

**University of Illinois at Urbana-Champaign
Facilities & Services
Division of Safety and Compliance**

Fall Protection Program Manual

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CONTENTS

PURPOSE4

POLICY.....4

SCOPE AND APPLICATION4

RESPONSIBILITIES4

DEFINITIONS5

FALL PROTECTION SYSTEMS7

 GUARDRAIL SYSTEM7

 SAFETY NET SYSTEMS8

 PERSONAL FALL ARREST SYSTEMS8

 POSITIONING DEVICE SYSTEMS9

 WARNING LINE SYSTEMS9

 CONTROLLED ACCESS ZONES10

 SAFETY MONITORING SYSTEMS11

 FALL PROTECTION PLAN11

 COVERS11

GENERAL FALL PROTECTION REQUIREMENTS12

 WALKING/WORKING SURFACES12

 HOIST AREAS12

 HOLES12

 FORMWORK AND REINFORCING STEEL12

 EXCAVATIONS12

 OVERHAND BRICKLAYING AND RELATED WORK12

 ROOFING WORK ON LOW SLOPED ROOFS13

 WORK ON STEEP SLOPE ROOFS13

 PRECAST CONCRETE ERECTION13

 RESIDENTIAL CONSTRUCTION13

 WALL OPENINGS13

PROTECTION FROM OVERHEAD HAZARDS14

TRAINING.....14

SCAFFOLDING16

 SCAFFOLD REQUIREMENTS16

 SCAFFOLD TRAINING17

VEHICLE-MOUNTED ELEVATING AND ROTATING WORK PLATFORMS17

 GENERAL17

 ELEVATING AND ROTATING PLATFORM TRAINING18

STAIRWAYS AND LADDERS19

 GENERAL REQUIREMENTS19

 STAIRWAYS19

 LADDERS20

 LADDER AND STAIRWAY TRAINING24

APPENDIX A25

GUARDRAIL SYSTEMS 25

APPENDIX B..... 26

SAFETY NET SYSTEMS..... 26

APPENDIX C..... 27

PERSONAL FALL ARREST SYSTEMS 27

APPENDIX D..... 29

SCAFFOLDS – 29 CFR 1910.28 STANDARDS 29

PURPOSE

The University of Illinois at Urbana-Champaign (UIUC), through the Division of Safety and Compliance (S&C), has established this Fall Protection Program to prevent injuries to employees relating to falls from elevated work surfaces, and to assure compliance with State and Federal Regulations governing such work (Occupational Safety and Health Administration (OSHA) Regulations located in 29 CFR 1910 and 1926).

Work involving elevated surfaces can include activities as simple as changing a light bulb or as difficult as painting a chimney. At greater heights, as in construction or utility work, fall protection is mandatory under most safety regulations.

POLICY

It is the policy of the UIUC to protect employees from fall hazards. This is accomplished in so far as possible with effective engineering controls, employee training, and administrative controls. In cases where these controls are not adequate, employees must be provided with fall protection to eliminate the potential for an employee to be injured by a fall.

SCOPE AND APPLICATION

The provisions of this fall protection program shall apply to all employees who are exposed to falls in the course of their employment. Specific requirements for fall protection are based on the type of work performed and length of fall the employee is exposed to.

RESPONSIBILITIES

The division of responsibilities regarding general health and safety is outlined in the Campus Administrative Manual (CAM) Section V-B, Environmental Health and Safety, Parts 1.0 through 1.4. In addition, to those requirements the following shall be met:

The Division of Safety and Compliance shall be responsible for:

- A. Providing technical assistance to campus units on the purchase of appropriate fall protection equipment.
- B. Assisting campus units in providing appropriate fall protection training to affected employees.
- C. Assisting campus units in the selection and design of systems to be used for elevated work situations.
- D. Performing spot inspections of elevated work sites in order to insure compliance with this program.
- E. Disseminating information to campus units concerning changes in this program and/or new regulatory requirements concerning fall protection.
- F. Evaluating and updating the Fall Protection Program at least annually.

Deans, Directors and Heads of Academic and Administrative Units shall be responsible for:

- A. Determining which employees are covered by this Fall Protection Program.
- B. Determining which types of training and equipment are needed in order to comply with this program.
- C. Making budget arrangements for the purchase of needed equipment.

Faculty and staff in charge of supervising employees covered by this program are responsible for:

- A. Providing training to employees in accordance with this program.
- B. Documenting training in writing and maintaining training records.
- C. Requesting assistance as needed from the Division of Environmental Health and Safety.
- D. Enforcing all provisions of the required Fall Protection Program.
- E. Inspecting work sites involving elevated work.
- F. Requesting funds as needed in order to comply with this program.

Employees shall be responsible for:

- A. Complying with all mandated health and safety requirements.
- B. Reporting unsafe conditions to supervision.
- C. Using all prescribed fall protection equipment.
- D. Reporting all job related injuries and illnesses immediately to supervision.

DEFINITIONS

Body belt (safety belt) means a strap with means for securing it about the waist and for attaching it to a lanyard, lifeline or deceleration device.

Body harness (safety harness) means straps which may be secured about the employee in a manner that will distribute the fall arrest forces over at least the thighs, pelvis, waist, chest and shoulders with means for attaching it to other components of a personal fall arrest system.

Connector means a device which is used to couple (connect) parts of the personal fall arrest system and positioning device systems together. It may be an independent component of the system, such as a carabiner, or it may be an integral component of part of the system (such as a buckle or D-ring sewn into a body belt or body harness, or a snap-hook spliced or sewn to a lanyard or self-retracting lanyard).

Dangerous equipment means equipment (such as pickling or galvanizing tanks, degreasing units, machinery, electrical equipment, and other units) which, as a result of form or function, may be hazardous to employees who fall onto or into such equipment.

Deceleration device means any mechanism, such as a rope grab, rip-stitch lanyard, specially-woven lanyard, tearing or deforming lanyards, automatic self-retracting lifeline/lanyards etc., which serves to dissipate a substantial amount of energy during a fall arrest, or otherwise limit the energy imposed on an employee during fall arrest.

Equivalent means alternative designs, materials, or methods to protect against a hazard which the employer can demonstrate will provide an equal or greater degree of safety for employees than the methods, materials, or designs specified in the standard.

Free fall means the act of falling before a personal fall arrest system begins to apply force to arrest the fall.

Guardrail system means a barrier erected to prevent employees from falling to lower levels.

Hole means a gap or void 2 inches or more in its least dimension, in a floor, roof, or other walking/working surface.

Infeasible means that it is impossible to perform the construction work using a conventional fall protection system (i.e., guardrail system, safety net system, or personal fall arrest system) or that it is technologically impossible to use any one of these systems to provide fall protection.

Lanyard means a flexible line of rope, wire rope or strap which generally has a connector at each end for connecting the body belt or body harness to a deceleration device, lifeline or anchorage.

Leading edge means the edge of a floor, roof or formwork for a floor or other walking/working surface (such as the deck) which changes location as additional floor, roof, decking, or formwork section are placed, formed, or constructed. A leading edge is considered to be an “unprotected side and edge” during when it is not actively and continuously under construction.

Lifeline means a component consisting of a flexible line for connection to an anchorage at one end to hang vertically (vertical lifeline), or for connection to anchorages at both ends to stretch horizontally (horizontal lifeline), and which serves as a means for connecting other components of a personal fall arrest system to the anchorage.

Lower level means those areas or surfaces to which an employee can fall without danger of falling farther. Such areas or surfaces include, but are not limited to, ground levels, floors, platforms, ramps, runways, excavations, pits, tanks, material, water, equipment, structures, or portions thereof.

Opening means a gap or void 30 inches or more high and 18 inches or more wide in a wall or partition through which an employee can fall to a lower level.

Personal arrest system means a system used to arrest an employee in a fall from working level. It consists of an anchorage, connectors, a body belt, or body harness, and may include a lanyard, deceleration device, lifeline, or suitable combinations of these. Use of a body belt for fall arrest is prohibited.

Rope grab means a deceleration device which travels on a lifeline and automatically, by friction, engages the lifeline and locks so as to arrest the fall of an employee. A rope grab usually employs the principal of inertial locking, cam/level locking, or both.

Roof means an exterior surface on the top of a building. This does not include floors or formwork which, because a building has not been completed, temporarily become the top surface of a building.

Roofing work means hoisting, storage, application, and removal of roofing materials and equipment, including related insulation, sheet metal, and vapor barrier work, but not including the construction of the roof deck.

Safety-monitoring system means a safety system in which a competent person is responsible for recognizing and warning employees of fall hazards.

