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15.0 PERSONNEL LIFTING

15.1 SCOPE

This chapter specifies the operation, testing, and inspection requirements for the use of personnel lift platforms suspended from mobile cranes.

15.2 DEFINITIONS

The following definitions are relevant to this Chapter. For other definitions see Appendix A.

competent person--a person who by professional standing, extensive knowledge, training and experience, has successfully demonstrated the ability to solve problems relating to the subject matter or work and has authorization to have hazards corrected.

ground crew--qualified riggers, ground-based signal person, and supervision.

hand rail--a member supported on brackets inside the platform to furnish support to platform occupants.

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 the top rail.

live boom--a boom whose lowering is controlled by a brake without the aid of other lowering retarding devices. A live boom is free fall capable, thus prohibited from lifting personnel.

live load line--a load line whose lowering is controlled by a brake without the aid of other lowering retarding devices. A live load line is free fall capable, thus prohibited from lifting personnel.

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

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.

shackle, safety type--a bolt-type anchor shackle, with cotter pin, meeting the requirements of Federal Specification RR-C-271D, Type IV A, Grade B, Class 3, or better.

suspension system--the wire rope or chain slings and other components, including fastening devices, used to connect the hoisting equipment to the personnel platform.

toe board--a vertical barrier at floor level, along the edges of a platform, to protect against material falling over the edge.

top rail--the top member of a barrier along the edges of a platform to protect personnel from falling from the platform.

15.3 GENERAL

Cranes are designed and intended for handling materials, not personnel. Personnel suspended from cranes shall be in a personnel platform. Riding the load, headache ball, hook, etc., is strictly prohibited. The use of boom attached personnel platforms at Hanford requires the prior approval of the RL H&R Program Manager. This chapter does not address boom attached personnel platforms.

A crane shall not be used for other purposes while handling personnel.

CAUTION: Lifting and lowering personnel with a crane shall be undertaken only in circumstances when it is not possible to accomplish the task by less hazardous means. A crane suspended personnel platform shall be used only when conventional means of access is more hazardous or not possible due to structural design or work place conditions.

15.4 SPECIAL PROCEDURES

The following special procedures shall be followed when personnel are to be lifted:

CAUTION: Lifting personnel near electric power lines is an extremely hazardous practice. See Attachment 15.1.

- a. The Authorizing Manager shall attest to the need for the operation by completing a Personnel Lifting - Planning and Authorization form (see Attachment 15.2). After approval by the Authorizing Manager and the industrial safety representative, the form shall be retained at the job site until operations authorized by that form are completed.
- b. Personnel lifting shall be performed under the direction of a Personnel Lift Supervisor. The Personnel Lift Supervisor also will serve as the designated leader for the personnel lifting operation.
- c. The ground crew shall not engage in any practice or have any other duties that will reduce safety of the personnel lift operation.
- d. One platform occupant shall be designated as the platform signal person. If circumstances dictate, a ground crew signal person shall also be appointed. The platform signal person shall be responsible for communications with the operator or ground crew signal person. In situations where direct visual contact with the operator is not possible, and a ground crew signal person is not a reasonable option, direct communication, such as by radio, may be used.
- e. The Personnel Lift Supervisor and the crane operator shall determine that:
 1. A firm footing exists under both crawler tracks or under each outrigger float. Cribbing mats under tracks or blocks under outrigger floats are used as necessary to provide a firm and substantial footing.
 2. Crane systems, controls, operator aids, and safety devices are activated and functioning properly
 3. No interferences exist.
 4. Configurations necessary to reach work locations will allow the crane to remain at no more than 50 percent of rated capacity at the maximum expected radius.

