NATIONAL COMMISSION FOR THE
CERTIFICATION OF CRANE OPERATORS (NCCCO)

SIGNALPERSON REFERENCE MANUAL

Hold Harmless/Release/Disclaimer Agreement

The reading and/or using person or entities using this publication for and in consideration of the assistance, cooperation, and information given by the National Commission for the Certification of Crane Operators (NCCCO) in this publication, "Signalperson Reference Manual," the receipt of which is acknowledged, does hereby and for all future time have released, hold harmless from any liability, and forever discharged for itself, its administrators and assigns the said NCCCO from all and any manner of action or demands whatsoever in law, in admiralty, or in equity, which against the said NCCCO anyone ever had, now have, or which shall be later claimed. This agreement relates specifically to any cause of action arising out of the publication, information provided, subsequent conduct, and any use of the information provided in this publication and related uses or demonstrations of skills, methods, and techniques cite in the publication. This mutually beneficial release and hold harmless agreement may not be changed orally, and exists in perpetuity. NCCCO generally and specifically disclaims any warranty, merchantability of intended or unintended use or, liability for use of the in the information. This publication is issued solely as a public service to improve the lifting industry and promote public safety.

Preface

This manual has been provided as a reference source for candidates preparing to take the NCCCO Signalperson Certification Exam. The information contained herein has been compiled from a number of different sources. These sources and the relevant material selected for inclusion in the Reference Manual are as follows:

- ASME B30.5 - 2007 - Mobile and Locomotive Cranes, Section 5-3.3: Signals.
- ASME B30.3 - 2004 - Construction Tower Cranes, Section 3-3.3: Signals.
- OSHA 1926.550 - Cranes and Derricks
- Voice Communication

Please note that candidates should be familiar with all sections of ASME B30.5- 2007 standards relevant to crane operations and signaling.

The material contained herein is not intended to be used for any other purpose than reference material in association with preparing for the NCCCO examinations. No part of this manual is to be copied or used in any manner other than by individual candidates preparing for the NCCCO Signalperson examination.

This page intentionally left blank

Table of Contents

This page intentionally left blank

ASME B30.5 - 2007 - MOBILE AND LOCOMOTIVE CRANES

Section 5-3.3 - Signals

This page intentionally left blank

Section 5-3.3 Signals

5-3.3.1 General

(a) Communication between the crane operator and the signal person shall be maintained continuously during all crane movements. If at any time communication is disrupted, the operator shall stop all crane movements until communication is restored and a proper signal is given and understood.

(b) If the operator has any concerns regarding the requested movement of the crane or needs to communicate with the signal person, the operator shall stop all crane movement. Crane movement shall not resume until the operator and the signal person agree the issue at hand has been resolved.

(c) If it is desired to give instructions to the operator, other that those provided by the established signal system, the crane movements shall be stopped.

5-3.3.2 Standard Signals

Standard signals to the operator shall be in accordance with the standards prescribed in para. 5-3.3.4 or para. 5-3.3.5. Signals shall be discernible or audible at all times. No response shall be made unless signals are clearly understood.

5-3.3.3 Signal person Qualifications

Prior to signaling crane operations, all signal persons shall be tested by a designated person and demonstrate their qualifications in the following areas:

(a) basic understanding of crane operation and limitations;

(b) standard hand signals described in para. 5-3.3.4 whenever hand signals are used;

(c) standard voice signals described in para. 5-3.3.5 whenever voice signals are used.

5-3.3.4 Standard Hand Signals

Hand signals shall be as shown in Fig. 17 and shall be posted conspicuously at the job site.

5-3.3.5 Standard Voice Signals

Prior to beginning lifting operations using voice signals, the signals shall be discussed and agreed upon by the person directing lifting operations, the crane operator, and the appointed signal person.

(a) Telephones, radios, or equivalent, if used, shall be tested before lifting operations begin. If the system is battery powered, extra batteries should be available at the job site.

(b) Prior to commencing a lift, the operator and signal person shall contact and identify each other.

(c) All directions given to the crane operator by the signal person shall be given from the operator's direction perspective (e.g., swing right).

(d) Each series of voice signals shall contain three elements stated in the following order:

(1) function and direction;

(2) distance and/or speed;

(3) function stop.

(e) For lifting operations using voice signals, the person directing lifting operations shall consider the complexity of the lift, the capabilities of the particular crane, the experience and skill of the operator and signal person, and the ability to communicate the necessary signals before permitting multiple simultaneous crane function signals.

5-3.3.6 Special Signals

For operations or crane attachments not covered by para. 5-3.3.4. para. 5-3.3.5, or para. 5-3.3.7, additions to or modifications of the standard signal procedures may be required. In all such cases, the required special signals shall be agreed upon in advance by the person directing lifting operations, the crane operator, and the signal person. These special signals should not be in conflict with the standard signals.

5-3.3.6 Audible Travel Signals

When moving the vehicle, the following signals shall be used:

(a) STOP: one short audible signal;

(b) GO AHEAD: two short audible signals;

(c) BACK UP: three short audible signals.

5-3.3.7 Audible Emergency Signal

Emergency signals can be given by anyone. The signal used shall be agreed upon for each job site location and it shall meet the requirements of para. 5-3.3.6 (e.g., multiple short audible signals or a continuous audible signal.)