Self-retracting lifeline/lanyard means a deceleration device containing a drum-wound line which can be slowly extracted from, or retracted onto, the drum under slight tension during normal employee movement, and which, after onset of a fall, automatically locks the drum and arrests the fall.

Snap-hook means a connector comprised of a hook-shaped member with a normally closed keeper, or similar arrangement, which may be opened to permit the hook to receive an object and, when released, automatically closes to retain the object. Snap-hooks are generally one of two types:

- A. The locking type with a self-closing, self-locking keeper which remains closed and locked until unlocked and pressed open for connection or disconnection; or
- B. The non-locking type with a self-closing keeper which remains closed until pressed open for connection or disconnection. Use of a non-locking snap-hook as part of personal fall arrest systems and positioning device systems is prohibited.

Steep roof means a roof having a slope greater than 4 in 12 (vertical to horizontal).

Toe-board means a low protective barrier that will prevent the fall of materials and equipment to lower levels and provide protection from falls for personnel.

Unprotected sides and edges means any side or edge (except at entrances to points of access) of a walking/working surface, e.g., floor, roof, or ramp runway where there is no wall or guardrail system at least 39 inches high.

Walking/working surface means any surface, whether horizontal or vertical on which an employee walks or works, including, but not limited to floors, roofs, ramps, bridges, runways, formwork and concrete reinforcing steel but not including ladders, vehicles, or trailers, on which employees must be located in order to perform their job duties.

Warning line system means a barrier erected on a roof to warn employees that they are approaching an unprotected roof side or edge, and which designates an area in which roofing work may take place without the use of guardrail, body belt, or safety net systems to protect employees in the area.

Work area means that portion of a walking/working surface where job duties are being performed.

FALL PROTECTION SYSTEMS

Where required by this program, fall arrest systems shall be one or more of the following types:

Guardrail System

Guardrail systems shall meet the following requirements (see **APPENDIX A**):

- A. The surface of the guardrail system shall not create puncture or laceration hazards.
- B. The ends of the top rail shall not overhang to the extent that they create a physical projection hazard.
- C. Steel and plastic banding may not be used to secure the top rail of the system.
- D. When rope (wire, synthetic, manila, plastic, etc.) is used as the top rail of the system it shall be demarked with highly visible flags at 6 foot intervals.

- E. Manila, plastic, or synthetic rope used as the top rail of the system must be inspected on a routine basis and replaced as necessary.
- F. Guardrail systems used to protect holes shall extend around all open sides.
- G. Access-ways to the holes shall be protected by a gate or chain system, or shall be offset.
- H. When necessary, up to two sides of the guardrail may be removed for lowering or raising materials. When the hole is not in use the guardrail system shall be put back in place.

Safety Net Systems

Safety net systems shall meet the following requirements (see **APPENDIX B**):

- A. The safety net(s) shall be installed as close to the underside of the working surface as possible, but in no case shall they be lower than 30 feet below that surface.
- B. Safety nets shall be inspected weekly for wear, damage, and other deterioration. Defective nets shall be taken out of service.
- C. All foreign materials which fall into the net shall be removed as soon as possible.

Personal fall arrest systems

Personal fall arrest systems shall meet the following requirements (see **APPENDIX C**):

- A. Body belts, body harnesses, lanyards, connectors, dee-rings, snaphooks, lifelines, and anchorage points shall meet the strength and design specifications outlined in **APPENDIX C**.
- B. All components used in a fall arrest system shall be compatible with one another.
- C. Snap-hooks may not be connected as follows unless they are the locking type and are designed for this type of installation:
 - 1. Directly to webbing, rope, or wire;
 - 2. To each other;
 - 3. To a D-ring to which another snap-hook or other connector is attached; or
 - 4. To any object which is incompatibly shaped or dimensioned in relation to the snap-hook such that unintentional disengagement could occur by the connected object being able to depress the snap-hook keeper and release itself.
- D. Connectors used for attachment with horizontal lifelines and/or vertical lifelines shall be capable of locking in both directions.
- E. When vertical lifelines are used, each employee shall be attached to a separate lifeline.
(Exception: during the construction of elevator shafts, two employees may be attached to the same lifeline in the hoist-way while working atop a false car that is equipped with a guardrail system. The strength of the lifeline must be 10,000 pounds).
- F. Lifelines must be protected against being cut or abraded.
- G. Personal fall arrest systems subjected to impact loading shall be taken out of service immediately and not used again until recertified for use by the manufacturer.
- H. The employer shall provide for prompt rescue of employees in the event of a fall, or assure that employees are able to perform self-rescue.
- I. Personal fall arrest systems shall be inspected by the user prior to each use.
- J. Personal fall arrest systems shall be attached to anchorage points as outlined in **APPENDIX C**.
- K. Personal fall arrest systems should limit the movement of the employee to that necessary to complete the work.
- L. Horizontal lifelines shall be designed, installed, and used only under the supervision of a qualified person.

M. Body belts, harnesses, and components shall be used only for employee protection and not for hoisting of materials.

Positioning Device Systems

Positioning device systems shall be rigged such that an employee cannot free fall more than 2 feet.

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

Snap-hooks shall be sized to be compatible with the member to which they are connected to prevent unintentional disengagement of the snap-hook by depressing the snap-hook keeper by the connected member, or shall be a locking type snap-hook designed and used to prevent disengagement of the snap-hook keeper by the connected member. Only locking type snap-hooks shall be used.

Unless a snap-hook is a locking type and designed for the following connections, they shall not be engaged in the following manner:

- A. Directly to webbing, rope or wire rope;
- B. To each other;
- C. To a D-ring to which another snap-hook or other connector is attached;
- D. To a horizontal lifeline; or
- E. To any object which is incompatibly shaped or dimensioned in relation to the snap-hook such that occur by the connected object being able to depress the snap-hook keeper and release itself.

Positioning device systems shall be inspected prior to each use for wear, damage, and other deterioration, and defective components shall be removed from service.

Body belts, harnesses, and components shall be used only for employee protection and not to hoist materials.

Warning Line Systems

Warning line systems and their use shall comply with all of the following requirements:

Warning lines shall be erected around all open sides as follows:

- A. When mechanical equipment is not being used, the warning line shall be erected not less than 6 feet from the roof edge.
- B. When mechanical equipment is used, the warning line system shall be at least 6 feet from the roof edge in the direction parallel to the travel of the machinery, and at least 10 feet from the roof edge in the direction perpendicular to travel of the machinery.
- C. Points of access, material handling areas, storage areas, and hoisting areas shall be connected to the work area by an access path formed by two warning lines.
- D. When the path to a point of access is not in use, a rope, wire, chain, or other barricade, equivalent in strength and height to the warning line, shall be placed across the path at the point where the path intersects the warning line erected around the work area, or the path shall be offset such that a person cannot walk directly into the work area.

Warning lines shall consist of the ropes, wires or chains, and supporting stanchions erected as follows:

- A. The warning line shall be flagged with a highly visible marker at intervals not to exceed 6 feet.
- B. The warning line shall be rigged and supported in such a way that the lowest point is no less than 34 inches above the walking surface and the highest point is no greater than 39 inches above the walking surface.
- C. After being erected to the warning line, stanchions shall be capable of resisting a force of at least 30 pounds applied horizontally 30 inches above the working surface.
- D. The warning line shall have a tensile strength of 500 pounds.

No employee shall be allowed in the area between a roof edge and a warning line unless the employee is performing roofing in that work area.

Controlled Access Zones

When controlled access zones are used to control access to areas in which leading edge work and other similar work is taking place the following requirements shall be met:

- A. The controlled access zone shall be defined by a control line defined by wires, ropes, tapes, or equivalent to restrict access.
- B. Control lines shall be erected not less than 6 feet nor more than 25 feet from the unprotected or leading edge.
(Exception: When erecting precast concrete members, the control lines shall be placed not less than 6 feet nor more than 60 feet or half the length of the member being erected, whichever is less, from the leading edge.)
- C. The control line shall run the entire length of the leading edge and shall be parallel to the leading edge.
- D. The control line shall be connected on each side to a guardrail system or wall.