5. Cranes equipped with outriggers shall have outriggers extended in accordance with the manufacturer's instructions.
- f. Each shift, before personnel initially enter the platform, the operator and signaler shall conduct a trial lift with the unoccupied personnel platform loaded with at least the anticipated lift weight. The trial lift shall be made from the location where personnel will enter the platform to each location where the platform will be hoisted and positioned. After the trial lift, a Personnel Lift Platform Pre-Lift Inspection form (see Attachment 15.3) shall be completed and signed by the Personnel Lift Supervisor. The completed form(s) shall be retained at the job site with the Personnel Lifting--Planning and Authorization form.
 1. Materials and tools to be used during the actual lift, if secured to prevent displacement, may be in the platform for the trial lift.
 2. It is acceptable to perform a single trial lift on each shift for all locations to be reached from a single setup position.
- g. The trial lift shall be repeated each shift before hoisting personnel.
- h. The trial lift shall be repeated whenever:
 1. The crane is moved and set up in a new location,
 2. The crane is returned to a previously used location,
 3. When the lift route is changed, unless the operator determines that the route change would not affect the safety of hoisted personnel, or
 4. If a different crane operator is assigned.
- i. A meeting attended by the operator, the ground crew, signaler(s), person(s) to be lifted, and the Personnel Lift Supervisor shall be held each shift to plan and review procedures to be followed, including:
 1. Points at which persons will enter and leave the platform
 2. Procedures for entering and leaving the platform
 3. Special precautions if personnel will perform work from the suspended platform.
- j. The meeting shall be repeated when new or replacement personnel are assigned to the group.
- k. After the trial lift, and just before hoisting personnel, the platform shall be hoisted a few inches and inspected by a competent person to ensure that it is secure and properly balanced. Personnel shall not be hoisted unless the following conditions are determined to exist:
 1. No hazardous conditions exist with the platform and its associated rigging
 2. The hoist line is not wrapped around any part of the platform
 3. Hoist ropes are free of kinks
 4. Multiple-part lines are not twisted around each other

5. The primary attachment is centered over the platform
 6. Ropes are properly seated on drums and sheaves
 7. The crane is within 1 percent of level
 8. The crane has an anti two-block device installed and operational.
- l. Communication between the operator, signaler, and person(s) being lifted shall be maintained.
 - m. The crane shall be operated so that lowering motion will be power-controlled lowering (no free-fall). Live booms and live load lines are prohibited.
 - n. When welding is done by personnel from the platform, the electrode holders shall be protected from contact with metal components of the personnel platform.
 - o. Each person in the personnel platform shall wear a full body harness with lanyards attached to designated anchor point(s) in the platform. Lanyards shall remain attached to the anchorage point(s) unless special circumstance work requirements dictate otherwise. Additional provisions apply when working over or near water where the danger of drowning exists, see 29 CFR 1926.106.
 - p. The operator shall remain at the controls, with the engine running, when the personnel platform is occupied.
 - q. Whenever the operator has any doubt as to the safety of the lift, the operator shall consult with the Personnel Lift Supervisor before commencing or continuing the lift.
 - r. Movement of the personnel platform shall be done in a slow, controlled, cautious manner with no sudden movements of the crane or platform. With personnel in the platform, the lifting or lowering speed shall not exceed 100 feet per minute (0.5 meter per second).
 - s. Cranes shall not travel while personnel are in the platform.
 - t. Suspended personnel platforms shall be used only for personnel, their tools, and sufficient materials to do their work. They shall not be used for transporting bulk materials.
 - u. Personnel platform suspension system sling assemblies shall not be used for other purposes.
 - v. Personnel shall keep all parts of the body inside the suspended personnel platform during raising, lowering, and positioning to avoid pinch points. This provision does not apply to a platform occupant performing the signaler duties. Personnel shall not stand on or work from the top rail, mid-rail, or toe board of the suspended personnel platform.
 - w. If the personnel platform cannot be landed, it should be tied to the structure before personnel get off or on. Exceptions to this provision require prior approval of the Personnel Lift Supervisor, as documented on the Personnel Lifting--Planning and Authorization form.
 - x. Personnel platforms shall not be used in winds in excess of 20 mph (32 km/hr), and should not be used in winds in excess of 15 mph (25 km/h). Do not use platforms in electrical storms, snow, ice, sleet, or other adverse weather conditions that could affect the safety of personnel.

- y. Use tag lines to control motion of occupied suspended personnel platforms unless their use creates an unsafe condition.
- z. Brakes and locks on the crane shall be set before any work is performed from the platform.

