing over sheaves.

(VI) Wire rope at or near terminal ends.

(C) Exception: In the event an inspection under (c)(ii) of this subsection is not feasible due to existing set-up and configuration of the crane/derrick (such as where an assist crane is needed) or due to site conditions (such as a dense urban setting). The inspection must consist of observation of the working range plus 3 additional wraps (running and standing) prior to use.

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

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

(I) The wire rope is replaced; or

(II) 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. If a rope is shortened under this subsection, you must ensure that the drum will still have two wraps of wire when the load and/or boom is in its lowest position.

(B) If the qualified person determines that, though not presently a safety hazard, the deficiency needs to be monitored, you must ensure that the deficiency is checked in the monthly inspections.

(iv) This inspection must be documented and be kept and made available upon request. Electronic records are acceptable.

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

(3) All documents produced under this section must be available, during the applicable document retention period, to all persons who conduct inspections under this section.

WAC 296-155-53405 Inspections.

(1) Cranes that have had modifications or additions as defined in WAC 296-155-53214 must be inspected by an accredited crane certifier after such modifications/additions have been completed, prior to initial use.

(2) Repaired/adjusted equipment.

(a) Cranes that have had significant repairs as defined in WAC 296-155-53214 must be inspected by an accredited crane certifier after such repairs have been completed, prior to initial use.

(b) Cranes that have had a repair or adjustment not defined in WAC 296-155-53214, that relates to safe operation (such as: A repair or adjustment to a safety device or operator aid, or to a critical part of a control system, power plant, braking system, load-sustaining structural components, load hook, or in-use operating mechanism), must be inspected by a qualified person after such a repair or adjustment has been completed, prior to initial use. The inspection must meet all of the following requirements:

(i) The qualified person must 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 must:

(A) Determine if a registered professional engineer (RPE) is needed to develop criteria for the repair/adjustment. If an RPE is not needed, you must ensure that the criteria are developed by the qualified person. If an RPE is needed, you must ensure that they are developed by an RPE.

(B) Determine if the repair/adjustment meets the criteria developed in accordance with (b)(ii)(A) of this subsection.

(iii) The inspection must include functional testing of the repaired/adjusted parts and other components that may be affected by the repair/adjustment.

(c) Equipment must not be used until an inspection under this section demonstrates that the repair/adjustment meets the requirements of (b)(i) of this subsection (or, where applicable, in (b)(ii) of this subsection).

(3) A competent person must begin a visual inspection prior to each shift the crane will be used, which must be completed before or during that shift. The inspection must consist of observation for apparent deficiencies. Taking apart equipment components and booming down is not required as part of this inspection unless the results of the visual inspection or trial operation indicate that further investigation necessitating taking apart crane components or booming down is needed. Determinations made in conducting the inspection must be reassessed in light of observations made during operation. At a minimum, the inspection must include all of the following:

(a) Control mechanisms for maladjustments interfering with proper operation;

(b) Control and drive mechanisms for apparent excessive wear of components and contamination by lubricants, water or other foreign matter;

(c) Air, hydraulic, and other pressurized lines for deterioration or leakage, particularly those which flex in normal operation;

(d) Hydraulic system for proper fluid level;

(e) Hooks and latches for deformation, cracks, excessive wear, or damage such as from chemicals or heat;

(f) Wire rope reeving for compliance with the manufacturer's specifications;

(g) Wire rope, in accordance with WAC 296-155-53404;

(h) Electrical apparatus for malfunctioning, signs of apparent excessive deterioration, dirt or moisture accumulation;

(i) Tires (when in use) for proper inflation and condition;

(j) Ground conditions around the equipment for proper support, including ground settling under and around outriggers/stabilizers and supporting foundations, groundwater accumulation, or similar conditions. This subsection does not apply to the inspection of ground conditions for railroad tracks and their underlying support when the railroad tracks are part of the general railroad system of transportation that is regulated pursuant to the Federal Railroad Administration under 49 C.F.R., Part 213;

(k) The crane for level position within the tolerances specified by the crane manufacturer's recommendations, both before each shift and after each move and setup;

(l) Operator cab windows for significant cracks, breaks, or other deficiencies that would hamper the operator's view;

(m) Rails, rail stops, rail clamps and supporting surfaces when the crane has rail traveling. This subsection does not apply to the inspection of rails, rail stops, rail clamps and supporting surfaces when the railroad tracks are part of the general railroad system of transportation that is regulated pursuant to the Federal Railroad Administration under 49 C.F.R., Part 213;

(n) Safety devices and operational aids for proper operation;

(o) Derricks must have guys inspected for proper tension.

(4) You must keep monthly inspection records (see items listed in subsection (3) of this section). These inspection records must be kept for at least 3 months. This report must contain the following information:

(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.

(5) If any deficiency is found during the inspection, an immediate determination must be made by the competent person as to whether the deficiency constitutes a safety hazard. If the deficiency is determined to constitute a safety hazard, the equipment must be taken out of service until it has been corrected and approved by a qualified person.

(6) If any deficiency in safety devices/operational aids is identified, the action specified in WAC 296-155-53410 and 296-155-53412 must be taken prior to using the equipment.

(7) If any deficiency is identified, an immediate determination must be made by a qualified person as to whether the deficiency constitutes a safety hazard.

(a) If a qualified person determines that a deficiency is a safety hazard, the crane must be taken out of service until it has been corrected, evaluated, and approved by a qualified person, except when temporary alternative measures are implemented as allowed in WAC 296-155-53412 and for tower cranes see WAC 296-155-54100(61).

(b) If a qualified person determines that, though not presently a safety hazard, the deficiency needs to be monitored, you must ensure that the deficiency is checked in the monthly inspections.

(8) 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), you must stop using the crane and a qualified person must:

(a) Inspect the crane for structural damage to determine if the crane can continue to be used safely.

(b) In light of the use/conditions determine whether any items/conditions listed in subsection (7) of this section need to be inspected; if so, the qualified person must inspect those items/conditions.

(c) If a deficiency is found, you must follow the requirements in subsection (7)(a) of this section.

(9) Cranes not in regular use. Cranes that have been idle for 3 months or more must be inspected by a qualified person in accordance with the requirements of subsection (3) of this section before initial use.

(10) Any part of a manufacturer's procedures regarding inspections that relate to safe operation (such as to a safety device or operational aid, critical part of a control system, power plant, braking system, load-sustaining structural components, load hook, or in-use operating mechanism) that is more comprehensive or has a more frequent schedule of inspection than the requirements of this section must be followed.

(11) All documents produced under this section must be available, during the applicable document retention period, to all persons who conduct inspections under this section.

WAC 296-155-53406 Signals.

(1) A qualified signal person that meets the requirements in WAC 296-155-53302 must be provided in each of the following situations:

(a) The point of operation, meaning the load travel or the area near or at load placement, is not in full view of the crane/equipment operator. The use of video equipment is allowed on a crane, but this shall not replace the requirements for when a qualified signal person is required.

Commented [SBS(42]: New language being clear that video equipment is allowed but doesn't replace a signal person

(b) When the crane is traveling, the view in the direction of travel is obstructed.

(c) Due to site specific safety concerns, either the crane/derrick operator or the person handling the load determines that it is necessary.

(2) Types of signals. Signals to crane/derrick operators must be by hand, voice, audible, or other means at least as effective.

(3) Hand signals.

(a) When using hand signals, the standard method as established in the applicable ASME B30 standards must be used. 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, nonstandard hand signals may be used in accordance with (b) of this subsection.

Note: See WAC 296-155-56400 for the hand signal chart.

(b) Nonstandard hand signals. When using nonstandard hand signals, the signal person, operator, and lift director must contact each other prior to the operation and agree on the nonstandard hand signals that will be used.

(4) Signals other than hand, voice or audible signals may be used where you demonstrate that the signals provided are at least equally effective communications as voice, audible, or standard method hand signals.

(5) Use and suitability.

(a) Prior to beginning operations, the operator, signal person, and lift director, must contact each other and agree on the voice signals that will be used. Once the voice signals are agreed upon, these employees need not meet again to discuss voice signals unless another employee is added or substituted, there is confusion about the voice signals, or a voice signal is to be changed.

(b) Each voice signal must contain the following 3 elements, given in the following order: Function (such as hoist, boom, etc.) and direction; distance and/or speed; function stop.

(c) The operator, signal person and lift director, must be able to effectively communicate in the language used.

(d) The signals used (hand, voice, audible, or other effective means), 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.

(e) Signals must be discernible or audible at all times. The crane operator must not respond unless signals are clearly understood.

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

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

(8) Only one person gives signals to a crane/derrick at a time, except in circumstances covered by subsection (9) of this section.

(9) Anyone who becomes aware of a safety problem must alert the operator or signal person by giving the stop or emergency stop signal. The operator must obey a stop (or emergency stop) signal, irrespective of who gives it.

(10) All directions given to the operator by the signal person must be given from the operator's direction perspective.

(11) 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 for which each signal is intended must be used, as follows:

(a) For each signal, prior to giving the function/direction, the signal person must identify the crane/derrick for which the signal is intended; or

(b) An equally effective method of identifying which crane/derrick the signal is intended for must be used.

(12) Hand signal chart. Hand signal charts must be either posted on the crane/derrick or conspicuously posted in the vicinity of the hoisting operations.

(13) Radio, telephone or other electronic transmission of signals.

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

(b) Signal transmission must be through a dedicated channel except:

(i) Multiple cranes/derricks and one or more signal persons may share a dedicated channel for the purpose of coordinating operations.

(ii) Where a crane is being operated on or adjacent to railroad tracks, and the actions of the crane operator need to be coordinated with the movement of other equipment or trains on the same or adjacent tracks.

(c) The operator's reception of signals and transmission of words must be made by a hands-free system.

Commented [ICD(43]: DOSH change. Devices may cost more with the hands free transmission option.

WAC 296-155-53408 Power line safety.

(1) Assembly and disassembly of crane/derrick.

(a) Before assembling or disassembling crane/derrick, you must determine if any part of the crane/derrick, load line or load (including rigging and lifting accessories) could get, in the direction or area of assembly, closer than 20 feet of a power line that is up to 350 kV or closer than 50 feet of a power line that exceeds 350 kV during the assembly/disassembly process. If so, you 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) - Clearance. Ensure that no part of the crane/derrick, load line or load (including rigging and lifting accessories), gets closer than 20 feet of a power line that is up to 350 kV or closer than 50 feet of a power line that exceeds 350 kV by implementing the measures specified in (b) of this subsection.

(iii) Option (3) - Table 4 clearance.

(A) Determine the line's voltage and the minimum approach distance permitted under Table 4 of this section.
(B) Determine if any part of the crane/derrick, load line or load (including rigging and lifting accessories), could get closer than the minimum approach distance of the power line permitted under Table 4 of this section. If so, then you must follow the requirements in (b) of this subsection to ensure that no part of the crane/derrick, load line, or load (including rigging and lifting accessories), gets closer to the line than the minimum approach distance.

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

(i) Conduct a planning meeting with the assembly/disassembly director, 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), show the equipment's work zone, and the steps that will be implemented to prevent encroachment/electrocution. This meeting will be documented, dated, and signed by all attendees prior to the commencement of their work.

Commented [ICD(44]: DOSH changes, should not cause additional cost.

(ii) If tag lines are used, they must be nonconductive.
(iii) At least one of the following additional measures must be in place. The measure selected from this list must be effective in preventing encroachment. The additional measures are:

(A) Use a dedicated spotter who is in continuous contact with the crane/derrick operator, plus an elevated warning line, barricade, or line of signs, in view of the spotter, equipped with flags or similar high-visibility markings. The dedicated spotter must:

(I) Be equipped with a visual aid to assist in identifying the minimum clearance distance. Examples of a visual aid include: A clearly visible 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 dedicated spotter and a building corner ahead of the dedicated spotter).
(II) Be positioned to effectively gauge the clearance distance.
(III) Where necessary, use equipment that enables the dedicated spotter to communicate directly with the operator, in accordance with WAC 296-155-53406(13) (radio, telephone, or other electronic transmission of signals).
(IV) Give timely information to the operator so that the required clearance distance can be maintained.

Note: To be considered a dedicated spotter, the requirements of WAC 296-155-53302 (Signal person qualifications) must be met and his/her sole responsibility is to watch the separation between the power line and the equipment, the load line and load (including rigging and lifting accessories), and ensure through communication with the operator that the applicable minimum approach distance is not breached.

(B) A proximity alarm set to give the operator sufficient warning to prevent encroachment.
(C) 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.
(D) A device that automatically limits range of movement, set to prevent encroachment.

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

(d) Assembly/disassembly inside Table 4 clearance is prohibited. No part of a crane/derrick, load line or load (including rigging and lifting accessories), whether partially or fully assembled, is allowed closer than the minimum approach distance under Table 4 of a power line unless you have 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, the utility owner/operator of power lines must provide the requested voltage information prior to commencement of work or within two working days of your request.

(f) Power lines presumed energized. You must assume that all power lines are energized unless the utility owner/operator confirms that the power line has been and continues to be deenergized and 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 crane/derrick.

(2) Operation of crane/derrick.

(a) Hazard assessments and precautions inside the work zone. Before beginning crane/derrick operations, you must:
(i) Identify the work zone.

(A) Define a work zone by demarcating boundaries ~~(such as with flags,~~ that are equipped with flags or similar high-visibility markings, or a device such as a range limit device or range control warning device~~)~~ and prohibiting the operator from operating the crane/derrick past those boundaries; or

(B) Define the work zone as the area 360 degrees around the crane/derrick, up to its maximum working radius.

Commented [ICD(45]: DOSH change, should not add additional costs.

(ii) Determine if any part of the crane/derrick, load line or load (including rigging and lifting accessories), if operated up to its maximum working radius in the work zone, could get closer than 20 feet of a power line that is up to 350 kV or closer than 50 feet of a power line that exceeds 350 kV. If so, you must meet the requirements in Option (1), Option (2), or Option (3) as follows:

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

(B) Option (2) - 20-foot clearance. Ensure that no part of the crane/derrick, load line, or load (including rigging and lifting accessories), gets closer than 20 feet to the power line by implementing the measures specified in (b) of this subsection.

(C) Option (3) - Table 4 clearance.

(I) Determine the line's voltage and the minimum approach distance permitted under Table 4 of this section.