When controlled access zones are used to control access where overhead bricklaying or related work is taking place the following requirements shall be met:

- A. The controlled access zone shall be defined by a control line erected not less than 10 feet nor more than 15 feet from the working edge.
- B. The control line shall extend for a distance sufficient to enclose all employees performing overhand bricklaying and related work at the working edge and shall be approximately parallel to the working edge. In addition, control lines shall be erected at each end.
- C. Only those employees involved in overhand bricklaying and related work shall be allowed inside the control area.
- D. Control lines shall consist of wires, ropes, tapes or equivalent materials and supporting stanchions.
- E. Each control line shall be marked with a highly visible flag at intervals not to exceed 6 feet.
- F. Each control line shall be rigged such that the lowest point is not less than 39 inches above the walking surface and the highest point is 45 inches above the walking surface.
- G. Each control line shall have a minimum breaking strength of 200 pounds.
- H. On floors and roofs where guardrail systems are not in place prior to the beginning of overhand bricklaying operations, controlled access zones shall be enlarged, as necessary, to enclose all points of access, material handling areas and storage areas.

On floors and roofs where guardrail systems are in place, but need to be removed to allow overhand bricklaying or leading edge work, only that portion of the guardrail system necessary to complete that days work shall be removed.

Safety Monitoring Systems

A competent person shall be designated by the employer to monitor the safety of other employees and shall comply with the following:

- A. Warn employees when it appears that the employee is unaware of a fall hazard or is acting in an unsafe manner; and
- B. Shall not have other responsibilities which could take the monitor's attention from the monitoring function.

The safety monitor shall be so located as to have complete visual sighting of affected employees and shall be close enough to communicate with said employees.

No employee other than an employee in roofing work on low sloped roofs or an employee covered by a fall protection plan designed in accordance with the **Fall Protection Plan** section (below) shall be allowed in an area where employees are protected by a safety monitoring system.

Each employee working in a controlled access zone, as described in the **Controlled Access Zones** section above, shall be directed to promptly comply with fall hazard warnings from the Safety Monitor.

Fall Protection Plan

Fall Protection Plans and their use shall comply with the following requirements. The options contained within this section are available only to employees involved in leading edge work, precast concrete erection work, or residential construction, and when it can be demonstrated that it is infeasible or it creates a greater hazard to use conventional fall protection equipment.

The Fall Protection Plan shall be prepared by a qualified person and developed for the specific site in which it is intended to be used. Changes to the plan shall also be approved by a qualified person.

A copy of the plan and all changes shall be maintained at the job site. The plan shall be implemented by a competent person. The plan shall include all of the following information:

- A. The reasons why conventional fall protection systems cannot be used.
- B. A written discussion of other steps being taken to reduce or eliminate fall hazards for employees not protected by a conventional fall protection system.
- C. The identity of all locations in which conventional fall protection cannot be used. In addition, each location shall be classified as a controlled access zone.
- D. A statement which provides the name or other identification of each employee who is designated to work in controlled access zones.
- E. Procedures for evaluation of the plan in the event of an actual accident or near miss.

The employer shall implement a Safety Monitoring System meeting the requirements of the **Safety Monitoring Systems** section above, or equivalent, as part of the Fall Protection Plan.

Covers

Covers used for holes in floors, roofs, and other walking/working surfaces shall meet the following requirements:

- A. Covers used in roadways and vehicular aisles shall be capable of supporting at least twice the maximum axle load of the largest vehicle expected to cross over the cover;
- B. All covers shall be secured in place; and
- C. All covers shall be color coded or marked with the word "HOLE" or "COVER."

GENERAL FALL PROTECTION REQUIREMENTS

Walking/Working Surfaces

Each employee on a walking/working surface which is 6 feet or more above the adjacent ground shall be protected from falling by the use of a guardrail system, safety net system, or personal fall arrest system.

(Exception: employees engaged in leading edge work and the employer can prove that providing fall protection is infeasible or creates a greater hazard shall have a fall protection plan.)

Each employee less than 6 feet above dangerous equipment shall be protected from falling onto the equipment by a guardrail system or equipment guarding.

Each employee 6 feet or higher above dangerous equipment shall be protected from the equipment by a guardrail system, personal fall arrest system or safety net system.

Hoist Areas

Each employee working in a hoist area which is 6 feet or more above a lower level shall be protected from falling by a guardrail system or personal fall protection system.

In cases where portions of a guardrail are removed from a hoist-way, exposed employees shall be protected by a personal fall arrest system. The guardrail must be replaced as soon as possible.

Holes

Employees on a walking/working surface shall be protected from falling in holes 6 feet or higher above the lower level by a guardrail system, personal fall protection system or hole cover.

Employees shall be prevented from tripping into or falling through holes by hole covers.

Formwork and Reinforcing Steel

Employees working on formwork or reinforcing steel which is 6 feet or more above the lower level shall be protected from falling by a safety net system, personal fall arrest system or positioning device system.

Excavations

Each employee at the edge of an excavation 6 feet or more in depth shall be protected from falling by a guardrail system, fence, barricades or cover.

Overhand Bricklaying and Related Work

Each employee performing overhand bricklaying and related work 6 feet or more above the ground shall be protected from falling by a guardrail system, safety net system, personal fall protection system or shall work in a controlled access zone.

When employees are required to reach 10 inches below the level of the working surface while performing overhand bricklaying work they shall be protected from falling by a guardrail system, safety net system or personal fall protection system.

No materials or equipment, except masonry, shall be placed within 4 feet of the edge and excess mortar, broken materials, and other waste items shall be removed from the edge on a regular basis.

Roofing Work on Low Sloped Roofs

Employees working on low-sloped roofs 6 feet or more above the adjacent ground shall be protected from falling by guardrail systems, safety net systems, personal fall arrest systems, or a combination warning line system and guardrail system, warning line system and safety net system, warning line system and personal fall arrest system, or warning line system and safety monitoring system.

When the roof level is 50 feet or less in width the use of a safety monitoring system alone is permitted.

Materials and equipment shall not be stored within 6 feet of the roof edge unless guardrails are erected at the edge. In addition, all materials placed on the roof shall be stacked or grouped in a stable self-supporting manner.

Work on Steep Slope Roofs

Employees working on steep roofs 6 or more feet above the adjacent ground shall be protected from falling by a guardrail system with toe-boards, a safety net system, or personal fall arrest system.

Materials and equipment shall not be stored within 6 feet of the roof edge unless guardrails are erected at the edge. In addition, all materials placed on the roof shall be stacked or grouped in a stable self-supporting manner.

Precast Concrete Erection

Employees involved in the erection of precast concrete members 6 feet or more above the adjacent ground shall be protected from falling by a personal fall arrest system, guardrail system, safety net system, or other equivalent fall protection. *(Exception: when the employer can demonstrate that providing one of these fall protection systems is infeasible or creates a greater hazard they shall implement a fall protection plan.)*

Residential Construction

Each employee engaged in residential construction 6 feet or more above the adjacent ground shall be protected from falling by a guardrail system, safety net system, or personal fall arrest system. *(Exception: when the employer can demonstrate that providing one of these fall protection systems is infeasible or creates a greater hazard, they shall implement a fall protection plan.)*

Wall Openings

Each employee working on, at or near a wall opening in which the outside edge of the wall opening is 6 feet or more above the adjacent ground and which the wall opening is less than 39 inches above the walking/working surface shall be protected from falling by a guardrail system, safety net system or personal fall arrest system.

PROTECTION FROM OVERHEAD HAZARDS

Toe-boards shall comply with the following:

- A. They shall be erected along the edge of the overhead walking/working surface for a distance sufficient to protect employees below; and
- B. They shall be capable of withstanding, without failure, a force of at least 50 pounds applied in any downward or outward direction; and
- C. They shall be a minimum of 3 ½ inches in vertical height above the walking/working surface and shall not have a gap greater than ¼ inch between the bottom of the toe-board and the walking/working surface.

When materials are piled higher than the top of the toe-board paneling, screening or mesh shall be placed in such a way as to prevent the material from falling.

When guardrail systems are used to prevent materials from falling, the openings contained therein shall be small enough to prevent materials from passing through.

Canopies used to protect employees shall be strong enough to prevent collapse and prevent penetration by any objects which may fall onto the canopy.

TRAINING

The employer shall provide a training program for each employee who may be exposed to fall hazards. The training program shall enable employees to recognize and eliminate falling hazards.

Training shall be provided by a competent person and shall cover the following items:

- A. The nature of fall hazards in the workplace.
- B. The correct procedures for erecting, maintaining, inspecting, disassembling, use and operation of those fall protection systems covered under the **FALL PROTECTION SYSTEMS** section of this program.
- C. The limitations of use of mechanical equipment during the performance of roofing work on low-sloped roofs.
- D. The correct procedures for handling and storing equipment and material used.
- E. The regulatory standards covered by this program.

The department shall verify that training has been provided by written certification containing all of the following information:

- A. Name/identity of employees trained; and
- B. The date(s) training was provided; and
- C. The signature of the person providing the training.