15.5 PLATFORM DESIGN AND CONSTRUCTION

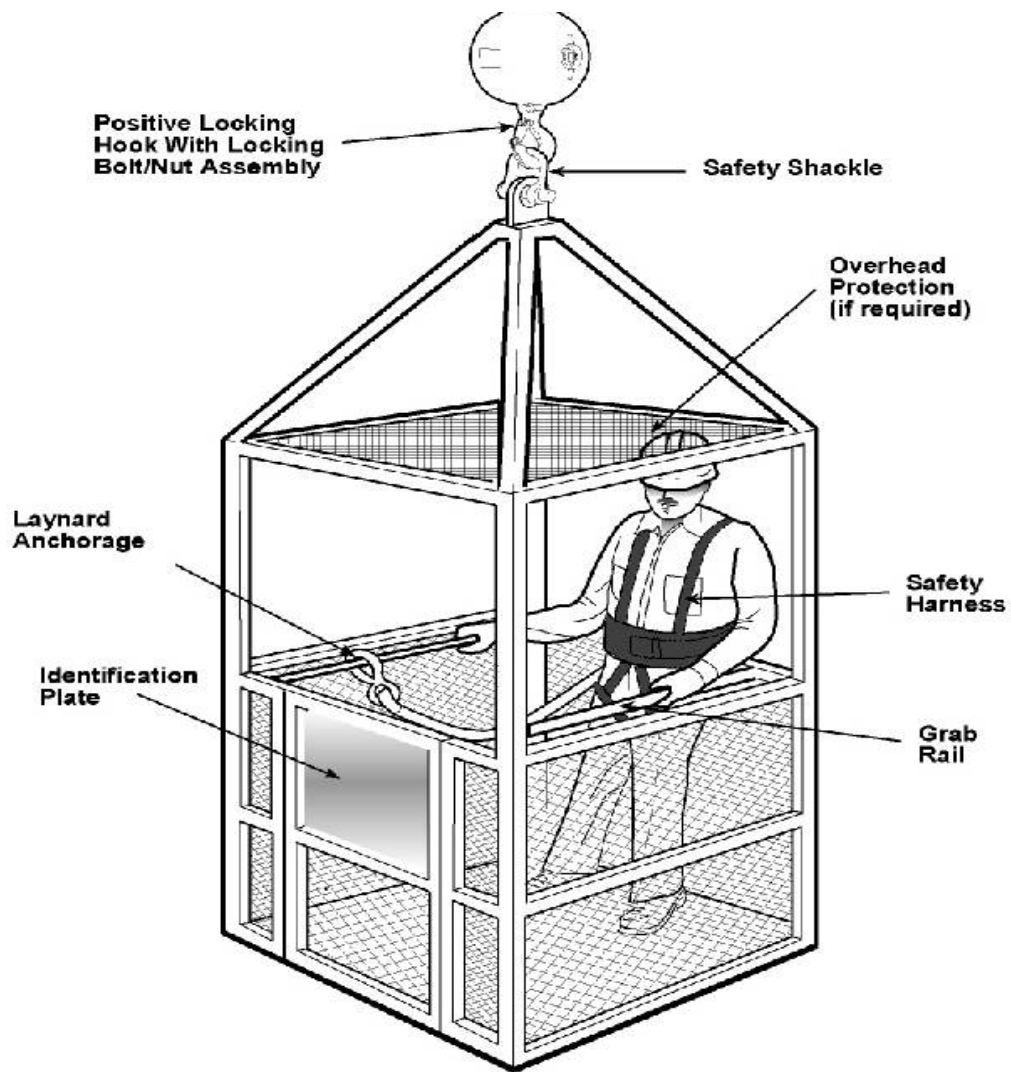
See Figures 15-1 and 15-2 for examples of personnel platforms, and Figure 15-3 for examples of positive locking hooks.

There is no attempt to comprehensively address platform design and construction in this Manual.¹ Nevertheless, because many platform design and construction features can be observed and should be known by the platform user, the following key design and construction requirements are presented:

- a. The personnel platform and suspension system shall be designed by a qualified engineer competent in structural design and familiar with national consensus standards governing personnel platform design.
- b. The personnel platform shall have a minimum design factor of five.
- c. Synthetic webbing, natural or synthetic fiber rope slings shall not be used for suspension systems.
- d. Wire rope sling and chain sling suspension systems shall have each leg of the system permanently marked with the rated load of the leg.
- e. Chain sling suspension systems shall use a minimum of grade 80 chain.
- f. Shackles used in any part of the suspension system shall be a safety type (bolt-type shackle with nut and cotter pin).
- g. Sling suspension systems shall utilize a master link. The master link shall not be used for other purposes. The master link shall be permanently marked with the suspension system's rated load and with identification as a personnel platform lifting suspension component.
- h. The design factor for the suspension system shall be:
 - 1. For one-leg system - design factor of seven
 - 2. For two or three-leg system - design factor of five on each leg
 - 3. For four-leg system - design factor of five on each leg with only three legs assumed to be carrying the load.