(II) Determine if any part of the crane/derrick, load line or load (including rigging and lifting accessories), while operating up to its maximum working radius in the work zone, could get closer than the minimum approach distance of the power line permitted under Table 4 of this section. If so, then you must follow the requirements in (b) of this subsection to ensure that no part of the crane/derrick, load line, or load (including rigging and lifting accessories), gets closer to the line than the minimum approach distance.

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

(i) Conduct a planning meeting with the operator and the other workers who will be in the area of the crane/~~derrick~~ equipment or load to review the location of the power line(s), show the work zone, and the steps that will be implemented to prevent encroachment/electrocution. This meeting will be documented, dated, and signed by all attendees prior to the commencement of their work.

Commented [ICD(46]: DOSH change, no additional cost

(ii) If tag lines are used, they must be nonconductive.
(iii) Erect and maintain an elevated warning line, barricade, or line of signs, in view of the operator, equipped with flags or similar high-visibility markings, at 20 feet from a power line that is up to 350 kV or 50 feet from a power line that exceeds 350 kV (if using Option (2)) or at the minimum approach distance under Table 4 of this section (if using Option (3)). If the operator is unable to see the elevated warning line, a dedicated spotter must be used as described in (iv)(B) of this subsection in addition to implementing one of the measures described in (b)(i), (iii) through (v) of this subsection.
(iv) Implement at least one of the following measures:

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

(B) Use a dedicated spotter who is in continuous contact with the crane/derrick operator, plus an elevated warning line, barricade, or line of signs, in view of the spotter, equipped with flags or similar high-visibility markings. The dedicated spotter must:

(I) Be equipped with a visual aid to assist in identifying the minimum clearance distance. Examples of a visual aid include: A clearly visible 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 dedicated spotter and a building corner ahead of the dedicated spotter).

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

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

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

Note: To be considered a dedicated spotter, the requirements of WAC 296-155-53302 (Signal person qualifications) must be met and his/her sole responsibility is to watch the separation between the power line and the equipment, the load line and load (including rigging and lifting accessories), and ensure through communication with the operator that the applicable minimum approach distance is not breached.

(C) 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.
(D) A device that automatically limits range of movement, set to prevent encroachment.
(E) An insulating link/device, as defined in WAC 296-155-52902, installed at a point between the end of the load line (or below) and the load.

(v) The requirements of (b)(iv) of this subsection do not apply to work covered by chapter 296-45 WAC.

(c) Voltage information. Where Option (3) is used, the utility owner/operator of power lines must provide the requested voltage information prior to commencement of work or within two working days of your request.

(d) Operations below power lines.

(i) No part of the crane/derrick, load line or load (including rigging and lifting accessories) is allowed below a power line unless you have 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)(ii) of this subsection apply.

(ii) Exceptions. (d)(i) of this subsection is inapplicable where you demonstrate that one of the following applies:

(A) The work is covered by chapter 296-45 WAC.

(B) For cranes/derricks with nonextensible booms: The uppermost part of the crane/derrick, with the boom at true vertical, would be more than 20 feet below the plane of a power line that is up to 350 kV, 50 feet below the plane of a power line that exceeds 350 kV or more than the Table 4 minimum clearance distance below the plane of the power line.

(C) For cranes with articulating or extensible booms: The uppermost part of the crane, with the boom in the fully extended position, at true vertical, would be more than twenty feet below the plane of a power line that is up to 350 kV, fifty feet below the plane of a power line that exceeds 350 kV or more than the Table 4 minimum clearance distance below the plane of the power line.

(D) Compliance with (d)(i) of this subsection is infeasible and meets the requirements of subsection (4) of this section.

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

(f) Training.

(i) You must train each operator and crew member assigned to work with the crane/derrick on all the following:

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

(I) Information regarding the danger of electrocution from the operator simultaneously touching the crane/derrick and the ground.
(II) 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.
(III) The safest means of evacuating from the crane/derrick that may be energized.
(IV) The danger of the potentially energized zone around the crane/derrick (step potential).
(V) The need for crew in the area to avoid approaching or touching the crane/derrick and the load.
(VI) Safe clearance distance from power lines.

(B) Power lines are presumed to be energized unless the utility owner/operator confirms that the power line has been and continues to be deenergized, and visibly grounded at the worksite.
(C) 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 power line is insulated.
(D) The limitations of an insulating link/device, proximity alarm, and range control (and similar) device, if used.
(E) The procedures to be followed to properly ground equipment and the limitations of grounding.

(ii) Employees working as dedicated spotters must be trained to enable them to effectively perform their task, including training on the applicable requirements of this section.
(iii) Training under this section must be administered in accordance with WAC 296-155-53409(2).

(g) Devices originally designed by the manufacturer for use as: A safety device (see WAC 296-155-53410), operational aid (see WAC 296-155-53412), or a means to prevent power line contact or electrocution, when used to comply with this section, must meet the manufacturer's procedures for use and conditions of use.

(3) Prior to working near a transmitter/communication tower where an electrical charge can be induced in the crane/derrick or materials being handled, the transmitter must be deenergized or the following precautions must be taken:

(a) The crane/derrick must be provided with an electrical ground directly to the crane/derrick frame;

(b) Ground jumper cables must be attached to materials being handled by boom equipment when electrical charge is induced while working near energized transmitters. Crews must be provided with nonconductive poles having large alligator clips or other similar protection to attach the ground cable to the load;
(c) Combustible and flammable materials must be removed from the immediate area prior to operations; and

(d) If tag lines are used, they must be nonconductive.

(4) Operation of the crane/derrick inside the Table 4 zone. Operations in which any part of the crane/derrick, load line or load (including rigging and lifting accessories) is either closer than the minimum approach distance under Table 4 of an energized power line or the power line voltage is undetermined and the crane/derrick load line or load is within 20 feet from the power line is prohibited, except where you demonstrate that all of the following requirements are met:

(a) Notify the crane safety program within the department of labor and industries.

(b) You determine that it is infeasible to do the work without breaching the minimum approach distance under Table 4 of this section.

(c) You determine that, after consultation with the utility owner/operator, it is infeasible to deenergize and ground the power line or relocate the power line.

(d) Minimum clearance distance.

(i) 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 crane/derrick, load line and load (including rigging and lifting accessories) to a complete stop; wind conditions; degree of sway in the power line; lighting conditions, and other conditions affecting the ability to prevent electrical contact.

(ii) Subsection (4)(d)(i) of this section does not apply to work covered by chapter 296-45 WAC; instead, for such work, the minimum clearance distances specified in chapter 296-45 WAC, Table 1 apply. Employers covered by chapter 296-45

WAC are permitted to work closer than the distances in chapter 296-45 WAC, Table 1, where both the requirements of this rule and WAC 296-45-375(10) are met.

(e) A planning meeting with the employer and utility owner/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 must include:

(i) If the power line is equipped with a device that automatically reenergizes the circuit in the event of a power line contact, before the work begins, the automatic reclosing feature of the circuit interrupting device must be made inoperative if the design of the device permits.

(ii) A dedicated spotter who is in continuous contact with the operator. The dedicated 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 clearly visible 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 dedicated spotter and a building corner ahead of the dedicated spotter).

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

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

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

Note: To be considered a dedicated spotter, the requirements of WAC 296-155-53302 (Signal person qualifications) must be met and his/her sole responsibility is to watch the separation between the power line and the equipment, the load line and load (including rigging and lifting accessories), and ensure through communication with the operator that the applicable minimum approach distance is not breached.

(iii) 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. However, this provision does not apply to work covered by chapter 296-45 WAC.

(iv) Insulating link/device.

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

(B) For work covered by chapter 296-45 WAC, the requirement in (e)(iv)(A) of this subsection applies only when working inside the clearance distances of Table 1 in chapter 296-45 WAC.
(C) For work covered by chapter 296-45 WAC, electrical workers, involving operations where use of an insulating link/device is infeasible, the requirements of WAC 296-45-375 (10)(c)(ii) or (iii) may be substituted for the requirement in (e)(iv)(A) of this subsection.

(v) Until one year after the effective date of this part, the following procedure may be substituted for the requirement in (e)(iv)(A) of this subsection: All employees, excluding equipment operators located on the equipment, who may come in contact with the equipment, the load line, or the load must be insulated or guarded from the equipment, the load line, and the load. Insulating gloves rated for the voltage involved are adequate insulation for the purposes of this section.

Commented [SBS(47]: Remove underline portion as it no longer applies. Will need to change numbering.

(vi) Until 3 years after the effective date of this part the following procedure may be substituted for the requirement in (e)(iv)(A) of this subsection:

(A) You must use a link/device manufactured on or before one year after the effective date of this part that meets the definition of an insulating link/device, except that it has not been approved by a nationally recognized testing laboratory, and that is maintained and used in accordance with manufacturer requirements and recommendations, and is installed at a point between the end of the load line (or below) and the load; and
(B) All employees, excluding equipment operators located on the equipment, who may come in contact with the equipment, the load line, or the load must be insulated or guarded from the equipment, the load line, and the load through an additional means other than the device described in (e)(vi)(A) of this subsection. Insulating gloves rated for the voltage involved are adequate additional means of protection for the purposes of this section.

(v) Use nonconductive rigging if the rigging may be within the Table 4 distance during the operation.

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

(ix) If a tag line is used, it must be of the nonconductive type.

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

(xi) Workers other than the operator must be prohibited from touching the load line above the insulating link/device and crane. Operators remotely operating the equipment from the ground must use either wireless controls that isolate the operator from the equipment or insulating mats that insulate the operator from the ground.

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

(xiii) The crane/derrick must be properly grounded.

(xiv) Insulating line hose or cover-up must be installed by the utility owner/operator except where such devices are unavailable for the line voltages involved.

(f) The procedures developed to comply with (e) of this subsection are documented and immediately available on-site.

(g) The crane/derrick user and utility owner/operator (or registered professional engineer) meet with the operator and the other workers who will be in the area of the crane/derrick or load to review the procedures that will be implemented to prevent breaching the minimum approach distance established in (d) of this subsection and prevent electrocution.

(h) The procedures developed to comply with (e) of this subsection are implemented.

(i) The utility owner/operator (or registered professional engineer) and all employers of employees involved in the work must identify one person who will direct the implementation of the procedures. The person identified in accordance with this section must direct the implementation of the procedures and must have the authority to stop work at any time to ensure safety.

(j) If a problem occurs implementing the procedures being used to comply with (e) of this subsection, or indicating that those procedures are inadequate to prevent electrocution, you must safely stop operations and either develop new procedures to comply with (e) of this subsection or have the utility owner/operator deenergize and visibly ground or relocate the power line before resuming work.

(k) Devices originally designed by the manufacturer for use as: Safety devices (see WAC 296-155-53410), operational aids (see WAC 296-155-53412), or a means to prevent power line contact or electrocution, when used to comply with this section, must meet the manufacturer's procedures for use and conditions of use.

(l) You must train each operator and crew member assigned to work with the equipment in accordance with subsection (2)(f) of this section.

(5) Cranes while traveling.

(a) This section establishes procedures and criteria that must be met for cranes traveling under a power line on the construction site with no load. Equipment traveling on a construction site with a load is governed by subsections (2), (4), (6), and (7) of this section, whichever is appropriate, and WAC 296-155-53400(35).

(b) You must ensure that:

(i) The boom/mast and boom/mast support system are lowered sufficiently to meet the requirements of this section.

(ii) The clearances specified in Table 5 of this section are maintained.

(iii) The effects of speed and terrain on crane movement (including movement of the boom/mast) are considered so that those effects do not cause the minimum clearance distances specified in Table 5 of this section to be breached.

(iv) Dedicated spotter. If any part of the crane while traveling will get closer than 20 feet of the power line, you must ensure that a dedicated spotter who is in continuous contact with the driver/operator is used. The dedicated spotter must:

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

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

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

Note: To be considered a dedicated spotter, the requirements of WAC 296-155-53302 (Signal person qualifications) must be met and his/her sole responsibility is to watch the separation between the power line and the equipment, the load line and load (including rigging and lifting accessories), and ensure through communication with the operator that the applicable minimum approach distance is not breached.

(v) Additional precautions for traveling in poor visibility. When traveling at night, or in conditions of poor visibility, in addition to the measures specified in (b)(i) through (iv) of this subsection, you must ensure that:

(A) The power lines are illuminated or another means of identifying the location of the lines must be used.

(B) A safe path of travel is identified and used.

(6) The requirements of subsections (1) and (2) of this section apply to power lines over 350 kV, and below 1000 kV except that wherever the distance "20 feet" is specified, the distance "50 feet" must be substituted.

(7) For power lines over 1000 kV, the minimum clearance distance must be established by the utility owner/operator or a registered professional engineer who is a qualified person with respect to power transmission and distribution.

Table 4—Minimum Clearance Distances

Voltage (nominal, kV)	Minimum clearance distance (feet)
up to 50	10
over 50 to 200	15
over 200 to 345	20
over 345 to 500	25
over 500 to 750	35
over 750 to 1,000	45
over 1,000	(as established by the utility owner/operator or registered professional engineer who is a qualified person with respect to electrical power transmission and distribution).

Note: The value that follows "to" is up to and includes that value.

Table 5—Minimum Clearance Distances While Traveling With No Load and Boom/Mast Lowered

Voltage (nominal, kV)	While traveling—Minimum clearance distance (feet)
up to 0.75	4 (while traveling/boom lowered)
over 0.75 to 50	6 (while traveling/boom lowered)

over 50 to 345	. . . . . 10 (while traveling/boom lowered)
over 345 to 750	. . . . . 16 (while traveling/boom lowered)
over 750 to 1,000	. . . . . 20 (while traveling/boom lowered)
over 1,000	. . . . . (as established by the utility owner/operator or registered professional engineer who is a qualified person with respect to electrical power transmission and distribution).

WAC 296-155-53409 Training.

(1) ~~You~~ The employer must provide training as follows:

(a) Overhead power lines. Prior to working energized lines, ~~Y~~othe employer must ensure that each employee is trained in accordance with the requirements listed in WAC 296-155-53408~~(2)(g) and 296-155-53408 (4)(k) in the topics listed in WAC 296-155-53408 (2)(f)~~.

(b) Qualified signal persons. You must ensure that each employee is trained who will be assigned to work as a signal person in accordance with the requirements of WAC 296-155-53302(3).

(c) Qualified rigger. You must ensure that each employee is trained who will be assigned to work as a rigger in accordance with the requirements of WAC 296-155-53306(3).