The most current training certification records shall be maintained by the department. Re-training shall be provided under the following conditions:

- A. The employer has reason to believe retraining is needed; or
- B. Changes in the workplace render previous training obsolete; or
- C. Changes in the type(s) of fall protection used render previous training obsolete; or

- D. Inadequacies in the affected employees knowledge of fall protection systems or equipment indicate that the employee has not retained the necessary understanding or skill.

SCAFFOLDING

Scaffold Requirements

Scaffolds shall be furnished for work that cannot be performed from the ground or from a ladder.

The footing or anchorage for scaffolds shall be sound, rigid, and capable of carrying the maximum intended load without settling or displacement. Unstable objects such as boxes, barrels or loose brick shall not be used to support scaffolds or planks.

Scaffolds and their components shall be capable of supporting without failure at least 4 times the maximum intended load.

Scaffolds shall be erected, moved, dismantled and altered only in the supervision of a competent person.

Scaffolds damaged or weakened from any cause shall be immediately repaired and shall not be used until repairs have been completed.

Scaffolds shall not be loaded in excess of the working load for which they are intended.

Scaffolds 6 feet or higher above the adjacent ground or floor shall have a guardrail system designed in accordance with **APPENDIX A** installed on all opens sides.

- A. *Exception #1: Scaffolds 4 to 6 feet in height, having a minimum dimension in either direction of ≤ 45 inches, shall have a standard guardrail system designed in accordance with APPENDIX A.*
- B. *Exception #2: Guardrail systems shall comply with the specific requirements outlined in APPENDIX A for the specific type of scaffolding, where such requirements exist.*
- C. *Exception #3: Where the employer can show that it is not possible to use a guardrail system, a personal fall arrest system (APPENDIX C) or safety net system (APPENDIX B) may be used.*

Scaffolds shall be provided with screen between the toe-board and guardrail in those locations in which employees are required to walk or pass beneath. The screen shall consist of #18 gauge U.S. Standard wire $\frac{1}{2}$ inch mesh, or the equivalent.

All load carrying timber members of scaffolding framing shall be a minimum of 1,500f. construction grade lumber. All dimensions are nominal sizes as provided in the American Lumber Standards, except that where rough sizes are noted, only rough and undressed lumber or the size specified will satisfy minimum requirements. (Note: Where nominal sizes of lumber are used in place of rough sizes, the nominal size lumber shall be such as to provide equivalent strength to that specified in **APPENDIX D**.)

All planking shall be Scaffold Grade as recognized by grading rules for the species of wood used. The maximum permissible spans for 2 x 10 inch or wider lumber shall comply with **Table 1**.

Table 1. Maximum Permissible Spans

	Material				
	Full thickness undressed lumber			Nominal thickness lumber*	
Working Load (lb/ft ²)	25	50	75	25	50
Permissible span (ft)	10	8	6	8	6

*Note: nominal lumber is not recommended for heavy duty use.

The maximum permissible working span for 1 ¼ x 9 inch or wider plank of full thickness is 4 feet with medium loading of 50 lb/ft².

All planking of platforms shall extend over their end supports not less than 6 inches nor more than 12 inches or be secured from movement.

An access ladder or equivalent safe access shall be provided.

The poles, legs or uprights of scaffolds shall be plumb, and securely and rigidly braced to prevent swaying and displacement.

Overhead protection shall be provided for employees exposed to overhead hazards.

Shore and lean-to scaffolds are prohibited.

Employees shall not be allowed to work on scaffolding during periods of high winds.

Slippery conditions on scaffolds shall be eliminated as soon as possible after they occur.

Tools, materials and debris shall not be allowed to accumulate to the extent that they cause a hazard to employees.

Scaffold Training

The design set-up and modification of scaffolding shall only be done under the supervision of a competent person. The person shall be deemed competent for such work by the employer based on his/her work experience, training, education or a combination thereof.

VEHICLE-MOUNTED ELEVATING AND ROTATING WORK PLATFORMS

General

Aerial lifts shall be designed and constructed in conformance with the applicable requirements of the American National Standard for “Vehicle Mounted Elevating and Rotating Work Platforms,” ANSI A92.2-1969, including appendix. Aerial lifts acquired for use before July 1, 1975 which do not meet the requirements of ANSI A92.2-1969, may not be used after July 1, 1976, unless they have been modified to conform. Aerial devices include the following types of vehicle-mounted aerial devices used to elevate personnel to jobsites above ground:

- A. Extensible boom platforms

- B. Aerial ladders
- C. Articulating boom platforms
- D. Vertical Towers
- E. Any combination of the above

Aerial lifts shall have electrical tests made in conformance with ANSI A92.2-1969, Section 5. Equivalent DC voltage test may be used in lieu of the AC test specified in Section 5. DC voltage tests which are approved by the manufacturer or equivalent entity shall be considered equivalent.

3. All critical hydraulic and pneumatic components shall comply with the provisions of ANSI A92.2-1969, Section 4.9 Bursting Safety Factor. Critical components are those in which a failure would result in a free fall or free rotation of the boom. All noncritical components shall have a bursting factor of at least one to two.

All welding performed on aerial lifts shall comply with the applicable Automotive Welding Society (AWS) Standards.

In addition to the requirements outlined in numbers 1 through 4, ladder trucks and tower trucks shall comply with 1910.67(b)(3). Before being moved for highway travel, aerial ladders shall be secured in the lower traveling position.

In addition to the requirements outlined above, extensible and articulating boom platforms shall comply with the following:

- A. Lift controls shall be tested each day prior to use in order to determine that they are working properly.
- B. A personal fall arrest system shall be used by the employee while operating the machine from the basket. The system shall be secured to a structural component of the basket. Belting off to an adjacent pole, structure, or equipment shall not be done.
- C. Employees shall stand firmly on the floor of the basket and shall not sit or climb on the edge of the basket or use planks, ladders, or other devices for a work position.
- D. The boom and basket load limits specified by the manufacturer shall not be exceeded.
- E. Brakes and outriggers shall be set on pads or a solid surface. They shall be used under those conditions specified by the manufacturer. In addition, wheel chocks shall be used when the aerial lift is on an incline.
- F. Aerial trucks shall not be moved when the boom is elevated except for those trucks specifically designed for this type of movement.
- G. Articulating boom and extensible boom platforms, primarily designed as personnel carriers, shall have both upper and lower controls.
- H. Insulated portions of the boom shall not be altered in any manner.
- I. Before moving the aerial lift, the boom shall be secured and the outriggers shall be properly stowed.
- J. Extendable-axle units shall have the axles extended prior to elevation or rotating the boom.
- K. Only trained persons shall operate an aerial lift.

Elevating and Rotating Platform Training

All employees shall receive training on the appropriate use of the equipment which includes the following:

- A. Proper setup, use and limitations of the machine being used.
- B. Proper use and selection of the fall protection provided.

Employees shall demonstrate to the employer an ability to properly use the machine.

Training shall be provided prior to the employee using the machine in questions.

Retraining shall be provided as often as needed to keep employees current on the safe use of the machine in question. In addition, retraining shall be provided before different machines are used.

Training shall be documented in writing and all records shall be maintained by the employing department.

STAIRWAYS AND LADDERS

General Requirements

A stairway or ladder shall be provided at all personnel points of access where there is a break in elevation of 19 inches or more and no ramp, runway, sloped embankment or personnel hoist is provided. All stairs shall be installed between 30° and 50° from horizontal.

An area under construction shall be provided with a double-cleated ladder, or two or more separate ladders, when ladders are the only means of access and exit, or when a ladder is used to serve simultaneous two-way traffic.

At least one point of access between floor levels under construction shall be maintained at all times. The point of access shall be kept clear, to permit free passage of employees.

Stairways, ladders and associated fall protection systems shall be installed before employees are allowed to begin work which necessitates their installation.

All handrails and guardrails required by this Section shall comply with the requirements of **APPENDIX A**.

Fall protection systems required by this Section shall comply with the requirements outlined in the **FALL PROTECTION SYSTEMS** section of this program.

Stairways

Stairways covered by this program are limited to those designed and installed for temporary use during construction as well as those designed for access to mechanical systems, i.e. water tanks, boilers, cooling towers, etc. Such stairs shall meet the following requirements.

- A. General use requirements.
 1. Stair treads and risers shall be reasonably slip-resistant and the nosing shall be a non-slip finish. In addition, tread and riser height shall be uniform throughout the length of the stair.
 2. All portions of stairs shall be free from hazardous projections.
 3. Slippery conditions on stairways shall be eliminated before the stairway is used.
- B. Design requirements.
 1. Stairs shall be installed between 30° and 50° from the horizontal.
 2. The minimum width of any stairway shall be 22 inches.