This page intentionally left blank

Figure 17: Standard Hand Signals
For Controlling Mobile Crane Operations

HOIST

With forearm vertical, forefinger pointing up, move hand in small horizontal circles.

LOWER

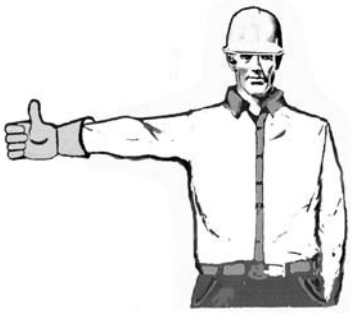
With arm extended downward, forefinger pointing down, move hand in small horizontal circles.

USE MAIN HOIST

Tap fist on head; then use regular signals.

USE WHIPLINE (Auxiliary Hoist)

Tap elbow with one hand; then use regular signals.



RAISE BOOM

Arm extended, fingers closed, thumb pointing upward.

LOWER BOOM

Arm extended, fingers closed, thumb pointing downward.

MOVE SLOWLY

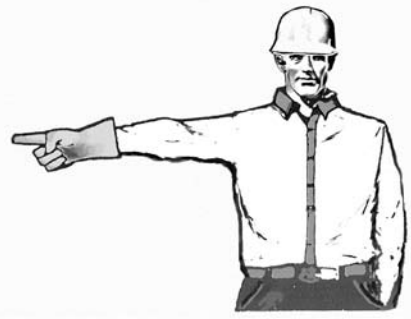
Use one hand to give any motion signal and place other hand motionless in front of hand giving the motion signal. (Hoist slowly shown in example.)

RAISE THE BOOM AND LOWER THE LOAD

With arm extended, thumb pointing up, flex fingers in and out as long as load movement is desired.

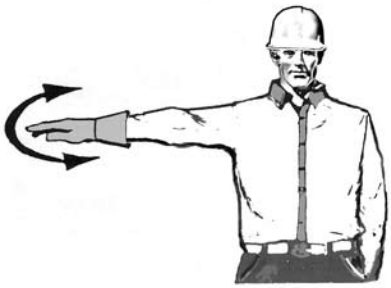
LOWER THE BOOM AND RAISE THE LOAD

With arm extended, thumb pointing down, flex fingers in and out as long as load movement is desired.



SWING

Arm extended point with finger in direction of swing of boom.

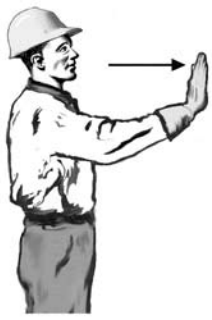


STOP

Arm extended, palm down, move arm back and forth horizontally.

EMERGENCY STOP

Both arms extended, palms down, move arms back and forth horizontally.



TRAVEL

Arm extended forward, hand open and slightly raised, make pushing motion in direction of travel.

DOG EVERYTHING

Clasp hands in front of body.

TRAVEL (BOTH TRACKS)

Use both fists in front of body, making a circular motion about each other, indicating direction of travel, forward or backward. (For land crane only)

TRAVEL (ONE TRACK)

Lock the track on side indicated by raised fist. Travel opposite track in direction indicated by circular motion of other fist, rotated vertically in front of body (For land cranes only).

EXTEND BOOM (TELESCOPING BOOMS)

Both fists in front of body with thumbs pointing outward.

RETRACT BOOM (TELESCOPING BOOMS)

Both fists in front of body with thumbs pointing toward each other.

EXTEND BOOM (TELESCOPING BOOM)

One hand signal. One fist in front of chest with thumb tapping chest.

RETRACT BOOM (TELESCOPING BOOM)

One hand signal. One fist in front of chest, thumb pointing outward and heel of fist tapping chest.

This page intentionally left blank

ASME B30.3 - 2004 - CONSTRUCTION TOWER CRANES

Section 3-3.3 - Signals

This page intentionally left blank

Section 3-3.3 Signals

SECTION 3-3.3: SIGNALS

3-3.3.1 Standard Signals

Standard signals to the operator shall be in accordance with the standards prescribed in para. 3-3.3.2, unless voice communication equipment (telephone, radio, or equivalent) is utilized. Signals shall be discernable or audible at all times. No crane motion shall be made unless signals are clearly understood.

3-3.3.2 Hand Signals

Hand signals shall be in accordance with Fig. 10 and shall be posted at the work site.

3-3.3.3 Special Signals

For operations not covered by para. 3-3.3.2, or for special conditions that occur from time to time, additions to or modifications of the standard signals may be required. In such cases, these special signals shall be agreed upon in advance by the operator and the signal person and should not be in conflict with standard signals.

3-3.3.4 Instructions to the Operator

If it is desired to give instructions to the operator, other than those provided by the established signal system, crane motions shall be stopped.

This page intentionally left blank

Figure 10: Standard Hand Signals
For Controlling Construction Tower Cranes

HOIST

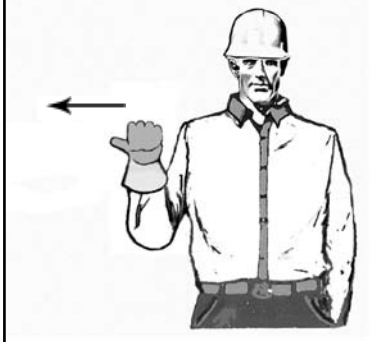
With forearm, vertical, forefinger pointing up, move hand in small horizontal circle.