(d) Lift director. *The employer must ensure that each employee who will be assigned to work as a Lift Director is trained in accordance with the requirements found in WAC 296-155-53301*.

(~~d~~e) Operators.

(i) Trainee/apprentice operator. You must ensure that each trainee/apprentice operator is trained in the areas addressed in WAC 296-155-53300 and 296-155-56420.

(ii) Operator. Operators who have met the requirements in WAC 296-155-53300 and 296-155-56420 will be considered trained.

(iii) For operators using equipment covered under this part that are exempt in WAC 296-155-52900 (3)(b), you must ensure that each operator is trained on the safe operation of the equipment the operator will be using.

Commented [ICD(48]: Need to be tweaked.

Commented [SBS(49R48]: I believe that it's now more simplified and clear.

(~~e~~f) You must train each operator of the equipment covered by this part 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 with a boom, 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. See WAC 296-155-53400 (68) and (69).

(ii) Where available, the manufacturer's emergency procedures for halting unintended equipment movement.

(~~f~~g) Competent persons and qualified persons. You must ensure that each competent person and each qualified person is trained regarding the requirements of this part applicable to their respective roles.

(~~g~~h) Crush/pinch points. You must ensure that each employee is trained who works with the equipment to keep clear of holes, and crush/pinch points and the hazards addressed in WAC 296-155-53400(42) (work area control).

(~~h~~i) **Tag-out.** You must ensure that each operator and each additional employee authorized to start/energize equipment or operate equipment controls (such as maintenance and repair employees) is trained, in the tag-out and start-up procedures in WAC 296-155-53400 (16) and (67).

(2) Training administration.

(a) You must evaluate each employee required to be trained under this part to confirm that the employee understands the information provided in the training.

(b) You must ensure that refresher training is provided in relevant topics for each employee when, based on the conduct of the employee or an evaluation of the employee's knowledge, there is an indication that retraining is necessary.

(c) Whenever you are required to provide training under this part, you must provide the training at no cost to the employee.

WAC 296-155-53410 Safety devices.

(1) Safety devices. The following safety devices are required on all cranes/derricks, except tower cranes and self-erecting tower cranes, covered by this part, unless otherwise specified. For requirements relating to operational aids and safety devices for tower cranes, see WAC 296-155-53900 (60) and (61), for self-erecting tower cranes see WAC 296-155-54100 (42) and (43).

(a) Crane level indicator.

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

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

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

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

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

(d) Cranes with foot pedal brakes must have locks, except for portal cranes and floating cranes.

(e) Hydraulic outrigger jacks and hydraulic stabilizer jacks must have an integral holding device/check valve.

(f) Cranes on rails must have rail clamps and rail stops, except for portal cranes.

(g) Horn.

(i) The crane/derrick, as defined in ASME B30.5, must have a built-in horn or a removable horn that is available to the operator.

(ii) If a built-in horn is not working properly, it must be tagged-out or removed. If a removable horn is not working properly, it must be removed.

(2) Proper operation required. Operations must not begin unless the devices listed in this section are in proper working order. If a device stops working properly during operations, the operator must safely stop operations. If any of the devices listed in this section are not in proper working order, the equipment must be taken out of service and operations must not resume until the device is again working properly. Alternative measures are not permitted to be used.

WAC 296-155-53412 Operational aids.

(1) The devices listed in this section (listed operational aids) are required on all cranes/derricks, except tower cranes and self-erecting tower cranes, covered by this part, unless otherwise specified. For requirements relating to operational aids and safety devices for tower cranes, see WAC 296-155-53900 (60) and (61), for self-erecting tower cranes see WAC 296-155-54100 (42) and (43).

Notes: The requirements in subsection (3)(e), (f) and (g) of this section do not apply to articulating cranes.
The requirements in subsection (3)(d), (e) and (h) of this section only apply to those digger derricks manufactured after the effective date of this section.

(2) Operations must not begin unless the listed operational aids are in proper working order, except where an operational aid is being repaired you use the specified temporary alternative measures. More protective alternative measures specified by the crane/derrick manufacturer, if any, must be followed.

(3) When operational aids are inoperative or malfunctioning, the crane and/or device manufacturer's recommendations for continued operation or shutdown of the crane must be followed until the problems are corrected. Without such recommendations and any prohibitions from the manufacturer against further operation, the following requirements apply:

Note: If a replacement part is no longer available, the use of a substitute device that performs the same type of function is permitted and is not considered a modification under WAC 296-155-53400 (58) and (59) (crane/derrick modifications).

(a) Recalibration or repair of the operational aid must be accomplished as soon as is reasonably possible, as determined by a qualified person.

(b) Boom hoist limiting device (except for derricks with base mounted drums).
(i) For cranes manufactured after December 16, 1969, a boom hoist limiting device is required. Temporary alternative measures: One or more of the following methods must be used:
(A) Use a boom angle indicator.

(B) Clearly mark the boom hoist rope (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 rope (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 crane was manufactured on or before December 16, 1969, and is not equipped with a boom hoist limiting device, at least one of the measures in (b)(i)(A) through (C) of this subsection must be used.

(c) Luffing jib limiting device. Cranes with a luffing jib must have a luffing jib limiting device. Temporary alternative measures are the same as in (b)(i) of this subsection, except to limit the movement of the luffing jib rather than the boom hoist.

(d) Anti two-blocking device. (This does not apply to dedicated pile drivers.)
(i) Telescopic boom cranes manufactured after February 28, 1992, must 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.
(A) Temporary alternative measures: Clearly mark the hoist rope (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
(B) Use a spotter when extending the boom.

(ii) Lattice boom cranes.
(A) Lattice boom cranes manufactured after February 28, 1992, must 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 after the effective date of this standard must 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.

Exception: The requirements in subsection (3)(d)(ii)(A) and (B) of this section do not apply to such lattice boom cranes when used for dragline, clamshell (grapple), magnet, drop ball (wrecking ball), container handling, concrete bucket, marine operations that do not involve hoisting personnel, and pile driving work.

(C) Temporary alternative measures: Clearly mark the hoist rope (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.

(iii) Articulating cranes manufactured after December 31, 1999, that are equipped with a load hoist must be equipped with a device that 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 must prevent such damage at all points where two-blocking could occur. Temporary alternative measures: When two-blocking could only occur with movement of the load hoist, clearly mark the hoist rope (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. When two-blocking could occur without movement of the load hoist, clearly mark the hoist rope (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 when extending the boom.

(e) Boom angle or radius indicator (except for derricks with base mounted drum hoists). The crane must have a boom angle or radius indicator readable from the operator's station. Temporary alternative measures: Radii or boom angle must be determined by measuring the radii or boom angle with a measuring device.

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

(g) Boom length indicator if the crane has a telescopic boom, except where the rated capacity is independent of the boom length. Temporary alternative measures: One or more of the following methods must 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.

(h) Load weighing and similar devices (this also applies to dedicated pile drivers manufactured more than one year after the effective date of this section). Cranes (other than derricks and articulating cranes) manufactured after March 29, 2003, with a rated capacity over 6,000 pounds must have at least one of the following: Load weighing device, load moment (or rated capacity) indicator, or load moment (or rated capacity) limiter.

(i) Temporary alternative measures: The weight of the load must 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 must be provided to the operator prior to the lift.
(ii) Articulating cranes manufactured after the effective date of this section must have at least one of the following: Automatic overload prevention device, load weighing device, load moment (or rated capacity) indicator, or load moment (rated capacity) limiter. Temporary alternative measures: The weight of the load must be determined from a source recognized by the industry (such as the load's manufacturer) or by a calculation method recognized by the industry (such as calculating a steel beam from measured dimensions and a known per foot weight). This information must be provided to the operator prior to the lift.

(i) Reserved.

(j) The following devices are required on cranes manufactured after the effective date of this section:

(i) Outrigger/stabilizer position (horizontal beam extension) sensor/monitor if the crane has outriggers or stabilizers. Temporary alternative measures: The operator must verify that the position of the outriggers or stabilizers is correct (in accordance with manufacturer procedures) before beginning operations requiring outrigger or stabilizer deployment.
(ii) Hoist drum rotation indicator if the crane/derrick has a hoist drum is not visible from the operator's station. Temporary alternative measures: Mark the drum to indicate the rotation of the drum. In addition, install mirrors or remote video cameras and displays if necessary for the operator to see the mark.

WAC 296-155-53414 Cranes/derricks with a rated hoisting/lifting capacity of 2,000 pounds or less.

Commented [SBS(50]: Deleting underlined code. Should we address numbering as the code already skips 53413?

For cranes/derricks with a maximum manufacturer-rated hoisting/lifting capacity of 2,000 pounds or less:

(1) The following sections apply: WAC 296-155-52900, Scope; WAC 296-155-52902, Definitions; WAC 296-155-53400 (34), (36) through (38), (45), (46), (59) and (67), General requirements; WAC 296-155-53404, Wire rope; WAC 296-155-53406, Signals; WAC 296-155-53408, Power line safety; WAC 296-155-53700(7), Mobile cranes—General; WAC 296-155-53715(5), Mobile cranes—Operations; WAC 296-155-539, Tower cranes; WAC 296-155-542, Overhead/bridge and gantry cranes; WAC 296-155-543, Derricks.

Note to subsection (1) of this section: Under subsection (2)(a) of this section, WAC 296-155-53402, (Assembly/disassembly) also apply.

(2) Assembly/disassembly.

(a) WAC 296-155-53402 (Assembly/disassembly) applies.

(b) Components and configuration. You must ensure that:

(i) The selection of components and the configuration of the crane/derrick which affects the capacity or safe operation of the crane/derrick complies with either the:

(A) Manufacturer instructions, recommendations, limitations, and specifications. When these documents and information are unavailable, a registered professional engineer familiar with the type of crane/derrick involved must approve, in writing, the selection and configuration of components; or

(B) Approved modifications that meet the requirements of WAC 296-155-53400 (58) and (59).

(ii) Post-assembly inspection. Upon completion of assembly, the crane/derrick is inspected to ensure that it is in compliance with subsection (2)(b)(i) of this section.

(c) Manufacturer prohibitions. You must comply with applicable manufacturer prohibitions.

(3) Operation - Procedures.

(a) You must comply with all manufacturer procedures applicable to the operational functions of the crane/derrick, including its use with attachments.

(b) Unavailable operation procedures. You must:

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

(ii) Ensure that procedures for the operational controls are developed by a qualified person.

(iii) Ensure that procedures related to the capacity of the crane/derrick are developed and signed by a registered professional engineer.

(c) Accessibility. You must ensure that:

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

(ii) Procedures applicable to the operation of the crane/derrick, recommended operating speeds, special hazard warnings, instructions and operator's manual, are readily available for use by the operator.

(iii) Where rated capacities are available at the control station only in electronic form and failure occurs that makes the rated capacities inaccessible, the operator must immediately cease operations or follow safe shut-down procedures until the rated capacities (in electronic or other form) are available.

(4) Safety devices and operational aids.

(a) You must ensure that safety devices and operational aids that are part of the original equipment are maintained in accordance with manufacturer procedures.

(b) Anti two-blocking. You must ensure that cranes covered by this section manufactured after the effective date of this standard must have either an anti two-block device that meets the requirements of WAC 296-155-53412 (3)(d), or is designed so that, in the event of a two-block situation, no damage or load failure will occur (for example, by using a power unit that stalls in response to a two-block situation).

(5) Operator qualifications. You must train each operator, ensure that, prior to operating the crane/derrick, the operator is trained on the safe operation of the type of crane/derrick the operator will be using.

(6) Signal person qualifications. You must train each signal person, in the proper use of signals applicable to the use of the crane/derrick.

(7) Keeping clear of the load. WAC 296-155-53400(43) applies, except for WAC 296-155-53400 (43)(c)(iii) (qualified rigger).

(8) Inspections. You must ensure that the crane/derrick is inspected in accordance with manufacturer procedures.

(9) Hoisting personnel. You must ensure that equipment covered by this section is not used to hoist personnel.

(10) Design. You must ensure that the crane/derrick is designed by a qualified engineer.

WAC 296-155-537 Mobile cranes.

WAC 296-155-53700 Mobile cranes – general.

(1) All crawler or truck cranes (greater than 2,000 pounds capacity) in use must meet the applicable requirements for design, construction, testing, inspection, maintenance, and operation as prescribed in the ASME B30.5-2018, Safety Standard for Mobile and Locomotive Cranes. It is not the intent of this rule to require retrofitting of existing cranes. However, when an item is being modified, its performance needs to be reviewed by a qualified person and compared to the applicable sections of this rule. For modification requirements see WAC 296-155-53400 (58) and (59). For cranes manufactured prior to the effective date of this rule the design, construction and testing criteria must meet at a minimum, ASME B30.5-2011.

Commented [SBS(51]: Remove underlined section to remove this exemption

Commented [SBS(52]: Newer ASME reference

Commented [SBS(53]: Newer ASME reference

(2) Mobile cranes must have boom stops to provide resistance from backward overturning. Such as:

- A fixed or telescoping bumper;
- A shock absorbing bumper;
- Hydraulic boom elevation cylinder(s).

(3) Restraints must be provided that will keep the jibs from backward overturning.

(4) Boom angle or radius indicators readable from the operator's station must be provided.

(5) A means must be provided that automatically stops the hoisting of the boom when the boom reaches a predetermined high angle. This can be either:

- A boom hoist disconnect;
- A shutoff;

or

- Hydraulic relief.

(6) A boom length indicator that is readable from the operator's station must be provided for telescopic booms, unless the load rating is independent of the boom length.

(7) Where the ground is soft or uneven, you must use timber, planking, or other suitable material to provide firm foundation and distribute the load.

(8) All welding procedures and welding operator qualifications must be in accordance with ANSI/AWS D14.3 when welding is to be performed on load-sustaining members.

WAC 296-155-53715 Mobile cranes – operations.

(1) Where applicable, if the load hoist mechanism is not equipped with an automatic brake and the load must remain suspended for any considerable length of time, the operator must hold the drum from rotating in the lowering direction by activating a manually operated brake. The boom hoist brakes must be set, and on rope boom support cranes, a braking mechanism and a ratchet and pawl or other locking device must be engaged to prevent inadvertent lowering of the boom.

(2) On wheel-mounted cranes, you must not lift loads over the front area, except as permitted by the crane manufacturer.