3. Stairs shall be designed and constructed to carry a live load of at least 5 five times the anticipated maximum live load. In no case shall the design be less than that required to safely handle a moving concentrated load of 1,000 pounds.
4. Vertical clearance above any stair tread to an overhead obstruction shall be at least 7 feet measured from the leading edge of the tread.
5. Stairways designed for temporary access purposes shall have landings not less than 30 inches extending in the direction of travel by 22 inches in width.
6. Where doors or gates open directly onto a stairway, a platform shall be provided. The platform shall be designed such that the door or gate provided does not reduce its effective width to less than 20 inches.

Ladders

Ladders shall comply with the **General Requirements** of this section as well as all of the following requirements:

- A. General use requirements.
 1. Ladders shall be maintained free from oil, grease and other slipping hazards.
 2. Ladders shall not be loaded beyond their rated capacity as designated by the manufacturer.
 3. Ladders shall be used only for the purpose for which they designed and intended.
 4. Ladders shall be used only on stable slip-resistant surfaces unless they are secured to prevent accidental displacement. Slip-resistant feet shall not be used as a substitute for care in placing, lashing or holding a ladder that is used on slippery surfaces.
 5. Ladders placed in any location in which they could be displaced shall be secured.
 6. The area around the top and bottom of ladder shall be maintained free from debris.
 7. Ladders shall not be moved, shifted or extended while occupied.
 8. Ladder used in locations which could lend it to coming into contact with live electrical equipment shall have non-conductive side rails.
 9. Ladders shall be inspected by a competent person for visible defects on a periodic and after any occurrence that could affect their safe use.
 10. Ladder repairs shall restore the ladder to its original design criteria.
 11. Single-rail ladder shall not be used.
 12. Ladders shall not be tied or fastened together to provide longer sections unless they are specifically designed for such use.
 13. When two or more separate ladders are used to reach an elevated work surface, the ladders shall be offset with a platform or landing between the ladders.
(Exception: When portable ladders are used to gain access to fixed ladders such as utility towers and billboard signs.)
 14. Wood ladders shall not be coated with any opaque covering.
(Exception: identification or warning labels may be placed on one face of the side rail.)
 15. When ascending or descending a ladder, the user shall face the ladder.
 16. Each employee shall use at least one hand to grasp the ladder when ascending or descending.
 17. An employee shall not carry any object or load which could cause the employee to lose balance and fall while ascending or descending the ladder.
 18. Ladders with structural defects shall immediately be taken out of service and marked with a highly visible tag which reads "DO NOT USE" or other similar language or shall be physically blocked from being used.

B. General design requirements.

1. Ladder rungs, cleats and steps shall be parallel, level, and uniform when the ladder is in position for use.
2. Ladder components shall be surfaced so as to prevent injury to an employee from punctures or laceration, and to prevent snagging of clothing.
3. The rungs of individual-rung/step ladders shall be shaped such that an employee's feet cannot slide off the end of the rungs.
4. Rungs, cleats and steps of ladders shall be spaced not less than 10 inches apart nor more than 14 inches apart as measured between the center lines of the rungs, cleats and steps.

(Exceptions: (a) Rungs, cleats and steps of step stools shall not be less than 8 inches apart nor more than 12 inches apart. (b) Rungs, cleats and steps of the base section of extension trestle ladders shall not be less than 8 inches apart nor more than 18 inches apart. The rungs spacing on the extension portion of said ladder shall not be less than 6 inches nor more than 12 inches.)

In addition to those requirements outlined above, portable ladders shall comply with the following requirements:

- A. Portable ladders shall be capable of supporting 4 times the maximum intended load.
(Exception: Extra heavy duty type 1A metal or plastic ladders shall sustain 3.3 times the maximum intended load.)
- B. The minimum clear distance between the side rails for all portable ladders shall be 11 ½ inches.
- C. The rungs and steps of portable metal ladders shall be corrugated, knurled, dimpled, coated with skid resistant material or otherwise treated to minimize slipping.
- D. A metal spreader or locking device shall be provided on each stepladder to hold the front and back sections in an open position when the ladder is being used.
- E. When portable ladders are used for access to an upper landing surface, the side rail shall extend 3 feet above the upper landing surface.
(Exception: When extension above the upper surface is not possible, the top of the ladder must be secured to a rigid support that will not deflect and a grasping device shall be provided to assist employees in mounting and dismounting the ladder.)
- F. Portable ladders shall be used at an angle such that the horizontal distance from the top support to the foot of the ladder is approximately one-quarter of the working length of the ladder.
(Exception: Wood job-made ladders with spliced side rails shall be used at an angle such that the horizontal distance is one-eighth the working length of the ladder.)
- G. The top of a non-self-supporting ladder shall be placed with the top two rails supported equally unless it is equipped with a single support attachment.
- H. Step ladders are subject to the following height restrictions:
 1. Type I - Industrial stepladder 3 to 20 feet
 2. Type II - Commercial stepladder 3 to 12 feet
 3. Type III - Household stepladder 3 to 6 feet
- I. Regardless of the type of step ladder provided the top step shall not be used as a step.
- J. The cross bracing of the back of a step ladder shall not be used for climbing unless the ladder is specifically designed and provided with steps for climbing on both front and rear sections.
- K. Portable rung ladders shall comply with the following:
 1. Single rung ladders longer than 30 feet shall not be used.
 2. Two section extension ladders shall not exceed 60 feet in length. All ladders of this type shall consist of two sections, one to fit within the side rails of the other, and arranged in such a manner

that the upper section can be raised and lowered. In addition, the sections shall overlap one another in accordance with **Table 2** below.

Table 2. Ladder Overlap

Size of ladder (feet)	Overlap (feet)
Up to and including 36	3
Over 36 up to and including 48	4
Over 48 up to and including 60	5

(Exception: Portable metal extension ladders shall be designed such that when they are made up of two sections they do not exceed 48 feet in length and when they are made up of more than two section they do not exceed 60 feet in length. Each type is subject to the overlap requirements outlined in the table above.)

Trestle and extension trestle ladders or section or base sections of extension trestle ladders longer than 20 feet shall not be used.

Special purpose portable ladders shall comply with the following:

- A. Painters stepladders shall longer than 12 feet shall not be used.
- B. Mason's ladders longer than 40 feet shall not be used.
- C. Trolley and side-rolling ladders longer than 20 feet shall not be used.

In addition to the requirements above, fixed ladders shall comply with all of the following requirements:

- A. The rungs and steps of fixed ladders shall be corrugated, knurled, dimpled, coated with skid resistant materials or otherwise treated to minimize slipping.
- B. The minimum perpendicular distance between fixed ladder rungs, cleats and steps, and any obstruction behind the ladder shall be 7 inches, except in the case of an elevator pit ladder, for which a minimum perpendicular clearance of 4 ½ inches is required.
- C. The minimum perpendicular distance between the fixed ladder rungs, cleats and steps, and any obstruction on the climbing side shall be 30 inches.
(Exception: when unavoidable obstructions are encountered, the minimum perpendicular clearance shall not be reduced to less than 24 inches provided a deflection device is installed to guide employees around the obstruction.)
- D. Through fixed ladders at their point of access/egress shall have a step across distance of not less than 7 inches nor more than 12 inches as measured from the centerline of the steps or rungs to nearest edge of the landing area.
- E. Fixed ladders shall be provided with cages, wells, ladder safety devices or self retracting lifelines where the length of climb is less than 24 feet but the top of the ladder is at a distance greater than 24 feet above lower levels.
- F. Where the total length of climb exceeds 24 feet, fixed ladders shall be equipped with one of the following:
 1. A ladder safety device; or
 2. Self retracting lifelines and rest platforms at intervals not to exceed 150 feet; or
 3. A cage or well and multiple ladder sections not to exceed 50 feet in length. Ladder sections shall be offset from adjacent sections, and landing platforms shall be provided at intervals of 50 feet.

- G. Fixed ladders without cages or wells shall have a clear width to the nearest object of at least 15 inches on each side of the centerline of the ladder.
- H. Cages required for fixed ladders shall meet the requirements of the section on cages below.
- I. Ladder safety devices for fixed ladders shall meet the requirements of the section on safety devices.
- J. Wells for fixed ladders shall meet the requirements of the section on wells below.
- K. Fixed ladders shall be used at an angle not to exceed 90 degrees from the horizontal as measured from the back side of the ladder.