LOWER

With arm extended downward, forefinger pointing down, move hand in small horizontal circles.

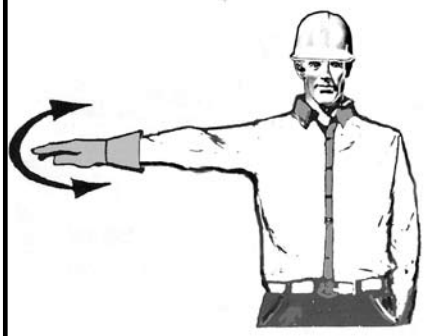
TOWER TRAVEL

Arm extended forward, hand open and slightly raised, make pushing motion in direction of travel.



TROLLEY TRAVEL

Palm up, fingers closed, thumb pointing in direction of motion, jerk hand horizontally.

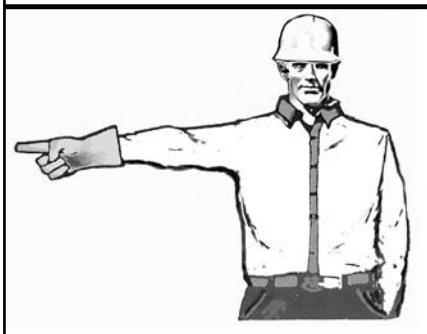


STOP

Arm extended, palm down, move arm back and forth horizontally.

EMERGENCY STOP

Both arms extended, palms down, move arms back and forth.



SWING

Arm extended point with finger in direction of swing of boom.

MOVE SLOWLY

Use one hand to give any motion signal and place other hand motionless in front of hand giving the motion signal. (Hoist slowly shown in example)

DOG EVERYTHING

Clasp hands in front of body.

This page intentionally left blank

OSHA 1926.550
Cranes and Derricks

Reprinted from Occupational Safety and Health Administration (OSHA).

This page intentionally left blank

OSHA 1926.550

Regulations (Standards - 29 CFR) - Table of Contents

- **Part Number:** 1926
- **Part Title:** Safety and Health Regulations for Construction
- **Subpart:** N
- **Subpart Title:** Crane, Derricks, Hoists, Elevators, and Conveyors
- **Standard Number:** 1926.550
- **Title:** Crane and Derricks

1926.550(a)(1)

The employer shall comply with the manufacturer's specifications and limitations applicable to the operation of any and all cranes and derricks. Where manufacturer's specifications are not available, the limitations assigned to the equipment shall be based on the determinations of a qualified engineer competent in this field and such determinations will be appropriately documented and recorded. Attachments used with cranes shall not exceed the capacity, rating, or scope recommended by the manufacturer.

1926.550(a)(2)

Rated load capacities, and recommended operating speeds, special hazard warnings, or instruction, shall be conspicuously posted on all equipment. Instructions or warnings shall be visible to the operator while he is at his control station.

1926.550(a)(3)

[RESERVED]

1926.550(a)(4)

Hand signals to crane and derrick operators shall be those prescribed by the applicable ANSI standard for the type of crane in use. An illustration of the signals shall be posted at the job site.

1926.550(a)(5)

The employer shall designate a competent person who shall inspect all machinery and equipment prior to each use, and during use, to make sure it is in safe operating condition. Any deficiencies shall be repaired, or defective parts replaced, before continued use.

1926.550(a)(6)

A thorough, annual inspection of the hoisting machinery shall be made by a competent person, or by a government or private agency recognized by the U.S. Department of Labor. The employer shall maintain a record of the dates and results of inspections for each hoisting machine and piece of equipment.

1926.550(a)(7)

Wire rope shall be taken out of service when any of the following conditions exist:

1926.550(a)(7)(i)

In running ropes, six randomly distributed broken wires in one lay or three broken wires in one strand in one lay;

1926.550(a)(7)(ii)

Wear of one-third the original diameter of outside individual wires. Kinking, crushing, bird caging, or any other damage resulting in distortion of the rope structure;

1926.550(a)(7)(iii)

Evidence of any heat damage from any cause;

1926.550(a)(7)(iv)

Reductions from nominal diameter of more than one-sixty-fourth inch for diameters up to and including five-sixteenths inch, one-thirty-second inch for diameters three-eighths inch to and including one-half inch, three-sixty-fourths inch for diameters nine-sixteenths inch to and including three-fourths inch, one-sixteenth inch for diameters seven-eighths inch to 1 1/8 inches inclusive, three-thirty-seconds inch for diameters 1 1/4 to 1 1/2 inches inclusive;

1926.550(a)(7)(v)

In standing ropes, more than two broken wires in one lay in sections beyond end connections or more than one broken wire at an end connection.

1926.550(a)(7)(vi)

Wire rope safety factors shall be in accordance with American National Standards Institute B30.5-1968 or SAE J959-1966.

1926.550(a)(8)

Belts, gears, shafts, pulleys, sprockets, spindles, drums, fly wheels, chains, or other reciprocating, rotating, or other moving parts or equipment shall be guarded if such parts are exposed to contact by employees, or otherwise create a hazard. Guarding shall meet the requirements of the American National Standards Institute B15.1-1958 Rev., Safety Code for Mechanical Power Transmission Apparatus.