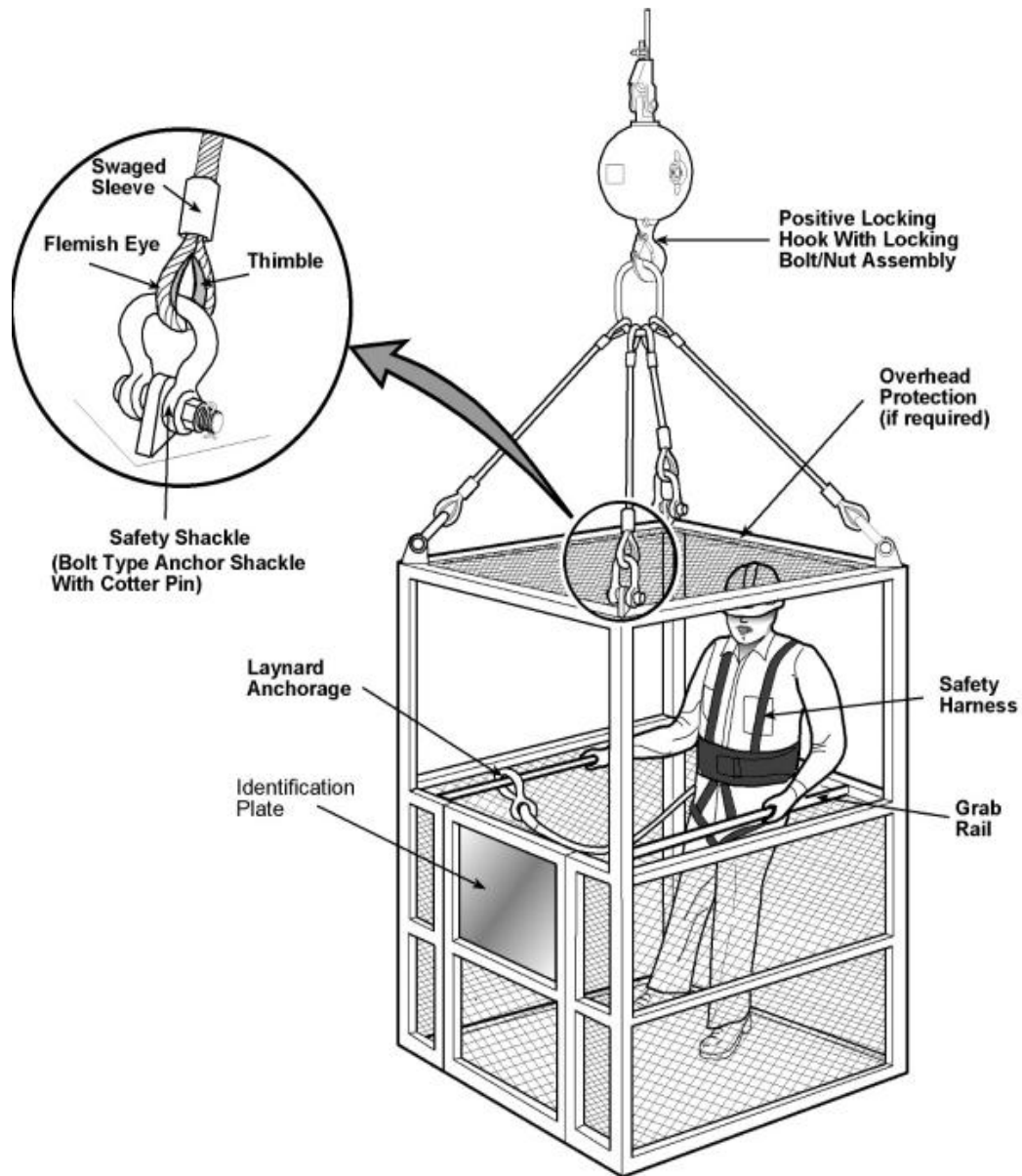
¹The following documents should be reviewed by those needing additional platform design and construction information: ASME B30.5-3.2.2, *Personnel Lifting*; ANSI 10.28, *Safety Requirements for Work Platforms Suspended From Cranes or Derricks for Construction and Demolition Operations*.