Cages required by this Section shall comply with all of the following requirements:

- A. Horizontal bands shall be fastened to the side rails of rail ladders or directly to the structure, building, or equipment for individual-rung ladders. The bands shall not be spaced more than 4 feet on center vertically.
- B. Vertical bars shall be on the inside of the horizontal bands and shall be fastened to them. Bars shall be spaced at intervals not to exceed 9 1/2 inches on center horizontally.
- C. Cages shall extend not less than 27 inches nor more than 30 inches from the centerline of the step or rung and shall not be less than 27 inches wide.
- D. The inside of the cage shall be clear of projections.
- E. The bottom level of the cage shall be at a level not less 7 feet nor more than 8 feet the point of access at the bottom of the ladder. The bottom of the cage shall be flared not less than 4 inches all around the bottom horizontal band and the next higher band.
- F. The top of the cage shall be a minimum of 42 inches above the top of the platform, or the point of access at the top of the ladder with provision for access to the platform or other point of access.

Ladder safety devices required by this section shall comply with all of the following requirements:

- A. Ladder safety devices shall be capable of withstanding without failure a drop test consisting of an 18-inch drop of a 550-pound weight.
- B. Ladders safety devices shall permit the employee using the device to ascend or descend without continually having to hold, push or pull any part of the device, leaving both hands free for climbing.
- C. Ladder safety devices shall be activated within 2 feet after a fall occurs, and limit the descending velocity of an employee to 7 feet/second or less.
- D. The connection between the carrier or lifeline and the point of attachment to the body belt/harness shall not exceed 9 inches in length.
- E. The mounting of ladder safety devices for fixed ladders shall conform to the following:
 - 1. Mountings for rigid carriers shall be attached at each end of the carrier, with intermediate mountings, as necessary, spaced along the entire length of the carrier, to provide the strength necessary to stop employees' falls.
 - 2. Mountings for flexible carriers shall be attached at each end of the carrier. When the system is exposed to wind, cable guides for flexible carriers shall be installed at a minimum spacing of 25 feet and a maximum spacing of 40 feet along the entire length of the carrier, to prevent wind damage to the system.
 - 3. The design and installation of mountings and cable guides shall not reduce the design strength of the ladder.

Wells required by this section shall meet all of the following requirements:

- A. Wells shall completely encircle the ladder.
- B. Wells shall be free from projections.
- C. The face the well on inside climbing side of the ladder shall extend not less than 27 inches nor more than 30 inches from the centerline of the step or cleat.
- D. The inside clear width shall be at least 30 inches.
- E. The bottom of the well on the access side shall not be less than 7 feet nor more than 8 feet above the point of access at the bottom of the ladder.

Ladder and Stairway Training

The employer shall provide training to all employees using ladders and stairways as defined by this section. Training shall include all of the following:

- A. Be provided by a competent person.
- B. Ensure that employees are aware of the nature of fall hazards in the work area.
- C. The correct procedures for erecting, maintaining and disassembling the fall protection system used.
- D. The proper construction, use, placement and care in handling all stairways and ladders.
- E. The maximum intended load carrying capacities of ladders used.
- F. The requirements of the section on **STAIRWAYS AND LADDERS** of this Program.

Training shall be documented in writing. In addition, training records shall be maintained by the employing department.

Retraining shall be provided for each employee as necessary so that the employee maintains the understanding and knowledge acquired through compliance with this program.

APPENDIX A

Guardrail Systems

Guardrail systems and their use shall comply with the following requirements:

A. The top edge height shall be 42 inches plus or minus 3 inches above the walking/working surface. The top edge may exceed the maximum height of 45 inches when circumstances require, however, the guardrail system must meet all of the additional requirements contained herein.

B. Mid-rails, screens, mesh, intermediate vertical members, or intermediate structural members shall be installed between the top edge of the top rail and the walking/working level in the following manner:

1. When used, mid-rails shall be located midway between the top rail and the walking/working surface.
2. When used, screens and mesh shall be installed between the top rail and the walking/working surface.
3. When used, intermediate members (i.e. balusters) shall be installed between the top rail and the walking/working level at intervals not to exceed 19 inches.
4. When used, other structural members or designs shall be installed between the top rail and the walking/working surface such that there are no openings exceeding 19 inches.

C. Guardrail systems shall be capable of supporting 200 pounds in any direction. In addition, when a 200 pound force is applied in a downward direction, the top rail of the system shall not deflect greater than 2 inches.

D. Mid-rails, screens, mesh, intermediate vertical members, solid panels and equivalent structural members installed shall be capable of supporting a 150 pound force applied in any direction at any point.

Systems designed in accordance with the following shall be considered as meeting the requirements of C and D of this appendix:

a. Wood railings: Wood components shall be a minimum of 1500 lb-ft/in² fiber construction grade lumber; the posts shall be at least 2-inch by 4-inch lumber spaced not more than 8 feet apart on centers; the top rail shall be at least 2-inch by 4-inch lumber, the intermediate rail shall be at least 1-inch by 6-inch lumber. All lumber dimensions are nominal sizes as provided by the American Softwood Lumber Standards, dated January 1970.

b. Pipe railings: For pipe railing systems posts, top rails and intermediate railings shall be at least 1½ inch nominal diameter with posts spaced not more than 8 feet apart on centers.

c. Structural steel railings: For structural steel railings posts, top rails and intermediate rails shall be at least 2-inch by 2-inch by 3/8-inch angles, with posts spaced not more than 8 feet apart on centers.

APPENDIX B

Safety Net Systems

1. Safety net systems and their use shall comply with the following:

A. Safety nets shall extend outward from the outermost work surface as outlined in **Table 3**:

Table 3. Safety Nets

Vertical distance working level to horizontal plane of net	Minimum required horizontal distance of outer edge of net from the edge of the working surface
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Up to 5 feet	8 ft
More than 5 feet up to 10 feet	10 ft
More than 10 feet	13 ft

B. Safety net systems shall be drop tested after the initial installation and before being used as a fall protection system. In addition, a drop test shall be performed whenever the system is relocated, after any major repair and at 6 month intervals when the system is left in one place. The safety net system shall be capable of withstanding the drop test without failure.

C. The drop test shall consist of dropping a 400 pound bag of sand 28 to 32 inches in diameter from the highest at which employees are exposed to fall hazards, but not less than 42 inches above the net.

(Exception: When the employer can demonstrate that it is unreasonable to perform a drop test, the employer shall certify that the net and net installation is in compliance with Sections B, C and D of this appendix by preparing a certification record prior to the net being used as a fall protection system. The certification shall include an identification of the net and net system for which the certification is being performed, the date that the system was certified as being in compliance and the signature of the person making the certification. The most recent certification for each installation shall be available for inspection at the jobsite where it is being used.)

D. The distance between the underside of the walking/working surface and the safety net system shall be sufficient to prevent contact with the underside of the walking/working surface by the employee dropping into the net. The required distance shall be determined by the drop test outlined in Section C of this appendix.

E. The maximum size of each safety net mesh opening shall not exceed 36 square inches nor be longer than 6 inches on any side, and the opening, measured center-to-center of mesh ropes or webbing, shall not exceed 6 inches. All mesh openings shall be secured to prevent enlargement of the opening.

F. Each safety net section shall have a border rope for webbing with a breaking strength of 5,000 pounds.

G. Connections between safety net panels shall be as strong as integral components and shall be spaced not more than 6 inches apart.

APPENDIX C

Personal Fall Arrest Systems

1. Personal fall arrest systems and their use shall comply with all of the following requirements (*Effective January 1, 1998, body belts are not acceptable as part of a personal fall arrest system.*):

A. Connecting devices shall comply with the following:

1. Connectors used shall be drop forged, pressed or formed steel, or made of equivalent materials. In addition they shall have a corrosion resistant finish and all surfaces shall be smooth to prevent damage to interfacing parts of the system.

2. Dee rings and snap-hooks shall have a minimum tensile strength of 5,000 pounds and shall be proof tested to a minimum tensile load of 3,600 pounds without cracking breaking or deformation.

B. Lanyards and vertical lifelines shall comply with the following:

1. Lanyards and vertical lifelines shall have a minimum breaking strength of 5,000 pounds.

2. Self-retracting lifelines and lanyards which automatically limit free fall distance to 2 feet or less shall be capable of sustaining a minimum tensile load of 3,000 pounds applied to the device with the lifeline or lanyard in the fully extended position.

3. Self retracting lifelines and lanyards which do not limit free fall to 2 feet or less, ripstitch lanyards, and tearing or deforming lanyards shall be capable of sustaining a minimum tensile strength of 5,000 pounds applied with the device in the fully extended position.