1926.550(a)(9)

Accessible areas within the swing radius of the rear of the rotating superstructure of the crane, either permanently or temporarily mounted, shall be barricaded in such a manner as to prevent an employee from being struck or crushed by the crane.

1926.550(a)(10)

All exhaust pipes shall be guarded or insulated in areas where contact by employees is possible in the performance of normal duties.

1926.550(a)(11)

Whenever internal combustion engine powered equipment exhausts in enclosed spaces, tests shall be made and recorded to see that employees are not exposed to unsafe concentrations of toxic gases or oxygen deficient atmospheres.

1926.550(a)(12)

All windows in cabs shall be of safety glass, or equivalent, that introduces no visible distortion that will interfere with the safe operation of the machine.

1926.550(a)(13)

1926.550(a)(13)(i)

Where necessary for rigging or service requirements, a ladder, or steps, shall be provided to give access to a cab roof.

1926.550(a)(13)(ii)

Guardrails, handholds, and steps shall be provided on cranes for easy access to the car and cab, conforming to American National Standards Institute B30.5.

1926.550(a)(13)(iii)

Platforms and walkways shall have anti-skid surfaces.

1926.550(a)(14)

Fuel tank filler pipe shall be located in such a position, or protected in such manner, as to not allow spill or overflow to run onto the engine, exhaust, or electrical equipment of any machine being fueled.

1926.550(a)(14)(i)

An accessible fire extinguisher of 5BC rating, or higher, shall be available at all operator stations or cabs of equipment.

1926.550(a)(14)(ii)

All fuels shall be transported, stored, and handled to meet the rules of Subpart F of this part. When fuel is transported by vehicles on public highways, Department of Transportation rules contained in 49 CFR Parts 177 and 393 concerning such vehicular transportation are considered applicable.

1926.550(a)(15)

Except where electrical distribution and transmission lines have been deenergized and visibly grounded at point of work or where insulating barriers, not a part of or an attachment to the equipment or machinery, have been erected to prevent physical contact with the lines, equipment or machines shall be operated proximate to power lines only in accordance with the following:

1926.550(a)(15)(i)

For lines rated 50 kV. or below, minimum clearance between the lines and any part of the crane or load shall be 10 feet;

1926.550(a)(15)(ii)

For lines rated over 50 kV., minimum clearance between the lines and any part of the crane or load shall be 10 feet plus 0.4 inch for each 1 kV. over 50 kV., or twice the length of the line insulator, but never less than 10 feet;

1926.550(a)(15)(iii)

In transit with no load and boom lowered, the equipment clearance shall be a minimum of 4 feet for voltages less than 50 kV., and 10 feet for voltages over 50 kV., up to and including 345 kV., and 16 feet for voltages up to and including 750 kV.

1926.550(a)(15)(iv)

A person shall be designated to observe clearance of the equipment and give timely warning for all operations where it is difficult for the operator to maintain the desired clearance by visual means;

1926.550(a)(15)(v)

Cage-type boom guards, insulating links, or proximity warning devices may be used on cranes, but the use of such devices shall not alter the requirements of any other regulation of this part even if such device is required by law or regulation;

1926.550(a)(15)(vi)

Any overhead wire shall be considered to be an energized line unless and until the person owning such line or the electrical utility authorities indicate that it is not an energized line and it has been visibly grounded;

1926.550(a)(15)(vii)

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

1926.550(a)(15)(vii)(a)

The equipment shall be provided with an electrical ground directly to the upper rotating structure supporting the boom; and

1926.550(a)(15)(vii)(b)

Ground jumper cables shall be attached to materials being handled by boom equipment when electrical charge is induced while working near energized transmitters. Crews shall be provided with nonconductive poles having large alligator clips or other similar protection to attach the ground cable to the load.

1926.550(a)(15)(vii)(c)

Combustible and flammable materials shall be removed from the immediate area prior to operations.

1926.550(a)(16)

No modifications or additions which affect the capacity or safe operation of the equipment shall be made by the employer without the manufacturer's written approval. If such modifications or changes are made, the capacity, operation, and maintenance instruction plates, tags, or decals, shall be changed accordingly. In no case shall the original safety factor of the equipment be reduced.

1926.550(a)(17)

The employer shall comply with Power Crane and Shovel Association Mobile Hydraulic Crane Standard No. 2.

1926.550(a)(18)

Sideboom cranes mounted on wheel or crawler tractors shall meet the requirements of SAE J743a-1964.

1926.550(a)(19)

All employees shall be kept clear of loads about to be lifted and of suspended loads.

1926.550(b)

Crawler, locomotive, and truck cranes.

1926.550(b)(1)

All jibs shall have positive stops to prevent their movement of more than 5 deg above the straight line of the jib and boom on conventional type crane booms. The use of cable type belly slings does not constitute compliance with this rule.

1926.550(b)(2)

All crawler, truck, or locomotive cranes in use shall meet the applicable requirements for design, inspection, construction, testing, maintenance and operation as prescribed in the ANSI B30.5-1968, Safety Code for Crawler, Locomotive and Truck Cranes. However, the written, dated, and signed inspection reports and records of the monthly inspection of critical items prescribed in section 5-2.1.5 of the ANSI B30.5-1968 standard are not required. Instead, the employer shall prepare a certification record which includes the date the crane items were inspected; the

signature of the person who inspected the crane items; and a serial number, or other identifier, for the crane inspected. The most recent certification record shall be maintained on file until a new one is prepared.