(3) Rolling outriggers. Mobile cranes using rolling outriggers must use load charts from the crane manufacturer or an RPE that specifically address this configuration. If the crane manufacturer does not address the use of rolling outriggers while some of the crane's weight is on its wheels, then the user must use the "on rubber" chart.

(4) While in transit, you must exercise the following additional precautions:

(a) The boom should be carried in line with the direction of motion.

(b) You must secure the superstructure against rotation (or the boom placed in a boom rack mounted on the carrier), except when negotiating turns when there is an operator in the cab or the boom is supported on a dolly.

(5) You must travel a crane with or without a load in the configuration recommended by the crane manufacturer. In the event a configuration is not specified, then you must not attempt travel with the boom so high that it may bounce back over the cab.

(6) When rotating the crane, you must avoid sudden starts and stops. Rotational speed must be such that the load does not swing out beyond the radius at which it can be controlled. You must use a tag or restraint line when rotation of the load is hazardous.

(7) You must not operate cranes without the ballast or counterweight being in place as specified by the crane manufacturer. Under specific conditions, such as during crane assembly or unusual boom configurations, you must adhere to the crane manufacturer's recommendations for the amount of ballast or counterweight.

(8) You must level the crane per the crane manufacturer's recommendation; in the event that these recommendations are not available you must follow an RPE's recommendation.

WAC 296-155-538 Articulating boom cranes.

WAC 296-155-53800 Articulating boom cranes – general.

(1) All articulating boom cranes in use must meet the applicable requirements for design, inspection, construction, testing, maintenance and operation as prescribed in the ASME B30.22-2016, Safety Standard for Articulating Boom Cranes. It is not the intent of this rule to require retrofitting of existing cranes. However, when an item is being modified, its performance needs to be reviewed by a qualified person and compared to the applicable sections of this rule. For modification requirements see WAC 296-155-53400 (58) and (59). For cranes manufactured prior to the effective date of this rule the design and construction criteria must meet at a minimum, ASME B30.22-2010.

Commented [SBS(54]: Newer ASME reference

Commented [SBS(55]: Newer ASME reference

(2) All articulating boom cranes with a winch must have a two-blocking damage prevention feature.

(3) All welding and welding operator qualifications for load sustaining members must be in accordance with ANSI/AWS D14.3.

WAC 296-155-53815 Articulating boom cranes – operations.

(1) The operator must not engage in any practice that diverts their attention while actually engaged in operating the crane.

(2) Stabilizers/outriggers must be visible to the operator or to a signal person during extension or setting.

(3) When the crane is equipped with stabilizers/outriggers, they must be extended and set per manufacturer's recommendations. When applicable, cribbing under the stabilizers/outriggers must meet the following requirements:

(a) Strong enough to prevent crushing;

(b) Of such thickness, width, and length as to completely support the pad.

(4) Crane supports for individual stabilizer/outrigger pads must be level to the manufacturer's specifications or those of a qualified person. Supports may be timbers, cribbing, or other structural members to distribute the load so as not to exceed the allowable bearing capacity of the underlying material.

(5) In transit the boom must be carried in stowed position, as recommended by the manufacturer.

(6) The crane must not travel with a load on the hook unless allowed by the manufacturer.

(7) You must not use articulating boom cranes with suspended work platforms (baskets).

(8) The use of attached work platforms to the boom must be approved by the crane manufacturer.

Note: Requirements for personnel lifting are located in WAC 296-155-547.

WAC 296-155-539 Tower cranes.

WAC 296-155-53900 Tower cranes – general.

(1) This section contains supplemental requirements for tower cranes; all sections of this part apply to tower cranes unless specified otherwise. In addition, the requirements in WAC 296-155-53402 apply unless otherwise specified, except that the term "assembly/disassembly" is

replaced by "erecting, climbing and dismantling," and the term "disassembly" is replaced by "dismantling."

(2) All tower cranes in use must meet the applicable requirements for design, construction, installation, testing, maintenance, inspection, and operation as prescribed by the manufacturer. If the manufacturer's recommendations are not available, follow the requirements in ASME B30.3-2016. It is not the intent of this rule to require retrofitting of existing cranes. However, when an item is being modified, its performance needs to be reviewed by a qualified person and compared to the applicable sections of this rule. For modification requirements see WAC 296-155-53400 (58) and (59). For cranes manufactured prior to the effective date of this rule the design and construction criteria must meet at a minimum, ASME B30.3-2009.

Commented [SBS(56]: Newer ASME reference

Commented [SBS(57]: Newer ASME reference

(3) You must follow the manufacturer's recommendations when installing, erecting, and dismantling tower cranes. If circumstances do not permit the normal manufacturer's written instructions from being followed, you must follow alternative written instructions from the manufacturer, an RPE, or ASME B30.3-2016.

Commented [SBS(58]: Newer ASME reference

(4) When cranes are erected/dismantled, written instructions by the manufacturer or qualified person and a list of the weights of each subassembly to be erected/dismantled must be at the site.

(5) An assembly/disassembly director must continuously supervise the erection, jumping and dismantling of the crane.

Commented [SBS(59]: The old language only called for a qualified person, which conflicted with the a/d director requirement

(6) You must establish procedures before beginning crane erection/dismantling work to implement the instructions and adapt them to the particular needs of the site.

(7) Tower cranes and tower crane assembly parts/components must be inspected by an accredited certifier, prior to assembly, following erection of the tower crane, after each climbing operation, or reconfiguring the boom, jib, or counterjib, before placing the crane in service. (See WAC 296-155-53206.) You must only use inspected and preapproved components in the assembly of a tower crane.

(8) You must erect tower masts plumb to a tolerance of 1:500 (approximately one inch in 40 feet) unless the manufacturer specifies otherwise and verified by a qualified person.

(9) You must install cranes that are required to weathervane when out-of-service with clearance for the boom (jib) and the superstructure to swing through a full 360 degree arc. You must maintain clearances recommended by the crane manufacturer between other weathervaning cranes and fixed objects.

(10) When the crane is out of operation, the jib or boom must be pointed downwind and the slewing brake must be released so as to permit the jib or boom to weathervane, provided the jib or boom has a clear 360 degree rotation.

(11) When the crane is out of operation and a 360 degree rotation is not feasible, you must follow the manufacturer's or RPE's written procedures for restraining the jib or boom from rotation.

(12) Foundations and structural supports. Tower crane foundations and structural supports (including both the portions of the structure used for support and the means of attachment) must be designed by the manufacturer or a registered professional engineer. The design must be followed.

(13) Prior to erecting a tower crane on a nonstandard tower crane base/structural support, you must ensure that the engineering configuration of this base/structural support has been reviewed and acknowledged as acceptable by an independent registered professional structural engineer (RPSE), licensed under chapter 18.43 RCW.

(14) An RPSE must certify that the crane foundation, structural supports and underlying soil provide adequate support for the tower crane with its applied torsional and overturning moments and the horizontal and vertical forces.

(15) The controlling entity that installed the tower crane foundations and structural supports must provide a written statement/documentation to the A/D director stating that they were installed in accordance with their design and requirements the RPE, and the engineer of record if applicable.

(16) You must consult the engineer of record to verify that the host structure is capable of safely resisting the applied crane forces, if this engineer is not available an RSPE must perform this verification. When inside climbing cranes are used, the integrity of the host structure must be reviewed and approved by an RPSE, for the effects of the crane, load, and wind forces at each level of the structure.

(17) Prior to installing a tower crane that will be attached to an existing building, new construction, or structure, an RPSE must certify that the structural attachment to the building is designed to withstand the torsional and overturning moments and the horizontal and vertical forces created by the crane to be installed.

(18) The assembly/disassembly director must address backward stability before slewing, traveling or freestanding tower cranes on ballasted bases.

(19) The top of the support/foundation must be accessible and free of debris, materials and standing water. No materials can be stored on the support unless approved by a qualified person. Tower crane's foundation and fasteners must remain accessible and visible for inspection at all times.

(20) You must not climb tower cranes in concrete structures until the concrete at the levels at which horizontal and vertical supports are to be placed has reached sufficient strength to resist the crane reactions. It may be necessary to test concrete cylinders or cores or to use on-site testing techniques for this purpose.

(21) Climbing jack systems used for raising a tower crane must be equipped with over-pressure relief valves, direct-reading pressure gauges, and pilot-operated hydraulic check valves installed in a manner which will prevent the jack from retracting should a hydraulic line or fitting rupture or fail.

(22) Before climbing or erecting/dismantling, you must balance cranes in accordance with the manufacturer's or a qualified person's instructions. If no such limit has been set, wind velocity must not exceed the limit set by the manufacturer, or 20 miles per hour as indicated by a wind velocity device mounted near the top of the crane. The crane operator must be present during climbing or erecting/dismantling operations.

(23) You must not commence climbing operations until all crane support provisions at the new support level are in place as per the manufacturer's recommendations or as specified by an RPSE.

(24) Crane superstructures and counterjibs (counterweight jib) must be arranged to receive counterweights, made in accordance with the manufacturer's specifications for the specified jib or boom length, and to hold them in position. You must provide means to guard against shifting or dislodgement during crane operation. Manufacturer's specified counterweight weights are not to be exceeded.

(25) Moveable counterweights, if provided, must either move automatically or must be equipped with a position indicator with read out at the operator's station(s).

(26) When counterweight position is controlled by wire ropes, you must provide means to prevent uncontrolled movement in the event of wire rope or wire rope termination failure.

(27) When counterweight position is controlled by wire ropes and/or linkages between the counterweight and the boom, you must make provisions to avert structural damage if the boom is moved beyond its normal limits.

(28) For cranes utilizing ballast, bases must include provisions to support and position the ballast. You must provide means to guard against shifting or dislodgement of ballast during crane operation.

(29) All electrical equipment must be properly grounded and protection must be provided against lightning per the manufacturer's recommendation or if not available, a registered professional electrical engineer.

(30) Each electrically powered crane must have a main disconnect switch at or near the initial base of the crane. This switch must have provisions for locking in the "off" position.

(31) You must guard or locate equipment so that live parts are not exposed to inadvertent contact by personnel and equipment under normal operating conditions.

(32) You must protect electrical equipment from dirt, grease, oil, and moisture. Fixtures, wiring, and connections exposed to the weather must be of weather resistant type.

(33) Wiring must conform to the provisions of ANSI/NFPA 70 for temporary wiring. Motors, controls, switches, and other electrical equipment must meet the applicable requirements of ANSI/NFPA 70. Hoists, slewing, trolley, and travel controllers must conform to ISO 7752-1, 2010.

(34) You must make provisions to guard against reversing of each motor due to reversed phase connections.

(35) Electrical circuits between the fixed and rotating portions of the crane must pass through a slip ring assembly that will permit continuous rotation of the upper crane structure in either direction, unless other means are provided to prevent damage to the electrical conductors.

(36) Individual overload protection must be provided for each motor.

(37) Crane trucks must be fitted with sweeps extending below the top of the rail, unless the construction of the rail foundation prohibits such extension, and placed in front of the leading wheels in either direction. Truck wheels/bogies must be guarded.

(38) You must provide a means to limit the drop of truck frames in case of wheel or axle breakage to a distance that will not cause a crane to overturn.

(39) ~~Multiple tower crane job sites. On job sites where more than one tower crane is installed, you must locate the cranes such that no crane may come in contact with the structure of another crane. Crane's jibs or booms are permitted to pass over one another.~~ Multiple tower cranes. Prior to the erection of a tower crane, when a tower crane's radius has the ability to overlap with another tower crane, the co-ordination during assemblies and operational radiuses of all cranes must be addressed. You must locate the tower cranes such that no crane may come in contact with the structure of another tower crane. Crane's jibs or booms are permitted to pass over one another. Hoist line contact into any portion of another crane must be prevented.

Commented [ICD(60]: DOSH change. With all of the construction, there have been many instances where tower cranes from different job sites have overlapped each other. This change will be more clear that these instances are covered. Should not create additional costs.

(40) You must position tower cranes, in service, whereby they can slew 360 degrees without either the counterjib or jib/boom striking any building, structure, or other object, unless:

(a) Suitable anticollision devices are installed which will prohibit contact with such objects or;

(b) Direct voice communications are established between any operator of the tower crane(s) involved and a signal person so stationed where the boom and/or counterweight movement, and the object with which it may contact can be observed so that the operator(s) can be warned of imminent danger.

(i) You must establish a secondary means of positive communications as a back-up for possible direct voice communication failure.

(ii) Radio communication systems without tone coded squelch are prohibited. You must not use citizens band radios as a means of communications for tower cranes.

(41) Limit switches must be installed and you must keep them properly adjusted. You must protect or isolate them in a manner which will prevent unauthorized tampering. Limit switches must provide the following functions:

(a) Limit the travel of the trolley to prevent it from hitting the outer end of the jib.

(b) Limit the upward travel of the load block to prevent two-blocking.

(c) Lower over travel limiting devices must be provided for all load hoists where the hook area is not visible to the operator.

(d) In the absence of the crane manufacturer's specifications, limit the load being lifted in a manner whereby no more than 110% of the maximum rated load can be lifted or moved.

(e) Cranes mounted on rail tracks must be equipped with limit switches limiting the travel of the crane on the track and stops or buffers at each end of the tracks.

(42) All tower cranes manufactured after July 27, 2010, must be equipped with a safety device (also referred to as a limit device) that provides deceleration before the top position of the crane hook is reached.

(43) The load must be free when lifted; it must not be caught on nor attached to other objects. You must limit side loading of jibs to freely suspended loads. You must not use cranes for dragging loads.

(44) When the operator may be exposed to the hazard of falling objects, the tower crane cab and/or remote control station must have adequate overhead protection.

(45) You must provide a safe means for access to the tower, operator's cab and machinery platform.

(46) When necessary for inspection or maintenance purposes, you must provide ladders, walkways with railing or other devices.

(47) All crane brakes must automatically set in event of power failure. Slewing brakes must also function in this manner or be capable of being set manually.

(48) Each tower crane must be provided with a slewing brake capable of holding in both directions preventing the superstructure from rotating during operation and must be capable of being set in the holding position and remaining so without further action on the part of the operator.

(49) The trolley must be provided with an operating brake capable of stopping the trolley in either direction. The system must include a means for holding the trolley without further action on the part of the operator, and must engage automatically if power or pressure to the brake is lost.

(50) In addition to the operating brake, the trolley must be equipped with an automatic braking device capable of stopping trolley in either direction in the event of trolley drive rope breakage, if such ropes are used.