4. Ropes and straps used in lanyards, lifelines, and strength components of body belts, body harness shall be made from synthetic fibers.

C. Anchorage points shall comply with the following:

1. Anchorages used for attachment of personal fall arrest systems shall be independent of any anchorage being used for other purposes and shall be capable of supporting a minimum tensile strength of 5,000 pounds per employee.

(Exception: Systems designed as a part of a complete personal fall arrest system which maintains a safety factor of at least two and which is under the supervision of a qualified person are exempt from these requirements.)

2. Personal fall arrest systems shall not be attached to guardrail systems.

D. Personal fall arrest systems shall also comply with the following requirements:

1. The attachment point of a body belt shall be located in the center of the wearers' back and the attachment point of a body harness shall be located in the center of the wearers back near shoulder level or above the wearers' head.

2. Body belts shall be at least 1 5/8 inches wide.

3. When personal fall arrest systems are used in hoist areas they shall be rigid to allow movement of the employee only as far as the edge of the walking/working surface.

4. When stopping a fall, personal fall arrest systems shall comply with the following:

- a. Limit maximum arresting force on an employee to 900 pounds when used with a body belt and 1,800 pounds when used with a body harness;
- b. Be rigid such that an employee can neither free fall more than 6 feet, nor contact any lower level.
- c. Bring an employee to a complete stop and limit the maximum deceleration distance to 3 1/2 feet; and
- e. Have twice the sufficient strength to withstand the potential impact energy of an employee free falling a distance of 6 feet or the distance permitted by the system, whichever is less.

APPENDIX D

Scaffolds – 29 CFR 1910.28 Standards

PART A: WOOD POLE SCAFFOLDS

1. Scaffold poles shall bear on a foundation of sufficient size and strength to spread the load from the poles over a sufficient area to prevent settlement. All poles shall be set plumb.
2. Where wood poles are spliced, the ends shall be squared and the upper section shall rest squarely on the lower section. Wood splice plates shall be provided on at least two adjacent sides and shall not be less than 4 feet 0 inches in length, overlapping the abutted ends equally, and have the same width and not less than the cross-sectional area of the pole. Splice plates of other materials of equivalent strength may be used.
3. Independent pole scaffolds shall be set as near to the wall of the building as practicable.
4. All pole scaffolds shall be securely guyed or tied to the building or structure. Where the height or length exceeds 25 feet, the scaffold shall be secured at intervals not greater than 25 feet vertically and horizontally.
5. Putlogs or bearers shall be set with their greater dimensions vertical, long enough to project over the ledgers of the inner and outer rows of poles at least 3 inches for proper support.
6. Every wooden putlog on single pole scaffolds shall be reinforced with a 3/16 x 2-inch steel strip or equivalent secured to its lower edge throughout its entire length.
7. Ledgers shall be long enough to extend over two pole spaces. Ledgers shall not be spliced between the poles. Ledgers shall be reinforced by bearing blocks securely nailed to the side of the pole to form a support for the ledger.
8. Diagonal bracing shall be provided to prevent the poles from moving in a direction parallel with the wall of the building, or from buckling.
9. Cross bracing shall be provided between the inner and outer sets of poles in independent pole scaffolds. The free ends of pole scaffolds shall be cross braced.
10. Full diagonal face bracing shall be erected across the entire face of pole scaffolds in both directions. The braces shall be spliced at the poles.
11. Platform planks shall be laid with their edges close together so the platform will be tight with no spaces through which tools or fragments of material can fall.
12. Where planking is lapped, each plank shall lap its end supports at least 12 inches. Where the ends of planks abut each other to form a flush floor, the butt joint shall be at the centerline of a pole. The abutted ends shall rest on separate bearers. Intermediate beams shall be provided where necessary to prevent dislodgment of planks due to deflection, and the ends shall be nailed or cleated to prevent their dislodgment.
13. When a scaffold turns a corner, the platform planks shall be laid to prevent tipping. The planks that meet the corner putlog at an angle shall be laid first, extending over the diagonally placed putlog far enough to have a good safe bearing, but not far enough to involve any danger from tipping. The planking running in the opposite direction at right angles shall be laid so as to extend over and rest on the first layer of planking.
14. When moving platforms to the next level, the old platform shall be left undisturbed until the new putlogs or bearers have been set in place, ready to receive the platform planks.
15. Guardrails not less than 2 x 4 inches or the equivalent and not less than 36 inches or more than 42 inches high, with a mid-rail, when required, of 1 x 4-inch lumber or equivalent, and toeboards, shall be installed at all open sides on all scaffolds more than 10 feet above the ground or floor. Toeboards shall be a minimum of 4 inches in height. Where employees are required to work or pass under the scaffold, # 18 U.S. Standard wire 1/2 inch mesh or equivalent shall be provided between the toeboard and the guardrail.

16. All wood pole scaffolds 60 feet or less in height shall be constructed and erected in accordance with **Table 4** through **Table 12** of this section. If they are over 60 feet in height they shall be designed by a registered professional engineer and constructed and erected in accordance with such design. A copy of the typical drawings and specifications shall be made available to the employer and for inspection purposes.
17. Wood-pole scaffolds shall not be erected beyond the reach of effective fire fighting apparatus.

Table 4. Minimum Nominal Size And Maximum Spacing Of Members Of Single Pole Scaffolds - Light Duty

	Maximum height of scaffold	
	20 feet	60 feet
Uniformly distributed load.....	Not to exceed 25 pounds per square foot.	
Poles or uprights.....	2 by 4 in.....	4 by 4 in.
Pole spacing (longitudinal).....	6 ft. 0 in.....	10 ft. 0 in.
Maximum width of scaffold.....	5 ft. 0 in.....	5 ft. 0 in.
Bearers or putlogs to 3 ft. 0 in. width.....	2 by 4 in.....	2 by 4 in.
Bearers or putlogs to 5 ft. 0 in. width.....	2 by 6 in. or 3 by 4 in.	2 by 6 in. or 3 by 4 in. (rough).
Ledgers.....	1 by 4 in.....	1 1/4 by 9 in.
Planking.....	1 1/4 by 9 in. (rough).....	2 by 9 in.
Vertical spacing of horizontal members.....	7 ft. 0 in.....	7 ft. 0 in.
Bracing, horizontal and diagonal.	1 by 4 in.....	1 by 4 in.
Tie-ins.....	1 by 4 in.....	1 by 4 in.
Toeboards.....	4 in. high (minimum).....	4 in. high (minimum)
Guardrail.....	2 by 4 in.....	2 by 4 in.

All members except planking are used on edge.

Table 5. Minimum Nominal Size And Maximum Spacing Of Members Of Single Pole Scaffolds - Medium Duty

Uniformly distributed load.....	Not to exceed 50 pounds per square foot.
Maximum height of scaffold.....	60 ft.
Poles or uprights.....	4 by 4 in.
Pole spacing (longitudinal).....	8 ft. 0 in.
Maximum width of scaffold.....	5 ft. 0 in.
Bearers or putlogs.....	2 by 9 in. or 3 by 4 in.
Spacing of bearers or putlogs.....	8 ft. 0 in.
Ledgers.....	2 by 9 in.
Vertical spacing of horizontal members.	9 ft. 0 in.
Bracing, horizontal.....	1 by 6 in. or 1 1/4 by 4 in.
Bracing, diagonal.....	1 by 4 in.
Tie-ins.....	1 by 4 in.
Planking.....	2 by 9 in.
Toeboards.....	4 in. high (minimum).
Guardrail.....	2 by 4 in.

All members except planking are used on edge.

Table 6. Minimum Nominal Size And Maximum Spacing Of Members Of Single Pole Scaffolds - Heavy Duty

Uniformly distributed load.....	Not to exceed 75 pounds per square foot.
Maximum height of scaffold.....	60 ft.
Poles or uprights.....	4 by 4 in.
Pole spacing (longitudinal).....	6 ft. 0 in.
Maximum width of scaffold.....	5 ft. 0 in.
Bearers or putlogs.....	2 by 9 in. or 3 by 5 in. (rough)
Spacing of bearers or putlogs.....	6 ft. 0 in.
Ledgers.....	2 by 9 in.
Vertical spacing of horizontal members.	6 ft. 6 in.
Bracing, horizontal and diagonal.....	2 by 4 in.
Tie-ins.....	1 by 4 in.
Planking.....	2 by 9 in.
Toeboards.....	4 in. high (minimum).
Guardrail.....	2 by 4 in.