1926.550(c)

Hammerhead tower cranes.

1926.550(c)(1)

Adequate clearance shall be maintained between moving and rotating structures of the crane and fixed objects to allow the passage of employees without harm.

1926.550(c)(2)

Each employee required to perform duties on the horizontal boom of hammerhead tower cranes shall be protected against falling by guardrails or by a personal fall arrest system in conformance with subpart M of this part.

1926.550(c)(3)

Buffers shall be provided at both ends of travel of the trolley.

1926.550(c)(4)

Cranes mounted on rail tracks shall be equipped with limit switches limiting the travel of the crane on the track and stops or buffers at each end of the tracks.

1926.550(c)(5)

All hammerhead tower cranes in use shall meet the applicable requirements for design, construction, installation, testing, maintenance, inspection, and operation as prescribed by the manufacturer.

1926.550(d)

Overhead and gantry cranes.

1926.550(d)(1)

The rated load of the crane shall be plainly marked on each side of the crane, and if the crane has more than one hoisting unit, each hoist shall have its rated load marked on it or its load block, and this marking shall be clearly legible from the ground or floor.

1926.550(d)(2)

Bridge trucks shall be equipped with sweeps which extend below the top of the rail and project in front of the truck wheels.

1926.550(d)(3)

Except for floor-operated cranes, a gong or other effective audible warning signal shall be provided for each crane equipped with a power traveling mechanism.

1926.550(d)(4)

All overhead and gantry cranes in use shall meet the applicable requirements for design, construction, installation, testing, maintenance, inspection, and operation as prescribed in the ANSI B30.2.0-1967, Safety Code for Overhead and Gantry Cranes.

1926.550(e)

Derricks. All derricks in use shall meet the applicable requirements for design, construction, installation, inspection, testing, maintenance, and operation as prescribed in American National Standards Institute B30.6-1969, Safety Code for Derricks.

1926.550(f)

Floating cranes and derricks -

1926.550(f)(1)

Mobile cranes mounted on barges.

1926.550(f)(1)(i)

When a mobile crane is mounted on a barge, the rated load of the crane shall not exceed the original capacity specified by the manufacturer.

1926.550(f)(1)(ii)

A load rating chart, with clearly legible letters and figures, shall be provided with each crane, and securely fixed at a location easily visible to the operator.

1926.550(f)(1)(iii)

When load ratings are reduced to stay within the limits for list of the barge with a crane mounted on it, a new load rating chart shall be provided.

1926.550(f)(1)(iv)

Mobile cranes on barges shall be positively secured.

1926.550(f)(2)

Permanently mounted floating cranes and derricks.

1926.550(f)(2)(i)

When cranes and derricks are permanently installed on a barge, the capacity and limitations of use shall be based on competent design criteria.

1926.550(f)(2)(ii)

A load rating chart with clearly legible letters and figures shall be provided and securely fixed at a location easily visible to the operator.

1926.550(f)(2)(iii)

Floating cranes and floating derricks in use shall meet the applicable requirements for design, construction, installation, testing, maintenance, and operation as prescribed by the manufacturer.

1926.550(f)(3)

Protection of employees working on barges.
The employer shall comply with the applicable requirements for protection of employees working onboard marine vessels specified in 1926.605.

1926.550(g)

Crane or derrick suspended personnel platforms -

1926.550(g)(1)

Scope, application and definitions -

1926.550(g)(1)(i)

Scope and application. This standard applies to the design, construction, testing, use and maintenance of personnel platforms, and the hoisting of personnel platforms on the load lines of cranes or derricks.

1926.550(g)(1)(ii)

Definitions. For the purposes of this paragraph (g), the following definitions apply:

1926.550(g)(1)(ii)(A)

"Failure" means load refusal, breakage, or separation of components.

1926.550(g)(1)(ii)(B)

"Hoist" (or hoisting) means all crane or derrick functions such as lowering, lifting, swinging, booming in and out or up and down, or suspending a personnel platform.

1926.550(g)(1)(ii)(C)

"Load refusal" means the point where the ultimate strength is exceeded.

1926.550(g)(1)(ii)(D)

"Maximum intended load" means the total load of all employees, tools, materials, and other loads reasonably anticipated to be applies to a personnel platform or personnel platform component at any one time.

1926.550(g)(1)(ii)(E)

"Runway" means 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.

1926.550(g)(2)

General requirements. The use of a crane or derrick to hoist employees on a personnel platform is prohibited, except when the erection, use, and dismantling of conventional means of reaching the worksite, such as a personnel hoist, ladder, stairway, aerial lift, elevating work platform or scaffold, would be more hazardous or is not possible because of structural design or worksite conditions.

1926.550(g)(3)

Cranes and derricks -

1926.550(g)(3)(i)

Operational criteria.

1926.550(g)(3)(i)(A)

Hoisting of the personnel platform shall be performed in a slow, controlled, cautious manner with no sudden movements of the crane or derrick, or the platform.