(51) The body or frame of the trolley must be fitted with a means to restrain the trolley from becoming detached from its guide rail(s) in the event of trolley wheel or axle breakage or side loading.

(52) The jib point sheave, if provided, must have at least one broad stripe of bright, contrasting color painted on each side so it can be determined whether or not the sheave is turning.

(53) You must protect employees required to perform duties on the boom/jib of tower cranes against falling in accordance with Part C-1 of this chapter.

(54) An audible signal must automatically sound whenever the crane travels in order to warn persons in the vicinity.

(55) You must mount a wind velocity indicating device at or near the top of the crane. You must provide a velocity readout at the operator's station in the cab, and a visible or audible alarm must be triggered in the cab and at remote control stations when a preset wind velocity has been exceeded.

(56) When the wind velocity indicating device is not functioning, crane operations may continue if another crane on the site is equipped with a functioning wind velocity indicator or if a qualified person determines that ambient wind velocity is within permitted limits.

(57) You must provide indicating devices to:

(a) Display the magnitude of the load on the hook;

(b) Display the boom angle or operating radius, as appropriate. On hammerhead booms (jibs), radius indication may be by means of flags or markers along the length of the boom (jib) so as to be visible to the operator;

(c) Display ambient wind velocity.

(58) You must provide a limiting device to:

(a) Decelerate the trolley travel at both ends of the jib prior to the final limit activation;

(b) Decelerate the luffing boom travel at upper and lower ends prior to final limit activation;

(c) Limit trolley travel at both ends of the jib;

(d) Stop boom luffing at lower and upper limits of boom movement;

(e) Decelerate the hoist up hook travel prior to final limit activation;

(f) Stop load block upper motion before two-blocking occurs;

(g) Stop load block downward motion to prevent the last two wraps of wire rope from spooling off the hoist drum;

(h) Limit crane travel at both ends of the runway tracks;

(i) Limit lifted load;

(j) Limit operating radius in accordance with lifted load, i.e., limit movement; and

(k) Limit pressures in hydraulic or pneumatic circuits.

(59) You must lock or seal load limiting devices and acceleration/deceleration limiters when provided with a method to inhibit tampering and unauthorized adjustment.

(60) Safety devices.

(a) 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 must automatically set in the event of pressure loss or power failure, are required:
(A) A hoist brake on all hoists;
(B) Slewing brake;
(C) Trolley brake;
(D) Rail travel brake.
(viii) Deadman control or forced neutral return control (hand) levers;

(ix) Emergency stop switch at the operator's station;
(x) Trolley end stops must be provided at both ends of travel of the trolley.

(b) Proper operation required. You must not begin operations unless the devices listed in this subsection are in proper working order. If a device stops working properly during operations, the operator must safely stop operations. You must take the crane out of service, and you must not resume operations until the device is again working properly. You must not use alternative measures.

(61) Operational aids.

(a) The devices listed in this subsection (operational aids) are required on all tower cranes covered by this part, unless otherwise specified.

(b) You must not begin crane operations unless the operational aids are in proper working order, except where you meet the specified temporary alternative measures. You must follow more protective alternative measures, if any are specified by the tower crane manufacturer.

(c) When operational aids are inoperative or malfunctioning, you must follow the crane and/or device manufacturer's recommendations for operation or shutdown of the crane until the problems are corrected. Without such recommendations and any prohibitions from the manufacturer against further operation, the following requirements apply:

Note: If a replacement part is no longer available, the use of a substitute device that performs the same type of function is permitted and is not considered a modification under WAC 296-155-53400 (58) and (59).

(i) You must accomplish recalibration or repair of the operational aid as soon as is reasonably possible, as determined by a qualified person.
(ii) Trolley travel limiting device. The travel of the trolley must 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. You must mark the trolley rope (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. You must use a spotter who is in direct communication with the operator when operations are conducted within 10 feet of the outer or inner trolley end stops.

(iii) Boom hoist limiting device. You must limit the range of the boom at the minimum and maximum radius. Temporary alternative measures: Clearly mark the hoist rope (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 who is in direct communication with the operator to inform the operator when this point is reached.

(iv) Anti two-blocking device. The tower crane must 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 hoist rope (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 who is in direct communication with the operator to inform the operator when this point is reached.

Note: This temporary alternative measure cannot be used if lifting personnel in a suspended platform.

(v) Hoist drum lower limiting device. Tower cranes manufactured after the effective date of this section must be equipped with a device that prevents the last two wraps of hoist cable from being spooled off the drum. Temporary alternative measures: Mark the hoist rope (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 two wraps of hoist cable being spooled off the drum, or use a spotter who is in direct communication with the operator to inform the operator when this point is reached.

(vi) Load moment limiting device. The tower crane must have a device that prevents moment overloading. Temporary alternative measures: You must use a radius indicating device (if the tower crane is not equipped with a radius indicating device, you must measure the radius to ensure the load is within the rated capacity of the crane). In addition, the weight of the load must 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. You must provide this information to the operator prior to the lift.

(vii) Hoist line pull limiting device. You must limit the capacity of the hoist to prevent overloading, including each individual gear ratio if equipped with a multiple speed hoist transmission. Temporary alternative measures: The

operator must ensure that the weight of the load does not exceed the capacity of the hoist (including for each individual gear ratio if equipped with a multiple speed hoist transmission).

(viii) Rail travel limiting device. You must limit the travel distance in each direction to prevent the travel bogies from running into the end stops or buffers. Temporary alternative measures: You must use a spotter who is in direct communication with the operator when operations are conducted within 10 feet of either end of the travel rail end stops; the spotter must inform the operator of the distance of the travel bogies from the end stops or buffers.

(ix) Boom hoist drum positive locking device and control. The boom hoist drum must be equipped with a control that will enable the operator to positively lock the boom hoist drum from the cab. Temporary alternative measures: You must manually set the device when required if an electric, hydraulic or automatic type is not functioning.

(x) Boom angle or hook radius indicator.

(A) Luffing boom tower cranes must have a boom angle indicator readable from the operator's station.

(B) Hammerhead tower cranes manufactured after the effective date of this section must have a hook radius indicator readable from the operator's station. Temporary alternative measures: You must determine hook radii or boom angle by measuring the hook radii or boom angle with a measuring device.

(xi) Trolley travel deceleration device. You must automatically reduce the trolley speed prior to the trolley reaching the end limit in both directions. Temporary alternative measures: You must post a notice in the cab of the crane notifying the operator that the trolley travel deceleration device is malfunctioning and instructing the operator to take special care to reduce the trolley speed when approaching the trolley end limits.

(xii) Boom hoist deceleration device. You must automatically reduce the boom speed prior to the boom reaching the minimum or maximum radius limit. Temporary alternative measures: You must post a notice in the cab of the crane notifying the operator that the boom hoist deceleration device is malfunctioning and instructing the operator to take special care to reduce the boom speed when approaching the boom maximum or minimum end limits.

(xiii) Load hoist deceleration device. You must automatically reduce the load speed prior to the hoist reaching the upper limit. Temporary alternative measures: You must post a notice in the cab of the crane notifying the operator that the load hoist deceleration device is malfunctioning and instructing the operator to take special care to reduce the hoist speed when approaching the upper limit.

(xiv) Wind speed indicator. You must provide a device to display the wind speed and it must be mounted at or near the top of the crane structure. 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.
(xv) Load indicating device. Cranes manufactured after the effective date of this section, must 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: The weight of the load must 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. You must provide this information to the operator prior to the lift.

(62) You must not install advertising signs or similar panels on the crane or tower unless size, design, and positioning satisfy the manufacturer's recommendations, in the absence of the manufacturer's recommendations, you must obtain an RPE's written approval.

(63) For night operations, lighting must be adequate to illuminate the working areas while not interfering with the operator's vision.

(64) All welding procedures and welding operator qualifications for use in repair or alteration of load sustaining members must be in accordance with ANSI/AWS D14.3 or ANSI/AWS D1.1. Where special steels or other materials are used, the manufacturer or a qualified person must provide welding procedure instructions. The type of metal used for load sustaining members must be identified by the manufacturer. In the absence of the manufacturer you must use an RPSE.

WAC 296-155-53905 Tower cranes – additional inspection criteria.

(1) In addition to the requirements in WAC 296-155-53405, the following additional items must be included:

(a) 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.

(b) 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.

(2) Annual. In addition to the items that must be inspected under WAC 296-155-53405(5), all turntable and tower bolts must be inspected for proper condition and torque.

WAC 296-155-53915 Tower cranes – operations.

(1) The operator must not engage in any practice that diverts their attention while actually engaged in operating the crane.

(2) The operator must do the following before leaving the crane unattended:

(a) Set down the load, rigging gear, bucket, lifting magnet, or other devices.

(b) Position trolley in accordance with the manufacturer's recommendations unless the site specific application drawing requires a different position.

(c) Leave the superstructure free to weathervane unless provisions for nonweathervaning have been specified by the manufacturer or by a qualified person.

(d) Disconnect power to operating controls or disengage the master clutch, as applicable.

(e) Place all controls in the "off" or "neutral" position.

(f) Secure the crane against accidental travel.

(g) Stop the internal combustion engine, when provided.

Exemption: If crane operation is frequently interrupted during a shift, the crane may remain running while the operator remains on the crane superstructure.

(h) Restrain the crane from travel with rail clamps, or other means provided, when a wind alarm is given or on leaving the crane overnight.

Note: Additional information relating to cranes being unattended are located in WAC 296-155-53400(52) of this part.

(3) If power fails during operation, the operator must:

(a) Set trolley, hoist, and travel brakes and locking devices, as applicable;

(b) Move all clutch or other power controls to the "off" or "neutral" position;

(c) If practical, you must land the suspended load under brake control.

(4) You must not climb cranes to a new operating level nor operate them when wind speeds exceed the maximum velocity recommended by the manufacturer. Where the manufacturer does not specify this information, an RPE must determine the maximum allowable wind velocity. Climbing operations are not allowed until tie-ins at the new support level as specified by a qualified person are in place.

(5) Prior to daily operation, you must check operator aids to determine if they are working properly as required in WAC 296-155-53405 and 296-155-53905.

(6) During adverse weather conditions which reduce visibility, you must perform operations according to the manufacturer's specifications, when not available in accordance with an RPE's written instructions.

(7) You must not lower the load below the point where less than two full wraps of rope remain on the drum.

(8) When slewing the boom (jib), trolleying a load, or traveling the crane, you must avoid sudden starts and stops. Slew and travel speeds must be such that the load does not swing out beyond the radius at which it can be controlled. You must use a tag or restraint line when swinging of the load is hazardous.

(9) You must not operate cranes without the ballast or counterweight in place as specified by the manufacturer. Under specific conditions, such as during crane assembly or disassembly, you must adhere to the manufacturer's recommendations for the amount of partial ballast or counterweight. You must not exceed the maximum ballast or counterweight approved by the manufacturer or an RPE for use on a given crane.

WAC 296-155-541 Self-erecting tower cranes.

WAC 296-155-54100 Self-erecting tower cranes – general.

(1) All self-erecting tower cranes in use must meet the applicable requirements for design, construction, installation, testing, maintenance, inspection, and operation as prescribed by the manufacturer. For modification requirements see WAC 296-155-53400 (58) and (59).

(2) In addition to the requirements in WAC 296-155-53402(6), employees must 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) When cranes are erected, reconfigured, or dismantled, you must follow written instructions by the manufacturer. If circumstances do not permit the normal manufacturer's written instructions from being followed, you must follow alternative written instructions from the manufacturer or an RPE.

(4) You must perform erection, reconfiguration, and dismantling under the supervision of a qualified person.

(5) You must carefully assess the area in which a crane is to be set up to ensure that it is suitable before the crane is taken to site and put into service. The area chosen must be of a sufficient size to enable the crane to be maneuvered into position, set up, operated and dismantled, with sufficient clearances between the crane and surrounding structures, as detailed by application drawings and in the manufacturer's operation and instruction manual.

(6) When setting up a crane, you must take care to ensure that the crane will not contact or approach overhead hazards such as power lines, communications cables or overhead structures.

(7) The assembly/disassembly director must address backward stability before slewing self-erecting tower cranes.

(8) Crane supports for individual outrigger pads must be level to the manufacturer's specifications or those of a qualified person. Supports may be timbers, cribbing, or other structural members to distribute the load so as not to exceed the allowable bearing capacity of the underlying material.

(9) All load bearing foundations, supports, and rail tracks must be constructed or installed to support the crane loads and to transmit them to the soil or other support medium. In addition to supporting vertical load, foundations and supports, rail supports excepted, must be designed to provide a moment resisting overturning equal to a minimum of 150% of the maximum crane overturning moment. This requirement may be met by means of structural anchors or ballast weights.

(10) In addition to the requirements in WAC 296-155-53400 (36) and (37), a qualified person must ensure that the underlying soil is adequate support for the crane with its maximum forces recommended by the manufacturer.

(11) You must install cranes required to weathervane when out-of-service with clearance for jib and superstructure to slew a full 360 degree arc unobstructed without encroaching any power line "Danger-Swing/Crush Zone." You must maintain clearances recommended by the crane manufacturer between weathervaning cranes, fixed objects and other cranes.

(12) When the crane is out of operation and a 360 degree rotation is not provided, follow the manufacturer's or RPE's written procedures.

(13) You must not install advertising signs or similar panels on the crane or tower unless size, design, and positioning satisfy the manufacturer's recommendations. In the absence of the manufacturer's recommendations, you must obtain an RPE's written approval.

(14) Prior to installing a self-erecting tower crane on a building or structure you must consult the engineer of record to verify that the host structure is capable of safely resisting the applied crane forces, if this engineer is not available an RSPE must perform this verification.

(15) When cranes are erected and after each reconfiguration, before placing the crane in service, all functional motions, motion limiting devices, brakes, and you must test indicating devices for operation.

(a) The order in which tests of a newly erected or reconfigured crane are to be performed is as follows:

(i) Functional motion tests without load. Each test must include:

(A) Load hoisting and lowering;

(B) Jib elevating and lowering, or traversing the trolley;

(C) Slew motion;

(D) Brakes and clutches;

(E) Operational aids and motion limiting devices;

(F) Remote control, if provided.

(ii) Functional load tests at rated load. Each test must include:

(A) Load hoisting and lowering;

(B) Jib elevating and lowering, or traversing the trolley;

(C) Slew motion;

(D) Brakes and clutches;

(E) Operational aids and load limiting devices;

(F) Remote control, if provided.