Figure 15-1. Typical Personnel Platform without Sling Suspension.



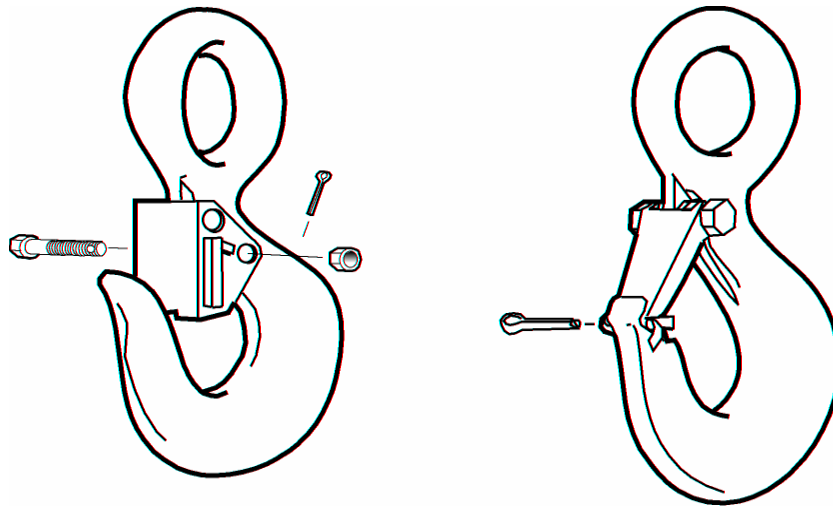
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Figure 15-2. Typical Personnel Platform with Sling Suspension.



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Figure 15-3 Positive Locking Hooks



Two Types of Positive Locking Hooks

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- i. Wire rope suspension systems with mechanically spliced Flemish eyes shall have thimbles in each sling eye.
- j. Wire rope clips, wedge sockets, or knots shall not be used in suspension system sling assemblies.
- k. Slings (wire rope or chain) shall receive an initial load test before installation by applying a test load to each individual leg equal to twice the rated load of the leg. If a master link is used in the suspension system, it shall be tested to at least twice the weight of the platform plus the platform rating. Load tests shall be conducted by the platform manufacturer, the platform assembler, or a qualified person.
- l. The platform suspension system attaching points shall be subjected to non-destructive testing by the platform manufacturer.
- m. The personnel platform shall have an identification plate that displays, as a minimum, the following information:
 1. Manufacturer name and address
 2. Platform rating in terms of weight and number of occupants
 3. Platform identification number
 4. Suspension system description

5. Weight of empty platform, including suspension system
 6. Date of manufacturer
 7. Listing of unique operational environments, if any, for which the platform is designed.
- n. The personnel platform shall have guard rail protection consisting of a top rail, intermediate rail, toe board, and lower barrier spanning the distance between the toe board and intermediate rail.
 - o. A hand rail (grab rail) shall be provided inside the personnel platform to minimize hand exposure. Hand railings shall be provided around the entire platform with the exception of any access gates or doors.
 - p. Anchorage points within the platform shall be provided for attaching personnel fall protection lanyards.
 - q. Platform access gates, including sliding or folding types, if installed, shall have a positive acting device to restrain the gate from accidental opening. Swinging type access gates shall not swing outward while the platform is suspended.
 - r. In addition to wearing hard hats, personnel shall be protected by overhead protection on the personnel platform when there is an overhead hazard.
 - s. The personnel platform shall be easily identifiable by high-visibility color or marking.
 - t. The personnel platform suspension system shall be attached to the crane load line by means such as a safety type shackle, a positive locking hook (see Figure 15-3), or a wedge and socket. Wedge and socket rope end connections shall have the dead end of the rope properly secured (see Chapter 14, Figure 14-4).