1926.550(g)(3)(i)(B)

Load lines shall be capable of supporting, without failure, at least seven times the maximum intended load, except that where rotation resistant rope is used, the lines shall be capable of supporting without failure, at least ten times the maximum intended load.
The required design factor is achieved by taking the current safety factor of 3.5 (required under 1926.550(b)(2) and applying the 50 per cent derating of the crane capacity which is required by 1926.550(g)(3)(i)(F).

1926.550(g)(3)(i)(C)

Load and boom hoist drum brakes, swing brakes, and locking devices such as pawls or dogs shall be engaged when the occupied personnel platform is in a stationary position.

1926.550(g)(3)(i)(D)

The crane shall be uniformly level within one percent of level grade and located on firm footing. Cranes equipped with outriggers shall have them all fully deployed following manufacturer's specifications, insofar as applicable, when hoisting employees.

1926.550(g)(3)(i)(E)

The total weight of the loaded personnel platform and related rigging shall not exceed 50 percent of the rated capacity for the radius and configuration of the crane or derrick.

1926.550(g)(3)(i)(F)

The use of machines having live booms (booms in which lowering is controlled by a brake without aid from other devices which slow the lowering speeds) is prohibited.

1926.550(g)(3)(ii)

Instruments and components.

1926.550(g)(3)(ii)(A)

Cranes and derricks with variable angle booms shall be equipped with a boom angle indicator, readily visible to the operator.

1926.550(g)(3)(ii)(B)

Cranes with telescoping booms shall be equipped with a device to indicate clearly to the operator, at all times, the boom's extended length or an accurate determination of the load radius to be used during the lift shall be made prior to hoisting personnel.

1926.550(g)(3)(ii)(C)

A positive acting device shall be used which prevents contact between the load block or overhaul ball and the boom tip (anti-two-blocking device), or a system shall be used which deactivates the hoisting action before damage occurs in the event of a two-blocking situation (two-block damage prevention feature).

1926.550(g)(3)(ii)(D)

The load line hoist drum shall have a system or device on the power train, other than the load hoist brake, which regulates the lowering rate of speed of the hoist mechanism (controlled load lowering.) Free fall is prohibited.

1926.550(g)(4)

Personnel Platforms. -

1926.550(g)(4)(i)

Design criteria.

1926.550(g)(4)(i)(A)

The personnel platform and suspension system shall be designed by a qualified engineer or a qualified person competent in structural design.

1926.550(g)(4)(i)(B)

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

1926.550(g)(4)(i)(C)

The personnel platform itself, except the guardrail system and personnel fall arrest system anchorages, shall be capable of supporting, without failure, its own weight and at least five times the maximum intended load. Criteria for guardrail systems and personal fall arrest system anchorages are contained in subpart M of this Part.

1926.550(g)(4)(ii)

Platform specifications.

1926.550(g)(4)(ii)(A)

Each personnel platform shall be equipped with a guardrail system which meets the requirements of Subpart M, and shall be enclosed at least from the toeboard to mid-rail with either solid construction or expanded metal having openings no greater than 1/2 inch (1.27 cm).

1926.550(g)(4)(ii)(B)

A grab rail shall be installed inside the entire perimeter of the personnel platform.

1926.550(g)(4)(ii)(C)

Access gates, if installed, shall not swing outward during hoisting.

1926.550(g)(4)(ii)(D)

Access gates, including sliding or folding gates, shall be equipped with a restraining device to prevent accidental opening.

1926.550(g)(4)(ii)(E)

Headroom shall be provided which allows employees to stand upright in the platform.

1926.550(g)(4)(ii)(F)

In addition to the use of hard hats, employees shall be protected by overhead protection on the personnel platform when employees are exposed to falling objects.

1926.550(g)(4)(ii)(G)

All rough edges exposed to contact by employees shall be surfaced or smoothed in order to prevent injury to employees from punctures or lacerations.

1926.550(g)(4)(ii)(H)

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

1926.550(g)(4)(ii)(I)

The personnel platform shall be conspicuously posted with a plate or other permanent marking which indicates the weight of the platform, and its rated load capacity or maximum intended load.

1926.550(g)(4)(iii)

Personnel platform loading.

1926.550(g)(4)(iii)(A)

The personnel platform shall not be loaded in excess of its rated load capacity, When a personnel platform does not have a rated load capacity then the personnel platform shall not be loaded in excess of its maximum intended load.

1926.550(g)(4)(iii)(B)

The number of employees occupying the personnel platform shall not exceed the number required for the work being performed.

1926.550(g)(4)(iii)(C)

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

1926.550(g)(4)(iii)(D)

Materials and tools for use during a personnel lift shall be secured to prevent displacement.

1926.550(g)(4)(iii)(E)

Materials and tools for use during a personnel lift shall be evenly distributed within the confines of the platform while the platform is suspended.

1926.550(g)(4)(iv)

Rigging.

1926.550(g)(4)(iv)(A)

When a wire rope bridle is used to connect the personnel platform to the load line, each bridle leg shall be connected to a master link or shackle in such a manner to ensure that the load is evenly divided among the bridle legs.

1926.550(g)(4)(iv)(B)

Hooks on overhaul ball assemblies, lower load blocks, or other attachment assemblies shall be of a type that can be closed and locked, eliminating the hook throat opening. Alternatively, an alloy anchor type shackle with a bolt, nut and retaining pin may be used.