(b) During the test, you must check the crane supports. Any observed displacement is reason to suspend testing until an evaluation is made by a qualified person.

(16) Conditions that adversely affect the crane at the time of erection, reconfiguration, or dismantling must be a limiting factor that could require suspending the operation. These conditions include but are not limited to:

(a) Support conditions;

(b) Wind velocity or gusting winds;

(c) Heavy rain;

(d) Fog;

(e) Extreme cold or heat;

(f) Ice;

(g) Artificial lighting.

(17) For night operations, lighting must be adequate to illuminate the working areas while not interfering with the operator's vision.

(18) For cranes utilizing ballast, bases must include provisions to support and position the ballast. You must provide means to guard against shifting or dislodgement during crane operation.

(19) Superstructures must be arranged to receive counterweights, made in accordance with the crane manufacturer's specifications, and to hold them in position. You must provide means to guard against shifting or dislodgement during crane operation.

(20) Counterweights must be securely fastened in place and must be at the location and within the weight tolerance as recommended by the manufacturer.

(21) Limiting devices must be provided to:

(a) Decelerate the trolley and hoist hook prior to activating the motion stop limit;

(b) Limit trolley travel at both ends of the jib;

(c) Limit jib telescoping at inner and outer position;

(d) Stop load block upward motion before two-blocking occurs;

(e) Stop load block downward motion to prevent the last two wraps of wire rope from spooling off the hoist drum;

(f) Limit crane travel at both ends of the runway tracks;

(g) Limit lifted load;

(h) Limit operating radius in accordance with lifted load, i.e., limit moment; and

(i) Limit pressures in hydraulic or pneumatic circuits, i.e., pressure relief valves.

(22) Load limiting devices and acceleration/deceleration limiters must be locked or sealed when provided with a method to inhibit tampering and unauthorized adjustment.

(23) All crane brakes must automatically set in event of power failure. Slew brakes must also function in this manner or be capable of being set manually.

(24) Each crane must be provided with a slewing brake capable of holding in both directions preventing the superstructure from rotating during operation and must be capable of being set in the holding position and remaining so without further action on the part of the operator.

(25) The trolley must be provided with an operating brake capable of stopping the trolley in either direction. The system must include a means for holding the trolley without further action on the part of the operator, and must engage automatically if power or pressure to the brake is lost.

(26) In addition to the operating brake, the trolley must be equipped with an automatic braking device capable of stopping the movement of the load trolley in the event of trolley drive rope breakage, if such ropes are used.

(27) The body or frame of the trolley must be fitted with a means to restrain the trolley from becoming detached from its guide rail(s) in the event of trolley wheel or axle breakage or side loading.

(28) All electrical equipment must be properly grounded and protection must be provided against lightning per the manufacturer's recommendations or if not available, a registered professional electrical engineer.

(29) Each electrically powered crane must have an over-current protected main disconnect switch mounted at or near the initial base of the crane. This switch must have provisions for locking in the off position.

(30) You must locate or guard electrical equipment so that live parts are not exposed to inadvertent contact by personnel and equipment under normal operating conditions.

(31) You must protect electrical equipment from dirt, grease, oil, and moisture. Fixtures, wiring, and connections exposed to the weather must be of weather resistant type.

(32) Wiring must conform to the provisions of ANSI/NFPA 70 for temporary wiring. Motors, controls, switches, and other electrical equipment must meet the applicable requirements of ANSI/NFPA 70. Hoists, slewing, trolley, and travel controllers must conform to ISO 7752-1, 2010.

(33) You must make provisions to guard against any crane function operating in the opposite intended direction due to reversed phase connections.

(34) Electrical circuits between the fixed and rotating portions of the crane must pass through a slip ring assembly that will permit continuous rotation of the upper crane structure in either direction unless other means are provided to prevent damage to the electrical conductors.

(35) Individual overload protection must be provided for each motor.

(36) For traveling cranes, both ends of all tracks must be provided with stops or buffers adjusted for simultaneous contact with both sides of the travel base. Stops attached to rails must be mounted not less than 3 feet (1 m) inboard of the last rail support. Cranes must be equipped with means to prevent running into the buffers or stops while under power.

(37) An audible signal device must be provided with the control located within reach of the operator.

(38) An audible signal must automatically sound whenever the crane travels in order to warn persons in the vicinity.

(39) Bogies must be fitted with sweeps extending below the top of the rail, unless the construction of the rail foundation prohibits such extension, and placed in front of the leading wheels in either direction. Bogie wheels must be guarded.

(40) You must provide a means to limit the drop of bogie frames in case of wheel or axle breakage to a distance that will not cause the crane to overturn.

(41) You must mount a wind velocity indicating device at or near the top of the crane. You must provide a velocity readout at the operator's station or in the cab. 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.

(42) Safety devices.

(a) The following safety devices are required on all self-erecting tower cranes unless otherwise specified:

(i) Boom stops on luffing boom type self-erecting tower cranes;

(ii) Jib stops on luffing boom type self-erecting 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 must automatically set in the event of pressure loss or power failure, are required:

(A) A hoist brake on all hoists;

(B) Slewing brake;

(C) Trolley brake;

(D) Rail travel brake.

(viii) Deadman control or forced neutral return control (hand) levers;

(ix) Emergency stop switch at the operator's station;

(x) Trolley end stops must be provided at both ends of travel of the trolley.

(b) Proper operation required. You must not begin operations unless the devices listed in this subsection are in proper working order. If a device stops working properly during operations, the operator must safely stop operations. You must take the crane out of service, and you must not resume operations until the device is again working properly. Alternative measures are not permitted to be used.

(43) Operational aids.

(a) The devices listed in this subsection (operational aids) are required on all self-erecting tower cranes covered by this part, unless otherwise specified.

(b) You must not begin crane operations unless the operational aids are in proper working order, except where the employer meets the specified temporary alternative measures. You must follow protective alternative measures specified by the self-erecting tower crane manufacturer, if any.

(c) When operational aids are inoperative or malfunctioning, you must follow the crane and/or device manufacturer's recommendations for operation or shutdown of the crane until the problems are corrected. Without such recommendations and any prohibitions from the manufacturer against further operation, the following requirements apply:

Note: If a replacement part is no longer available, the use of a substitute device that performs the same type of function is permitted and is not considered a modification under WAC 296-155-53400 (58) and (59).

(i) You must accomplish recalibration or repair of the operational aid as soon as is reasonably possible, as determined by a qualified person.

(ii) Trolley travel limiting device. The travel of the trolley must 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. You must mark the trolley rope (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. You must use a spotter who is in direct communication with the operator when operations are conducted within 10 feet of the outer or inner trolley end stops.

(iii) Boom hoist limiting device. You must limit the range of the boom at the minimum and maximum radius. Temporary alternative measures: Clearly mark the hoist rope (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 who is in direct communication with the operator to inform the operator when this point is reached.

(iv) Anti two-blocking device. The self-erecting tower crane must 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 hoist rope (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 who is in direct communication with the operator to inform the operator when this point is reached.

Note: This temporary alternative measure cannot be used if lifting personnel in a suspended platform.

(v) Hoist drum lower limiting device. Self-erecting tower cranes manufactured after the effective date of this section must be equipped with a device that prevents the last two wraps of hoist cable from being spooled off the drum. Temporary alternative measures: Mark the hoist rope (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 two wraps of hoist cable being spooled off the drum, or use a spotter who is in direct communication with the operator to inform the operator when this point is reached.

(vi) Load moment limiting device. The self-erecting tower crane must have a device that prevents moment overloading. Temporary alternative measures: You must use a radius indicating device (if the tower crane is not equipped with a radius indicating device, you must measure the radius to ensure the load is within the rated capacity of the crane). In addition, the weight of the load must 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. You must provide this information to the operator prior to the lift.

(vii) Hoist line pull limiting device. You must limit the capacity of the hoist to prevent overloading, including each individual gear ratio if equipped with a multiple speed hoist transmission. Temporary alternative measures: The operator must ensure that the weight of the load does not exceed the capacity of the hoist (including for each individual gear ratio if equipped with a multiple speed hoist transmission).
(viii) Rail travel limiting device. You must limit the travel distance in each direction to prevent the travel bogies from running into the end stops or buffers. Temporary alternative measures: You must use a spotter who is in direct communication with the operator when operations are conducted within 10 feet of either end of the travel rail end stops; the spotter must inform the operator of the distance of the travel bogies from the end stops or buffers.
(ix) Boom hoist drum positive locking device and control. The boom hoist drum must be equipped with a control that will enable the operator to positively lock the boom hoist drum from the cab. Temporary alternative measures: You must manually set the device when required if an electric, hydraulic or automatic type is not functioning.
(x) Boom angle or hook radius indicator.

(A) Luffing boom self-erecting tower cranes must have a boom angle indicator readable from the operator's station.
(B) Self-erecting hammerhead cranes manufactured after the effective date of this section must have a hook radius indicator readable from the operator's station. Temporary alternative measures: You must determine the radii or boom angle by measuring the hook radii or boom angle with a measuring device.

(xi) Trolley travel deceleration device. You must automatically reduce the trolley speed prior to the trolley reaching the end limit in both directions. Temporary alternative measures: You must post a notice in the cab of the crane notifying the operator that the trolley travel deceleration device is malfunctioning and instructing the operator to take special care to reduce the trolley speed when approaching the trolley end limits.
(xii) Boom hoist deceleration device. You must automatically reduce the boom speed prior to the boom reaching the minimum or maximum radius limit. Temporary alternative measures: You must post a notice in the cab of the crane notifying the operator that the boom hoist deceleration device is malfunctioning and instructing the operator to take special care to reduce the boom speed when approaching the boom maximum or minimum end limits.
(xiii) Load hoist deceleration device. You must automatically reduce the load speed prior to the hoist reaching the upper limit. Temporary alternative measures: You must post a notice in the cab of the crane notifying the operator

that the load hoist deceleration device is malfunctioning and instructing the operator to take special care to reduce the hoist speed when approaching the upper limit.

(xiv) Wind speed indicator. You must provide a device to display the wind speed and it must be mounted at or near the top of the crane structure. Temporary alternative measures: Use of wind speed information from a properly functioning indicating device on another crane on the same site, or a qualified person estimates the wind speed.

(xv) Load indicating device. Cranes manufactured after the effective date of this section, must 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: You must determine the weight of the load 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. You must provide this information to the operator prior to the lift.

(44) All welding procedures and welding operator qualifications for use in repair or alteration of load sustaining members must be in accordance with ANSI/AWS D14.3 or ANSI/AWS D1.1. Where special steels or other materials are used, the manufacturer or a qualified person must provide welding procedure instructions. The type of metal used for load sustaining members must be identified by the manufacturer. In the absence of the manufacturer you must use an RPSE.

WAC 296-155-54115 Self-erecting tower cranes – operations.

(1) The operator must not engage in any practice that diverts their attention while actually engaged in operating the crane.

(2) Before leaving the crane unattended the operator must:

(a) Set down the load, rigging gear, bucket, lifting magnet, or other devices;

(b) Land any load suspended below the hook;

(c) Put controls in the off or neutral position;

(d) Set brakes and other locking devices;

(e) Disengage the main control circuit;

(f) Stop the engine: An exception to this may exist when crane operation is frequently interrupted during a shift and the operator must leave the crane. Under these circumstances, the engine may remain running and (a) through (e) of this subsection apply. The operator must be situated where any entry to the crane can be observed.

(g) Leave the superstructure free to weathervane unless provisions for nonweathervaning have been specified by the manufacturer or by a qualified person.

Note: Additional information relating to cranes being unattended are located in WAC 296-155-53400(52) of this part.

(3) If power fails during operation, the operator must:

(a) Set all brakes and locking devices;

(b) Move all clutch or other power controls to the "off" or "neutral" position;

(c) If practical, the suspended load must be landed under brake control, according to the manufacturer's procedures.

(4) The operator must be familiar with the crane and its proper care. If adjustments or repairs are necessary, the operator must report the condition to the competent person. The next operator must be notified of the condition.

(5) All controls must be tested by the operator at the start of a new shift, if possible. If any controls fail to operate properly, you must adjust or repair them before operations are initiated.

(6) You must not operate cranes when wind speeds exceed the maximum velocity recommended by the manufacturer. Where the manufacturer does not specify this information, an RPE must determine the maximum allowable velocity.

(7) Prior to daily operation, you must check operator aids to determine if they are working properly as required in WAC 296-155-53405(3).

(8) During adverse weather conditions which reduce visibility, you must perform operations in accordance with the manufacturer's specifications, when not available follow RPE's recommendations for reduced function speeds and with signaling means appropriate to the situation.

(9) No less than two full wraps of rope must remain on the load hoist drum(s) at any time during operation.

(10) When slewing the boom (jib), trolleying a load, or traveling the crane, you must avoid sudden starts and stops. Slew and travel speeds must be such that the load does not swing out beyond the radius at which it can be controlled. You must use a tag or restraint line when uncontrolled rotation of the load is hazardous.

(11) You must not operate cranes without the ballast or counterweight in place as specified by the manufacturer. Under specific conditions, such as during crane assembly or disassembly, you must adhere to the manufacturer's recommendations for the amount of partial ballast or counterweight. You must not exceed the maximum ballast or counterweight approved by the manufacturer for use on a given crane.

(12) The load must be free when lifted; it must not be caught on nor attached to other objects. Side loading of jibs must be limited to freely suspended loads. You must not use cranes for dragging loads.

WAC 296-155-542 Overhead/bridge and gantry cranes.

WAC 296-155-54200 Overhead/bridge and gantry cranes – general.

(1) Permanently installed overhead/bridge and gantry cranes which are located in a manufacturing facility or powerhouse must follow the requirements of WAC 296-24-235 (General safety and health standards), even when a construction activity is being performed. This requirement applies to overhead, bridge, gantry cranes, including semigantry, cantilever gantry, wall cranes, storage bridge cranes, and others having the same fundamental characteristics.

(2) Overhead and gantry cranes that are not permanently installed must follow the applicable requirements in chapter 296-155 WAC Part L.

(3) Cranes included in this section must meet the applicable requirements for design, inspection, construction, testing, maintenance and operation as prescribed in:

(a) ASME B30.2-2016, Safety Standard for Overhead and Gantry Cranes (Top Running Bridge, Single or Multiple Girder, Top Running Trolley Hoist).