15.6 PLATFORM TESTING PROGRAM

In addition to the trial lift and inspection required at each shift, the following proof testing program is required:

- a. At least annually and at each new job site, before personnel are hoisted, the platform and suspension system shall be proof tested to 125% of the personnel platform's rated capacity. The proof test shall be documented.
- b. The test load shall be held in a suspended position for 5 minutes with the load suitably distributed. At the option of the Personnel Lift Supervisor, annual proof testing may be done concurrently with the trial lift. After proof testing, any deficiencies revealed during the inspection shall be corrected and another proof test shall be conducted. Any modifications or structural repair to a personnel platform or rigging shall require retesting to 150% of the platform and suspension system.

NOTE: Personnel platforms often have custom proof test loads supplied by the platform manufacturer. Manufacturers may have load test values greater than the minimum values stated in 15.6.a & b.

15.7 PLATFORM MAINTENANCE

- a. A preventative maintenance program based on recommendations from the platform manufacturer should be established and implemented by the platform owner or custodian.
- b. Replacement parts shall be equal to or exceed the original specifications.
- c. Any hazard disclosed by any inspection shall be corrected before using the platform.
- d. Welding repairs shall be done by a qualified welder using qualified welding procedures.
- e. Adjustments or repair to the platform or the platform suspension system shall be done by qualified persons.
- f. Only modifications approved in writing by the manufacturer shall be accomplished.
- g. The platform owner or custodian shall maintain records on any repairs, replacements, or modifications to structural components of the platform.

15.8 HOISTING EQUIPMENT

- a. Before beginning personnel lifting operations, verify that crane inspections are current.
- b. Information provided by the crane manufacturer shall be consulted for specific or more stringent maintenance instructions concerning personnel lifting.
- c. As a minimum, the crane shall be maintained and inspected as required by Chapter 14 of this Manual.
- d. Cranes with live boom or live load line shall have these capabilities removed for the period of personnel lifting.
- e. The crane shall have an anti two-block device. (A two-block warning device does not meet this requirement.)
- f. The crane shall have a boom angle indicator readily visible to the operator.
- g. The crane shall have automatic brakes such that when the controls are released the motions are brought to rest.
- h. Hydraulic cranes shall have check valves or other device that will prevent uncontrolled movement in the event of system failure, engine failure, or hose rupture.
- i. The cranes shall have a means to prevent retraction of hydraulically or pneumatically activated outriggers or stabilizers in the event a hydraulic or pneumatic line fails.
- j. Pendent supported, jib type, boom extensions without positive stops are prohibited for personnel lifting.
- k. Hooks used for attaching a personnel platform shall be of the type with a positive locking device that will prevent the platform connection or bridle from being dislodged. (See Figure 15-3).

ATTACHMENT 15-1. LIFTING PERSONNEL NEAR ELECTRIC POWER LINES.**A15-1.1 MANDATORY WHEN NEAR POWER LINES**

When lifting personnel near electric power lines, it is advisable to perform the lift so there is no possibility of the crane, load line, or personnel platform becoming a conductive path. Cranes shall not lift personnel under electric power lines if any combination of boom, personnel platform, load line, or machine component will enter the prohibited zone shown in Chapter 14, Table 14-1. Lifting personnel near electric power lines is not allowed unless there is no less hazardous way to do the job.

The following conditions must be considered when lifting personnel near electric power lines:

Condition A--Power lines are de-energized and grounded. (The safest and preferred condition.)

Condition B--Power lines are energized with the equipment outside the prohibited zone but working within a fully extended boom length of the prohibited zone. **Regardless of whether the boom will be fully extended, the fully extended boom length must be considered.**

Condition C--Power lines are energized with the equipment inside the prohibited zone. **Lifting personnel in this condition is strictly prohibited.**

A15-1.2 CONDITION A

Condition A is the preferred condition under which to perform a personnel lift. The following steps shall be taken when lifting personnel in Condition A:

- a. The electric utility organization shall de-energize the power lines.
- b. As a minimum, the power lines shall be visibly grounded to avoid the possibility of electrical feedback.
- c. Before lifting personnel, a qualified representative from the electric utility organization shall be on site to verify that the power lines are de-energized and grounded.
- d. In addition to Electrical Hazard Warning Signs on the crane required by paragraph 14.6.6.5, Electrical Hazard Warning Signs shall also be posted inside the personnel platform.
- e. Proximity warning devices, insulated links or boom cages, if used, shall not be a substitute for any requirements of this section.