1926.550(g)(4)(iv)(C)

Wire rope, shackles, rings, master links, and other rigging hardware must be capable of supporting, without failure, at least five times the maximum intended load applied or transmitted to that component. Where rotation resistant rope is used, the slings shall be capable of supporting without failure at least ten times the maximum intended load.

1926.550(g)(4)(iv)(D)

All eyes in wire rope slings shall be fabricated with thimbles.

1926.550(g)(4)(iv)(E)

Bridles and associated rigging for attaching the personnel platform to the hoist line shall be used only for the platform and the necessary employees, their tools and the materials necessary to do their work and shall not be used for any other purpose when not hoisting personnel.

1926.550(g)(5)

Trial lift, inspections and proof testing.

1926.550(g)(5)(i)

A trial lift with the unoccupied personnel platform loaded at least to the anticipated lift weight shall be made from ground level, or any other location where employees will enter the platform to each location at which the personnel platform is to be hoisted and positioned. This trial lift shall be performed immediately prior to placing personnel on the platform. The operator shall determine that all systems, controls and safety devices are activated and functioning properly; that no interferences exist; and that all configurations necessary to reach those work locations will allow the operator to remain under the 50 percent limit of the hoist's rated capacity. Materials and tools to be used during the actual lift can be loaded in the platform, as provided in paragraphs (g)(4)(iii)(D), and (E) of this section for the trial lift. A single trial lift may be performed at one time for all locations that are to be reached from a single set up position.

1926.550(g)(5)(ii)

The trial lift shall be repeated prior to hoisting employees whenever the crane or derrick is moved and set up in a new location or returned to a previously used location. Additionally , the trial lift shall be repeated when the lift route is changed unless the operator determines that the route change is not significant (i.e. the route change would not affect the safety of hoisted employees.)

1926.550(g)(5)(iii)

After the trial lift, and just prior to hoisting personnel, the platform shall be hoisted a few inches and inspected to ensure that it is secure and properly balanced. Employees shall not be hoisted unless the following conditions are determined to exist:

1926.550(g)(5)(iii)(A)

Hoist ropes shall be free of kinks;

1926.550(g)(5)(iii)(B)

Multiple part lines shall not be twisted around each other;

1926.550(g)(5)(iii)(C)

The primary attachment shall be centered over the platform, and

1926.550(g)(5)(iii)(D)

The hoisting system shall be inspected if the load rope is slack to ensure all ropes are properly stated on drums and in sheaves.

1926.550(g)(5)(iv)

A visual inspection of the crane or derrick, rigging, personnel platform, and the crane or derrick base support or ground shall be conducted by a competent person immediately after the trial lift to determine whether the testing has exposed any defect or produced any adverse effect upon any component or structure.

1926.550(g)(5)(v)

Any defects found during inspections which create a safety hazard shall be corrected before hoisting personnel.

1926.550(g)(5)(vi)

At each job site, prior to hoisting employees on the personnel platform, and after any repair or modification, the platform and rigging shall be proof tested to 125 percent of the platform's rated capacity by holding it in a suspended position for five minutes with the test load evenly distributed on the platform (this may be done concurrently with the trial lift). After proof testing, a competent person shall inspect the platform and rigging. Any deficiencies found shall be corrected and another proof test shall be conducted. Personnel hoisting shall not be conducted until the proof testing requirements are satisfied.

1926.550(g)(6)

Work practices.

1926.550(g)(6)(i)

Employees shall keep all parts of the body inside the platform during raising lowering, and positioning. This provision does not apply to an occupant of the platform performing the duties of a signal person.

1926.550(g)(6)(ii)

Before employees exit or enter a hoisted personnel platform that is not landed, the platform shall be secured to the structure where the work is to be performed, unless securing to the structure creates an unsafe situation.

1926.550(g)(6)(iii)

Tag lines shall be used unless their use creates an unsafe condition.

1926.550(g)(6)(iv)

The crane or derrick operator shall remain at the controls at all times when the crane engine is running and the platform is occupied.

1926.550(g)(6)(v)

Hoisting of employees shall be promptly discontinued upon indication of any dangerous weather conditions or other impending danger.

1926.550(g)(6)(vi)

Employees being hoisted shall remain in continuous sight of and in direct communication with the operator or signal person. In those situations where direct visual contact with the operator is not possible, and the use of a signal person would create a greater hazard for the person, direct communication alone such as by radio may be used.

1926.550(g)(6)(vii)

Except over water, employees occupying the personnel platform shall use a body belt/harness system with lanyard appropriately attached to the lower load block or overhaul ball, or to a structural member within the personnel platform capable of supporting a fall impact for employees using the anchorage. When working over water the requirements of 1926.106 shall apply.

1926.550(g)(6)(viii)

No lifts shall be made on another of the crane's or derrick's loadlines while personnel are suspended on a platform.

1926.550(g)(7)

Traveling.

1926.550(g)(7)(i)

Hoisting of employees while the crane is traveling is prohibited, except for portal, tower and locomotive cranes, or where the employer demonstrates that there is no less hazardous way to perform the work.

1926.550(g)(7)(ii)

Under any circumstances where a crane would travel while hoisting personnel, the employer shall implement the following procedures to safeguard employees:

1926.550(g)(7)(ii)(A)

Crane travel shall be restricted to a fixed track or runway;

1926.550(g)(7)(ii)(B)

Travel shall be limited to the load radius of the boom used during the lift; and

1926.550(g)(7)(ii)(C)

The boom must be parallel to the direction of travel.