Commented [SBS(61]: Newer ASME reference

(b) ASME B30.11-2010, Safety Standards for Monorails and Underhung Cranes.

(c) ASME B30.17-2015, Safety Standards for Overhead and Gantry Cranes (Top Running Bridge, Single Girder, Underhung Hoist).

Commented [SBS(62]: Newer ASME reference

(d) It is not the intent of this rule to require retrofitting of existing cranes. However, when an item is being modified, its performance needs to be reviewed by a qualified person and compared to the applicable sections of this rule. For modification requirements see WAC 296-155-53400 (58) and (59). For cranes manufactured prior to the effective date of this rule the design and construction criteria must meet at a minimum, ASME B30.2.0-1990.

(4) The rated load of the crane must be plainly marked on each side of the crane, and if the crane has more than one hoisting unit, each hoist must have its rated load marked on it or its load block, and this marking must be clearly legible from the ground or floor.

(5) The crane or surrounding structure must be marked to provide operating directions that match and are visible from the crane's operating controls, i.e., north/south, east/west or forward/back, left/right.

(6) Overhead and gantry cranes with bridge trucks must be equipped with sweeps which extend below the top of the rail and project in front of the truck wheels.

(7) Except for floor-operated cranes, an effective warning device must be provided for each crane equipped with a power traveling mechanism.

(8) You must provide a wind-indicating device for all outdoor overhead and gantry cranes. The device must be mounted on the crane runway structure and must give a visible and audible alarm to the crane operator at a predetermined wind velocity. A single wind-indicating device may serve as an alarm for more than one crane.

(9) Electrical.

(a) Wiring and equipment must comply with Article 610 of ANSI/NFPA No. 70, National Electrical Code and chapter 296-155 WAC Part I.

(b) The control circuit voltage must not exceed 600 volts for AC or DC.

(c) The voltage at pendant pushbuttons must not exceed 150 volts for AC and 300 volts for DC.

(d) Where multiple conductor cable is used with a suspended pushbutton station, the station must be supported in a manner that will protect the electrical conductors against strain.

(e) You must construct pendant control stations to prevent electrical shock. The pushbutton enclosure must be at ground potential and marked for identification of functions.

(10) All welding procedures and welding operator qualifications to be used on load sustaining members must be in accordance with ANSI/AWS D1.1, except as modified by ANSI/AWS D14.1.

WAC 296-155-54215 Overhead/bridge and gantry cranes – operations.

(1) The operator must not engage in any practice that diverts their attention while actually engaged in operating the crane.

(2) The operator must do the following before leaving a cab-operated crane or a cab-operated carrier unattended:

(a) Remove any attached load and raise the hook to the highest allowable position.

(b) Place controllers or master switches in the "off" position and deenergize the main switch (crane disconnect) of the specific crane.

Note: Additional information relating to cranes being unattended is located in WAC 296-155-53400(52) of this part.

(3) If power fails during operation, the operator must:

(a) Move all clutch or other power controls to the "off" position;

(b) Prior to reuse of the crane you must check operating motions for proper direction.

(4) The operator must be familiar with the crane and its proper care. If adjustments or repairs are necessary, the operator must report the condition to the competent person. The next operator must be notified of the condition.

(5) You must not lower the load below the point where less than two full wraps of wire rope remain on the drum.

(6) When two or more cranes are used to lift a load, one qualified person must be in charge of the operation. This person must analyze the operation and instruct all personnel involved in the proper positioning, rigging of the load, and the movements to be made.

(7) The operator must not leave the position at the controls while the load is suspended over an area accessible to people.

(8) For cab and remote operated cranes, when the load or hook approaches near or over personnel, a warning signal must be sounded.

(9) Hoist limit switch.

(a) At the beginning of each operator's shift, you must test the upper limit switch of each hoist under no load.

(b) You must never use the hoist limit switch which controls the upper limit of travel of the load block as an operating control.

WAC 296-155-543 Derricks.

WAC 296-155-54300 Derricks – general.

(1) This section contains supplemental requirements for derricks, whether temporarily or permanently mounted; all sections of this part 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.

(2) Derricks. All derricks in use must meet the applicable requirements for design, construction, installation, inspection, testing, maintenance, and operation as prescribed in American National Standard Institute B30.6-2015, Safety Standard for Derricks. It is not the intent of this rule to require retrofitting of existing derricks. However, when an item is being modified, its performance needs to be reviewed by a qualified person and compared to the applicable

Commented [SBS(63]: Newer ASME reference

sections of this rule. For modification requirements see WAC 296-155-53400 (58) and (59). For derricks manufactured prior to the effective date of this rule the design and construction criteria must meet at a minimum, ASME B30.6-2010.

Commented [SBS(64]: Newer ASME reference

(3) Derricks must 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.

(4) You must follow the manufacturer's recommendations when installing, erecting, operating, maintenance and dismantling derricks. If the manufacturer's recommendations are not available, follow the requirements in ASME B30.6-2015.

Commented [SBS(65]: Newer ASME reference

(5) When derricks are erected/dismantled, written instructions by the manufacturer or qualified person and a list of the weights of each subassembly to be erected/dismantled must be at the site.

(6) You must establish procedures before beginning derrick erection/dismantling work to implement the instructions and adapt them to the particular needs of the site.

(7) A qualified person must supervise the erection and dismantling of the derrick.

(8) Derricks and their crane assembly parts/components must be inspected by an accredited certifier, prior to assembly and following erection of the derrick before placing the crane in service (see WAC 296-155-53212). Only inspected and preapproved components are allowed to be used in the assembly of a derrick.

(9) Prior to erecting a derrick on a nonstandard base/structural support, you must ensure that the engineering configuration of this base/structural support has been reviewed and acknowledged as acceptable by an independent registered professional structural engineer (RPSE), licensed under chapter 18.43 RCW.

(10) An RPSE must certify that the derrick foundation, structural supports and underlying soil provide adequate support for the derrick with its applied torsional and overturning moments and the horizontal and vertical forces.

(11) Derricks must be attached to bases/structural supports in compliance with the manufacturer's or an RPSE's instructions.

(12) Prior to installing a derrick that will be attached to an existing building, new construction, or structure, an RPSE must certify that the structural attachments to the building are designed to withstand the torsional and overturning moments and the horizontal and vertical forces created by the derrick to be installed.

(13) You must consult the engineer of record to verify that the host structure is capable of safely resisting the applied derrick forces, if this engineer is not available an RPSE must perform this verification.

(14) Derrick superstructures and machine deck (counterweight jib/counter-jibs) must be arranged to receive counterweights, made in accordance with the manufacturer's specifications for the specified jib or boom length, and to hold them in position. You must provide means to guard against shifting or dislodgement during derrick operation. Manufacturer's specified counterweight weights are not to be exceeded.

(15) For derricks utilizing ballast, bases must include provisions to support and position the ballast. You must provide means to guard against shifting or dislodgement of ballast during derrick operation.

(16) All electrical equipment must be properly grounded and protection must be provided against lightning per the manufacturer's recommendations or if not available, a registered professional electrical engineer.

(17) Each electrically powered derrick must have a main disconnect switch at or near the initial base of the derrick. This switch must have provisions for locking in the "off" position.

(18) You must locate or guard electrical equipment so that live parts are not exposed to inadvertent contact by personnel and equipment under normal operating conditions.

(19) You must protect electrical equipment from dirt, grease, oil, and moisture. Fixtures, wiring, and connections exposed to the weather must be of weather resistant type.

(20) Wiring must conform to the provisions of ANSI/NFPA 70 for temporary wiring. Motors, controls, switches, and other electrical equipment must meet applicable requirements of ANSI/NFPA 70. Hoists, slewing, trolley, and travel controllers must conform to ISO 7752-1, 2010.

(21) You must make provisions to guard against reversing of each motor due to reversed phase connections.

(22) Electrical circuits between the fixed and rotating portions of the derrick must pass through a slip ring assembly that will permit continuous rotation of the upper derrick structure in either direction, unless other means are provided to prevent damage to the electrical conductors.

(23) Individual overload protection must be provided for each motor.

(24) You must protect employees required to perform duties on the boom/jib of derricks against falling in accordance with Part C-1 of this chapter.

(25) You must not install advertising signs or similar panels on the derrick unless size, design, and positioning satisfy the manufacturer's recommendations, in the absence of the manufacturer's recommendations, you must obtain an RPE's written approval.

(26) For night operations, lighting must be adequate to illuminate the working radius while not interfering with the operator's vision.

(27) All welding procedures and welding operator qualifications for use in repair or alteration of load sustaining members must be in accordance with ANSI/AWS D14.3 or ANSI/AWS D1.1. Where special steels or other materials are used, the manufacturer or a qualified person must provide welding procedure instructions. The type of metal used for load sustaining members must be identified by the manufacturer. In the absence of the manufacturer you must use an RPSE.

WAC 296-155-54305 Derricks – construction.

(1) **Guy derricks.**

(a) The minimum number of guys must 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.

(b) You must not use guy derricks unless you have the following guy information from the manufacturer or a qualified person, when not available from the manufacturer:
(i) The number of guys.
(ii) The spacing around the mast.
(iii) The size, grade, and construction of rope to be used for each guy.

(c) For guy derricks manufactured after December 18, 1970, in addition to the information required in subsection (b) of this section, you must have the following guy information from the manufacturer or a qualified person, when not available from the manufacturer:
(i) The amount of initial sag or tension.
(ii) The amount of tension in guy line rope at anchor.

(d) The mast base must permit the mast to rotate freely with allowance for slight tilting of the mast caused by guy slack.

(e) The mast cap must:
(i) Permit the mast to rotate freely.
(ii) Withstand tilting and cramping caused by the guy loads.
(iii) Be secured to the mast to prevent disengagement during erection.
(iv) Be provided with means for attaching guy ropes.

(2) Stiffleg derricks.

(a) The mast must be supported in the vertical position by at least two stifflegs; one end of each must be connected to the top of the mast and the other end securely anchored.

(b) The stifflegs must be capable of withstanding the loads imposed at any point of operation within the load chart range.

(c) The mast base must:
(i) Permit the mast to rotate freely (when necessary).
(ii) Permit deflection of the mast without binding.

(d) You must prevent the mast from lifting out of its socket when the mast is in tension.

(e) The stiffleg connecting member at the top of the mast must:
(i) Permit the mast to rotate freely (when necessary).
(ii) Withstand the loads imposed by the action of the stifflegs.
(iii) Be secured so as to oppose separating forces.

(3) Gin pole derricks.

(a) Guy lines must 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, you must ensure that the derrick is not used in an unstable position.

(b) The base of the gin pole must permit movement of the pole (when necessary).

(c) The gin pole must be anchored at the base against horizontal forces (when such forces are present).

(4) Chicago boom derricks. The fittings for stepping the boom and for attaching the topping lift must be arranged to:

(a) Permit the derrick to swing at all permitted operating radii and mounting heights between fittings.

(b) Accommodate attachment to the upright member of the host structure.

(c) Withstand the forces applied when configured and operated in accordance with the manufacturer's/builder's procedures and within its rated capacity.

(d) Prevent the boom or topping lift from lifting out under tensile forces.

(5) Anchoring and guying.

(a) You must use load anchoring data developed by the manufacturer or a registered professional engineer.

(b) Guy derricks.

(i) You must anchor the mast base per the manufacturer's recommendations. In the absence of the manufacturer's recommendations you must use an RPSE.
(ii) The guys must be secured to the ground or other firm anchorage.
(iii) The anchorage and guying must 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.

(c) Stiffleg derricks.

(i) The mast base and stifflegs must be anchored per the manufacturer's recommendations. In the absence of the manufacturer's recommendations you must use an RPSE.
(ii) The mast base and stifflegs must 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.

(d) Gin pole derricks.

(i) Side guys must be located so that they do not usurp the topping-lifted load;

(ii) Side guys must be evenly played out or in depending on their position relative to the boom foot pivot.

(6) Swingers and hoists.

(a) The boom, slewing mechanism, and hoists must be suitable for the derrick work intended and must be anchored to prevent displacement from the imposed loads.

(b) Base-mounted drum hoists. Base-mounted drum hoists must meet the requirements of ASME B30.7-2016, including the following:

Commented [SBS(66]: Newer ASME reference

(i) Load ratings must be the manufacturer's recommended single rope pull in pounds (kilograms), at a specified rate of speed, on a given size drum, and prescribed number of layers of rope.
(ii) Markings. Hoists are to be marked with the following identification for each drum:
(A) Load rating;
(B) Drum size consisting of barrel diameter, barrel length, and flange diameter;
(C) Rope size(s);
(D) Rope speed in feet per minute (meters per second);
(E) Rated power supply.

(iii) Attachments and anchorages for hoist bases must provide mounting of the hoist and must be capable of withstanding loads imposed by the hoist under operating conditions. The weight of the hoist and loads imposed by the load ropes must be provided for.
(iv) Location of drum hoists. Drum hoists must be located in a manner that provides proper rope spooling on the drums.

WAC 296-155-54320 Derricks – operations.

(1) The operator must not engage in any practice that diverts their attention while actually engaged in operating the derrick.

(2) The operator must do the following before leaving the derrick unattended:

(a) Set down any attached load.

(b) Disengage clutches.

(c) Put the handles of controls in the "off" position.

(d) Open main switch or stop the engine.

(e) Engage the manual locking devices in the absence of automatic holding equipment.

Note: Additional information relating to cranes being unattended is located in WAC 296-155-53400(52) of this part.

(3) If power fails during operation, the derrick hoist operator must:

(a) If practical, you must land the suspended load under brake control, according to the manufacturer's procedures or an RPE;

(b) Set all brakes or locking devices;

(c) Move all clutch or other power controls to the "off" position.

(4) The operator must be familiar with the derrick and its proper care. If adjustments or repairs are necessary, the operator must report the condition to the competent person, and must also notify the next operator.

(5) The operator must test all controls at the start of a new shift. If any controls do not operate properly, you must adjust or repair them before operations are begun.

(6) You must not lower the load below the point where less than two full wraps of rope remain on the drum.

(7) When slewing a derrick, you must avoid sudden starts and stops. Slewing speed must be such that the load does not swing out beyond the radius at which it can be controlled. You must use a tag or restraint line when slewing of the load is hazardous.

(8) Use of winch heads.

(a) You must not handle ropes on a winch head without the knowledge of the operator.

(b) While a winch head is being used, the operator must be within reach of the power unit control lever.