A15-1.3 CONDITION B

The following steps shall be taken when lifting personnel in Condition B:

- a. A meeting, on the job site, between the Personnel Lift Authorizing Manager, the Lifting Supervisor, and a qualified representative of the electrical utility shall take place. Procedures to safely complete the lift shall be established.
- b. The clearance specified in Chapter 14, Table 14-1 shall be maintained.
- c. Power line movements, horizontal and vertical, caused by wind shall be considered.

- d. The required clearances to the power lines shall be continuously monitored by a signal person, whose sole responsibility is to maintain proper clearance. The signal person shall be in constant communication with the crane operator.
- e. Tag lines to the personnel platform, when used, shall be of a nonconductive type, such as dry rope made of polypropylene or polyethylene fiber.
- f. No person outside the platform or crane cab shall be permitted to touch the crane, load line or platform unless the signal person indicates it is safe.
- g. Operation of the boom or the platform over power lines should be avoided. Poor perception of distance and multiple potential contact points make this very hazardous.
- h. Consider attaching ribbons, balls, or other visibility enhancing devices, to the power line to aid in visually locating the prohibited zone.
- i. In addition to Electrical Hazard Warning Signs on the crane required by paragraph 14.6.6.5, Electrical Hazard Warning Signs shall also be posted inside the personnel platform.
- j. Proximity warning devices, insulated links or boom cages, if used, shall not be a substitute for any requirements of this section.

A15-1.4 CONDITION C

Lifting personnel with any part of the equipment or platform in the prohibited zone (Chapter 14, Table 14-1) is strictly prohibited.

Attachment 15-2. PERSONNEL LIFTING -PLANNING AND AUTHORIZATION FORM

(Exact form and content not mandatory)

- 1. Location _____ Date: ___/___/_____
- 2. Purpose of Lift: _____

- 3. Hoisting Equipment Manufacturer: _____
Model Number: _____
Serial Number: _____
- 4. Expected Radius: _____ (Maximum)
_____ (at Work Location)
- 5. A) Rated Load at Maximum Radius: _____
B) Maximum Lifted Load (50% of 5.A): _____
- 6. A) Platform Identification: _____
B) Platform Rating: _____
- 7. Platform Weight: _____
- 8. A) Number of Platform Occupants: _____
B) Approximate Weight (With Equip.): _____
- 9. Total Lift Weight: _____ (7 + 8B) (No More than 5B Above)
- 10. Personnel Lift Supervisor: _____
- 11. What are the alternatives to this personnel lift? _____

- 12. Why are the alternatives not being used? _____

- 13. Pre-Lift Briefing Held: ___/___/_____ AM / PM
Attendees: _____

- 14. Anticipated Hazards (Wind, Weather, Visibility, Power Lines): _____

- 15. Lift Accomplished Date: _____ Time: _____
- 16. Remarks: _____

_____/_____/_____
 Personnel Lift Authorizing Manager Date Industrial Safety Representative Date

Attachment 15-3.PERSONNEL LIFT - PLATFORM PRE-LIFT INSPECTION

(Exact form and content not mandatory)

Inspector: _____

Date: _____

Platform ID: _____

	SAT	UNSAT
1. Trial Lift Completed with anticipated lift weight _____ (lb or kg)	{ }	{ }
2. Markings (All Information Legible)		
Platform	{ }	{ }
Suspension System	{ }	{ }
3. Structure		
Load Supporting Welds/Bolts	{ }	{ }
Load Supporting Members	{ }	{ }
Barrier From Toe Board to Intermediate Rail	{ }	{ }
Hand Rail	{ }	{ }
Fall Protection Device Anchorage Points	{ }	{ }
Gate Locking Mechanisms	{ }	{ }
Platform Flooring	{ }	{ }
Suspension Attachment Points	{ }	{ }
4. Attachment Mechanisms		
Pins/Ears/Bolt-Up's/Eyes (Circle)	{ }	{ }
Wire Rope/Chain/Rigid Leg (Circle)	{ }	{ }
Master Links	{ }	{ }
5. Special Purpose Items (i.e., Overhead Protection, Flotation, Platform Controls)		
List: (1) _____	{ }	{ }
(2) _____	{ }	{ }
(3) _____	{ }	{ }

6. General Comments: _____

_____/_____
 Personnel Lift Supervisor Signature/Date