1926.550(g)(7)(ii)(D)

A complete trial run shall be performed to test the route of travel before employees are allowed to occupy the platform. This trial run can be performed at the same time as the trial lift required by paragraph (g)(5)(i) of this section which tests the route of the lift.

1926.550(g)(7)(ii)(E)

If travel is done with a rubber tired-carrier, the condition and air pressure of the tires shall be checked. The chart capacity for lifts on rubber shall be used for application of the 50 percent reduction of rated capacity. Notwithstanding paragraph (g)(5)(i)(E) of this section, outriggers may be partially retracted as necessary for travel.

1926.550(g)(8)

Pre-lift meeting.

1926.550(g)(8)(i)

A meeting attended by the crane or derrick operator, signal person(s) (if necessary for the lift), employee(s) to be lifted, and the person responsible for the task to be performed shall be held to review the appropriate requirements of paragraph (g) of this section and the procedures to be followed.

1926.550(g)(8)(ii)

This meeting shall be held prior to the trial lift at each new work location, and shall be repeated for any employees newly assigned to the operation.

Voice Signal Communication

This page intentionally left blank

Voice Signal Communication

Prior to Lifting Operations

Prior to beginning lifting operations using voice signals, the signals shall be discussed and agreed upon by the person directing lifting operations, the crane operator, and the appointed signalperson.

Telephones, radios, or equivalent, if used, shall be tested before lifting operations begin. If the system is battery powered, extra batteries should be available at the job site.

Prior to commencing a lift, the operator and signalperson shall contact and identify each other.

- Begin by calling for the operator by name
- Operator will acknowledge with the signalperson's name

Voice Command Basics

The devices used to transmit signals shall be tested on site before beginning operations to ensure that the signal transmission is clear and reliable.

Signal transmission must be through a dedicated channel. Exception: Multiple cranes/derricks and one or more signalpersons may share a dedicated channel for the purpose of coordinating operations.

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

Cautions regarding radio use may include the following:

- Awareness of any explosive devices in general area (radio transmissions have been known to cause premature detonation of explosives that use electric detonators)
- Other electronics (potential for interference)
- Other radios nearby operating on the same frequency

Elements of Voice Signals

Each series of voice signals shall contain three elements stated in the following order:

1. function and direction;
2. distance and/or speed;
3. function stop.

Function names should be the same as the ASME B30 standard hand signal names.

List of **ACCEPTABLE** voice signal functions:

- 'Hoist' or 'raise the load'
- 'Lower'
- 'Raise boom' or 'boom up'
- 'Lower boom' or 'boom down'
- 'Extend boom' or 'telescope out'
- 'Retract boom' or 'telescope in'
- 'Raise boom and lower the load' or 'boom up and lower the load'
- 'Lower boom and raise the load' or 'boom down and raise the load' or 'boom down and hoist the load'
- 'Swing right'
- 'Swing left'
- 'Trolley in'
- 'Trolley out'
- 'Use main hoist'
- 'Use whipline' or 'use auxiliary hoist'
- 'Stop'

Examples of **UNACCEPTABLE** voice signal functions:

- 'Up on the load'
- 'Hoist down'
- 'Move the load'
- 'Hold the load'
- 'Load up'
- 'Load down'

NOTE: Some voice signal functions inherently give a direction as well (i.e. hoist, lower, raise boom, lower boom). For those that are simply a function, be sure to include a direction when initiating the function (i.e. swing RIGHT, trolley OUT).

Here are some examples of correct voice signals:

- Swing right 50 feet, 25 feet, 15 feet, 10 feet, 5 feet, 2 feet, swing stop
- Lower load 100 feet, 50 feet, 40 feet, 30 feet, 2 feet, lower stop
- Hoist load slow, slow, keep hoisting, slow, hoist stop

When giving swing command, the signalperson will give directions from the operator's perspective.

When initiating a function, always give the approximate total distance.

- Swing right about fifty feet

When describing distance, give the distance remaining, not the distance traveled.

- Lower 50 feet, 40 feet, keep lowering 30 feet, 20 feet, 10 feet 5 feet, 3, 2, 1, lower stop

Let the operator know when he is close to the spot that he is to stop.

- …about three feet, two feet, one foot, swing stop

Once the task has begun the signalperson should never break communication with the operator – this is referred to as maintaining "constant communication".

Never unkey the microphone while the load is moving. The signalperson should maintain constant communication to let operator know everything is all right.

- slowly down, slow, slow, slow…

If signalperson breaks communications, the operator should stop immediately. The operator will then acknowledge the signalperson by name and will continue only when signalperson regains constant communication.

If the operator sees something and needs to communicate with the signalperson, the operator will stop and give one blast of the horn to alert the signalperson. The signalperson will break constant communication and the operator will notify the signalperson of the problem.

It is helpful for the signalperson to give a detailed ongoing description of the parts of the lift that the operator cannot see (i.e. operating 'in the blind'). The goal is to 'paint a picture' for the operator in these situations.

NATIONAL COMMISSION FOR THE CERTIFICATION OF CRANE OPERATORS

2750 Prosperity Avenue, Suite 505
Fairfax, VA 22031 - 4312

Phone: 703-560-2391
Fax: 703-560-2392
info@nccco.org