(9) Securing the derrick.

(a) When the boom is being held in a fixed position, dogs, pawls, or other positive holding mechanisms on the boom hoist must be engaged.

(b) When taken out of service for 30 days or more, you must secure the derrick according to the manufacturer's recommendations. In the absence of the manufacturer's recommendations you must use an RPE.

WAC 296-155-544 Additional requirements for other types of cranes/derricks.

WAC 296-155-54400 Floating cranes/derricks and land cranes/derricks on barges.

(1) This section contains supplemental requirements for floating cranes/derricks and land cranes/derricks on barges, pontoons, vessels or other means of flotation (i.e., vessel/flotation device). The sections of this part apply to floating cranes/derricks and land cranes/derricks on barges, pontoons, vessels or other means of flotation, unless specified otherwise. The requirements of this section do not apply when using jacked barges when the jacks are deployed to the river, lake, or sea bed and the barge is fully supported by the jacks.

(2) General requirements. The requirements in subsections (3) through (10) of this section apply to both floating cranes/derricks and land cranes/derricks on barges, pontoons, vessels or other means of flotation.

(3) Work area control.

(a) The requirements of WAC 296-155-53400(42) (work area control) apply, except for WAC 296-155-53400 (42)(b)(ii).

(b) You must either:

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

(ii) Clearly mark the hazard areas by a combination of warning signs (such as, "Danger - Swing/Crush Zone") and high visibility markings on the equipment that identify the hazard areas. In addition, you must train each employee to understand what these markings signify.

(4) Keeping clear of the load. WAC 296-155-53400(43) does not apply.

(5) Additional safety devices. In addition to the safety devices listed in WAC 296-155-53410, the following safety devices are required:

(a) Barge, pontoon, vessel or other means of flotation list and trim indicator. The safety device must be located in the cab or, when there is no cab, at the operator's station.

(b) Positive equipment house lock.

(c) Wind speed and direction indicator. A competent person must determine if wind is a factor that needs to be considered; if wind needs to be considered, you must use a wind speed and direction indicator.

(6) Operational aids.

(a) An anti two-block device is required only when hoisting personnel or hoisting over an occupied cofferdam or shaft.

(b) WAC 296-155-53412 (3)(h) (Load weighing and similar devices) does not apply to dragline, clamshell (grapple), magnet, drop ball, container handling, concrete bucket, and pile driving work performed under this section.

(7) Accessibility of procedures applicable to equipment operation. If the crane/derrick has a cab, the requirements of WAC 296-155-53400(6) apply. If the crane/derrick does not have a cab, you must ensure that:

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

(b) Procedures applicable to the operation of the equipment (other than load charts), recommended operating speeds, special hazard warnings, instructions and operators manual, must be readily available on board the vessel/flotation device.

(8) Inspections. In addition to meeting the requirements of WAC 296-155-53405 for inspecting the crane/derrick, you must inspect the barge, pontoons, vessel or other means of flotation used to support a floating crane/derrick or land crane/derrick, to ensure that:

(a) Shift. For each shift inspection, the means used to secure/attach the equipment to the vessel/flotation device is in proper condition, including wear, corrosion, loose or missing fasteners, defective welds, and (when applicable) insufficient tension.

(b) Monthly. For each monthly inspection:

(i) The means used to secure/attach the equipment to the vessel/flotation device is in proper condition, including inspection for wear, corrosion, and (when applicable) insufficient tension.

(ii) The vessel/flotation device is not taking on water.

(iii) The deck load is properly secured.

(iv) The vessel/flotation device is watertight based on the condition of the chain lockers, storage, fuel compartments, and hatches.

(v) The firefighting and lifesaving equipment is in place and functional.

(c) The shift and monthly inspections are conducted by a competent person, and:

(i) If any deficiency is identified, an immediate determination is made by a qualified person whether the deficiency constitutes a hazard.

(ii) If the deficiency is determined to constitute a hazard, the vessel/flotation device is removed from service until the deficiency has been corrected.

(d) Annual: External vessel/flotation device inspection. For each annual inspection:

(i) The external portion of the barge, pontoons, vessel or other means of flotation used is inspected annually by a qualified person who has expertise with respect to vessels/flotation devices and that the inspection includes the following items:

(A) The items identified in this subsection.

(B) Cleats, bitts, chocks, fenders, capstans, ladders, and stanchions, for significant corrosion, wear, deterioration, or deformation that could impair the function of these items.

(C) External evidence of leaks and structural damage; evidence of leaks and damage below the waterline may be determined through internal inspection of the vessel/flotation device.

(D) 4-corner draft readings.

(E) Firefighting equipment for serviceability.

(ii) Rescue skiffs, lifelines, work vests, life preservers and ring buoys are inspected for proper condition.

(iii) If any deficiency is identified, an immediate determination is made by the qualified person whether the deficiency constitutes a hazard or, though not yet a hazard, needs to be monitored in the monthly inspections.

(A) If the qualified person determines that the deficiency constitutes a hazard, the vessel/flotation device is removed from service until it has been corrected. See requirements in WAC 296-155-53400(68).

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

(e) 4-year: Internal vessel/flotation device inspection. For each 4-year inspection:

(i) A marine engineer, marine architect, licensed surveyor, or other qualified person who has expertise with respect to vessels/flotation devices surveys the internal portion of the barge, pontoons, vessel, or other means of flotation.

(ii) If the surveyor identifies a deficiency, an immediate determination is made by the surveyor as to whether the deficiency constitutes a hazard or, though not yet a hazard, needs to be monitored in the monthly or annual inspections, as appropriate.

(A) If the surveyor determines that the deficiency constitutes a hazard, the vessel/flotation device is removed from service until it has been corrected.

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

(f) Documentation. The monthly and annual inspections required in (b) and (d) of this subsection are documented in accordance with WAC 296-155-53405, respectively, and that the 4-year inspection required in this section is documented, except that you must retain the documentation for that inspection for a minimum of 4 years. You must make

all such documents available, during the applicable document retention period, to all persons who conduct inspections in accordance with WAC 296-155-53405.

(9) Working with a diver. You must meet the following additional requirements when working with a diver in the water:

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

(b) The operator must remain at the controls of the crane/derrick at all times.

(c) In addition to the requirements in WAC 296-155-53406 (Signals), either:

(i) A clear line of sight must be maintained between the operator and dive tender; or

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

(d) The means used to secure the crane/derrick to the vessel/flotation device (see subsection (12)(e) of this section) must not allow any amount of shifting in any direction.

(10) Barge, pontoons, vessel or other flotation manufacturer's specifications and limitations.

(a) You must ensure that the barge, pontoons, vessel, or other means of flotation must be capable of withstanding imposed environmental, operational and in-transit loads when used in accordance with the manufacturer's specifications and limitations.

(b) You must ensure that the manufacturer's specifications and limitations with respect to environmental, operational, and in-transit loads for a barge, pontoon, vessel, or other means of flotation are not exceeded or violated.

(c) When the manufacturer's specifications and limitations are unavailable, you must ensure that the specifications and limitations established by a marine engineer, marine architect, licensed surveyor, or other qualified person who has expertise with respect to environmental, operational and in-transit loads for the barge, pontoons, vessel, or other means of flotation are not exceeded or violated.

(11) 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 flotation:

(a) Load charts.

(i) You must not exceed the manufacturer load charts applicable to operations on water. When using these charts, you must comply with all parameters and limitations (such as dynamic and environmental parameters) applicable to the use of the charts.

(ii) You must ensure that load charts take into consideration a minimum wind speed of 40 miles per hour.

(b) You must ensure that the requirements for maximum allowable list and maximum allowable trim as specified in Table 6 of this section are met.

Table 6

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

(c) You must ensure that the equipment is stable under the conditions specified in Tables 7 and 8 of this section. (Note: Freeboard is the vertical distance between the water line and the main deck of the vessel.)

Table 7

Operated at	**Wind speed**	**Minimum freeboard**
Rated capacity	60 mph	2 ft
Rated capacity plus 25%	60 mph	2 ft
High boom, no load	60 mph	2 ft

Table 8

For backward stability of the boom:	
Operated at	**Wind speed**
High boom, no load, full back list (least stable condition)	90 mph

(d) If the equipment is employer-made, you must not use it unless you have documents demonstrating that the load charts and applicable parameters for use meet the requirements of (a) through (c) of this subsection. Such documents must 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 flotation).

(e) You must ensure that the barge, pontoons, vessel or other means of flotation used:

(i) Are structurally sufficient to withstand the static and dynamic loads of the crane/derrick when operating at the crane/derrick's maximum rated capacity with all planned and actual deck loads and ballasted compartments.
(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.

(12) Land cranes/derricks. For land cranes/derricks used on barges, pontoons, vessels or other means of flotation, you must ensure that:

(a) The rated capacity of the equipment (including, but not limited to, modification of load charts) applicable for use on land is 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 flotation that will be used, under the environmental conditions expected and encountered.
(iii) The conditions required in (c) and (d) of this subsection are met.

(b) The rated capacity modification required in (a) of this subsection is performed by the equipment manufacturer, or a qualified person who has expertise with respect to both land crane/derrick capacity and the stability of vessels/flotation devices.

(c) For list and trim.
(i) The maximum allowable list and the maximum allowable trim for the barge, pontoon, vessel or other means of flotation must not exceed the amount necessary to ensure that the conditions in (d) of this subsection are met. In addition, the maximum allowable list and the maximum allowable trim does not exceed the least of the following: 5 degrees, the amount specified by the

crane/derrick manufacturer, or, when, 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 does not exceed the amount specified by the crane/derrick manufacturer, or, when, an amount is not so specified, the amount specified by the qualified person.

(d) For the following conditions:

(i) All deck surfaces of the barge, pontoons, vessel or other means of flotation used are above water.

(ii) The entire bottom area of the barge, pontoons, vessel or other means of flotation used is submerged.

(e) Physical attachment, corralling, rails system and centerline cable system meet the requirements in Option (1), Option (2), Option (3), or Option (4) of this section, and that whichever option is used also meets the requirements of (e)(v) of this subsection.

(i) Option (1) - Physical attachment. The crane/derrick is physically attached to the barge, pontoons, vessel or other means of flotation. Methods of physical attachment include crossed-cable systems attached to the crane/derrick and vessel/flotation device, bolting or welding the crane/derrick to the vessel/flotation device, strapping the crane/derrick to the vessel/flotation device with chains, or other methods of physical attachment.

(ii) Option (2) - Corralling. The crane/derrick is prevented from shifting by installing barricade restraints (i.e., a corralling system). You must ensure that corralling systems do not allow the equipment to shift by any amount of shifting in any direction.

(iii) Option (3) - Rails. You must prevent the crane/derrick from shifting by being mounted on a rail system. You must ensure that rail clamps and rail stops are used unless the system is designed to prevent movement during operation by other means.

(iv) Option (4) - Centerline cable system. The crane/derrick is prevented from shifting by being mounted to a wire rope system. You must ensure that the wire rope system meets the following requirements:

(A) The wire rope and attachments are of sufficient size and strength to support the side load of crane/derrick.

(B) The wire rope is attached physically to the vessel/flotation device.

(C) The wire rope is attached to the crane/derrick by appropriate attachment methods (such as shackles or sheaves) on the undercarriage, and that the method used will allow the crew to secure the crane/derrick

from movement during operation and to move the crane/derrick longitudinally along the vessel/flotation device for repositioning.
(D) Means are installed to prevent the crane/derrick from passing the forward or aft end of the wire rope attachments.
(E) The crane/derrick is secured from movement during operation.

(v) The systems/means used to comply with Option (1), Option (2), Option (3), or Option (4) of this section are designed by a marine engineer, registered professional engineer familiar with floating crane/derrick design, or qualified person familiar with floating crane/derrick design.

(f) Exception. For mobile auxiliary cranes used on the deck of a floating crane/derrick, the requirement specified by (e) of this subsection to use Option (1), Option (2), Option (3), or Option (4) does not apply when the employer demonstrates implementation of a plan and procedures that meet the following requirements:

(i) 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.
(ii) The plan is designed so that the applicable requirements of this section are met despite the position, travel, operation, and lack of physical attachment (or corralling, use of rails or cable system) of the mobile auxiliary crane.
(iii) The plan specifies the areas of the deck where the mobile auxiliary crane is permitted to be positioned, travel, and operate, and the parameters and limitations of such movements and operation.
(iv) The deck is marked to identify the permitted areas for positioning, travel, and operation.
(v) The plan specifies the dynamic and environmental conditions that must be present for use of the plan.
(vi) If the dynamic and environmental conditions in (f)(v) of this subsection are exceeded, the mobile auxiliary crane is attached physically or corralled in accordance with Option (1), Option (2) or Option (4) of (e) of this subsection.

(g) The barge, pontoons, vessel or other means of flotation used:

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

WAC 296-155-54405 Dedicated pile drivers.

(1) The provisions of Part L of this chapter apply to dedicated pile drivers, except as specified in this section.

(2) WAC 296-155-53412 (3)(d) (Anti two-blocking device) does not apply.

(3) WAC 296-155-53412 (3)(h) (Load weighing and similar devices) applies only to dedicated pile drivers manufactured after the effective date of this section.

WAC 296-155-54410 Sideboom cranes.

(1) The provisions of this standard apply, except WAC 296-155-53400(34) (Ground conditions), WAC 296-155-53410 (Safety devices), WAC 296-155-53412 (Operational aids), WAC 296-155-531 through 296-155-53214 (crane certifier accreditation and crane certification) and WAC 296-155-53300 (Operator qualifications and certification).

(2) Sideboom cranes manufactured prior to the effective date of this section must meet the requirements of SAE J743a-1964. Sideboom cranes mounted on wheel or crawler tractors manufactured after the effective date of this section must meet the requirements of ASME B30.14-2010.

WAC 296-155-54800 Design of platforms and suspension systems.

(1) Employers that manufacture personnel platforms and/or their suspension systems must be designed, constructed and tested according to ASME B30.23-2005, Personnel Lifting Systems. The design and manufacturer's specifications must be made by a registered professional engineer. Personnel platforms manufactured prior to the effective of this section must comply with ASME B30.23-1998.

WAC 296-155-55300 Personnel lifting requirements.

(4) You must only use personnel platforms for personnel, their tools, and sufficient material to do their work. You must use them solely for transporting bulk materials.

Commented [SBS(67]: The added code stopped

Commented [SBS(68]: Delete red highlighted portion.