All members except planking are used on edge.

Table 7. Minimum Nominal Size And Maximum Spacing Of Members Of Independent Pole Scaffolds - Light Duty

Maximum height of scaffold	20 feet	60 feet
Uniformly distributed load.....	Not to exceed 25 pounds per square foot.	
Poles or uprights.....	2 by 4 in.....	4 by 4 in.
Pole spacing (longitudinal).....	6 ft. 0 in.....	10 ft. 0 in.
Pole spacing (transverse).....	6 ft. 0 in.....	10 ft. 0 in.
Ledgers.....	1 1/4 by 4 in....	1 1/4 by 9 in.
Bearers to 3 ft. 0 in. span.....	2 by 4 in.....	2 by 4 in.
Bearers to 10 ft. 0 in. span.....	2 by 6 in. or 3 by 4 in...	2 by 9 in. (rough) or 3 by 8 in.
Planking.....	1 1/4 by 9 in....	2 by 9 in.
Vertical spacing of horizontal members.....	7 ft. 0 in.....	7 ft. 0 in.
Bracing, horizontal and diagonal.....	1 by 4 in.....	1 by 4 in.
Tie-ins.....	1 by 4 in.....	1 by 4 in.
Toeboards.....	4 in. high.....	4 in. high (minimum)
Guardrail.....	2 by 4 in.....	2 by 4 in.

All members except planking are used on edge.

Table 8. Minimum Nominal Size And Maximum Spacing Of Members Of Independent Pole Scaffolds - Medium Duty

Uniformly distributed load.....	Not to exceed 50 pounds per square foot.
Maximum height of scaffold.....	60 ft.
Poles or uprights.....	4 by 4 in.
Pole spacing (longitudinal).....	8 ft. 0 in.
Pole spacing (transverse).....	8 ft. 0 in.
Ledgers.....	2 by 9 in.
Vertical spacing of horizontal members....	6 ft. 0 in.
Spacing of bearers.....	8 ft. 0 in.
Bearers.....	2 by 9 in. (rough) or 2 by 10 in.
Bracing, horizontal.....	1 by 6 in. or 1 1/4 by 4 in.
Bracing, diagonal.....	1 by 4 in.
Tie-ins.....	1 by 4 in.
Planking.....	2 by 9 in.
Toeboards.....	4 in. high (minimum).
Guardrail.....	2 by 4 in.

All members except planking are used on edge.

Table 9. Minimum Nominal Size And Maximum Spacing Of Members Of Independent Pole Scaffolds - Heavy Duty

Uniformly distributed load.....	Not to exceed 75 pounds per square foot.
Maximum height of scaffold.....	60 ft.
Poles or uprights.....	4 by 4 in.
Pole spacing (longitudinal).....	6 ft. 0 in.
Pole spacing (transverse).....	8 ft. 0 in.
Ledgers.....	2 by 9 in.
Vertical spacing of horizontal members.	4 ft. 6 in.
Bearers.....	2 by 9 in. (rough)
Bracing, horizontal and diagonal.....	2 by 4 in.
Tie-ins.....	1 by 4 in.
Planking.....	2 by 9 in.
Toeboards.....	4 in. high (minimum).
Guardrail.....	2 by 4 in.

All members except planking are used on edge.

Table 10. Tube And Coupler Scaffolds - Light Duty

Uniformly distributed load.....	Not to exceed 25 p.s.f.
Post spacing (longitudinal).....	10 ft. 0 in.
Post spacing (transverse).....	6 ft. 0 in.

Working levels	Additional planked levels	Maximum height
1	8	125 ft.
2	4	125 ft.
3	0	91 ft. 0 in.

Table 11. Tube And Coupler Scaffolds - Medium Duty

Uniformly distributed load.....	Not to exceed 50 p.s.f.
Post spacing (longitudinal).....	8 ft. 0 in.
Post spacing (transverse).....	6 ft. 0 in.

Working levels	Additional planked levels	Maximum height
1	6	125 ft.
2	0	78 ft. 0 in.

Table 12. Tube And Coupler Scaffolds - Heavy Duty

Uniformly distributed load.....	Not to exceed 75 p.s.f.
Post spacing (longitudinal).....	6 ft. 6 in.
Post spacing (transverse).....	6 ft. 0 in.

Working levels	Additional planked levels	Maximum height
1	6	125 ft.

PART B: TUBE AND COUPLER SCAFFOLDS

1.A light-duty tube and coupler scaffold shall have all posts, bearers, runners, and bracing of nominal 2-inch O.D. steel tubing. The posts shall be spaced no more than 6 feet apart by 10 feet along the length of the scaffold. Other structural metals when used must be designed to carry an equivalent load.

2.A medium-duty tube and coupler scaffold shall have all posts, runners, and bracing of nominal 2-inch O.D. steel tubing. Posts spaced not more than 6 feet apart by 8 feet along the length of the scaffold shall have bearers of nominal 2 1/2-inch O.D. steel tubing. Posts spaced not more than 5 feet apart by 8 feet along the length of the scaffold shall have bearers of nominal 2-inch O.D. steel tubing. Other structural metals when used must be designed to carry an equivalent load.

3.A heavy-duty tube and coupler scaffold shall have all posts, runners, and bracing of nominal 2-inch O.D steel tubing, with the posts spaced not more than 6 feet apart by 6 feet 6 inches along the length of the scaffold. Other structural metals when used must be designed to carry an equivalent load.

4.Tube and coupler scaffolds shall be limited in heights and working levels to those permitted in tables D-13, 14, and 15, of this section. Drawings and specification of all tube and coupler scaffolds above the limitations in tables D-13, 14, and 15 of this section shall be designed by a registered professional engineer and copies made available to the employer and for inspection purposes.

5.All tube and coupler scaffolds shall be constructed and erected to support four times the maximum intended loads as set forth in tables D-13, 14, and 15 of this section, or as set forth in the specifications by a registered professional engineer, copies which shall be made available to the employer and for inspection purposes.

6.All tube and coupler scaffolds shall be erected by competent and experienced personnel.

7.Posts shall be accurately spaced, erected on suitable bases, and maintained plumb.

8.Runners shall be erected along the length of the scaffold located on both the inside and the outside posts at even height. Runners shall be interlocked to form continuous lengths and coupled to each post. The bottom runners shall be located as close to the base as possible. Runners shall be placed not more than 6 feet 6 inches on centers.

9.Bearers shall be installed transversely between posts and shall be securely coupled to the posts bearing on the runner coupler. When coupled directly to the runners, the coupler must be kept as close to the posts as possible.

10.Bearers shall be at least 4 inches but not more than 12 inches longer than the post spacing or runner spacing. Bearers may be cantilevered for use as brackets to carry not more than two planks.

11.Cross bracing shall be installed across the width of the scaffold at least every third set of posts horizontally and every fourth runner vertically. Such bracing shall extend diagonally from the inner and outer runners upward to the next outer and inner runners.

12. Longitudinal diagonal bracing shall be installed at approximately a 45-degree angle from near the base of the first outer post upward to the extreme top of the scaffold. Where the longitudinal length of the scaffold permits, such bracing shall be duplicated beginning at every fifth post. In a similar manner longitudinal diagonal bracing shall also be installed from the last post extending back and upward toward the first post. Where conditions preclude the attachment of this bracing to the posts, it may be attached to the runners.

13. The entire scaffold shall be tied to and securely braced against the building at intervals not to exceed 30 feet horizontally and 26 feet vertically.

14. Guardrails not less than 2 x 4 inches or the equivalent and not less than 36 inches or more than 42 inches high, with a mid-rail, when required, of 1 x 4-inch lumber or equivalent, and toeboards, shall be installed at all open sides on all scaffolds more than 10 feet above the ground or floor. Toeboards shall be a minimum of 4 inches in height. Where employees are required to work or pass under the scaffold, # 18 U.S. Standard wire 1/2 inch mesh or equivalent shall be provided between the toeboard and the guardrail along the entire opening.

PART C: TUBULAR WELDED FRAME SCAFFOLDS

1. Metal tubular frame scaffolds, including accessories such as braces, brackets, trusses, screw legs, ladders, etc., shall be designed and proved to safely support four times the maximum intended load.

2. Spacing of panels or frames shall be consistent with the loads imposed.

3. Scaffolds shall be properly braced by cross bracing or diagonal braces, or both, for securing vertical members together laterally, and the cross braces shall be of such length as will automatically square and align vertical members so that the erected scaffold is always plumb, square, and rigid. All brace connections shall be made secure.

4. Scaffold legs shall be set on adjustable bases or plain bases placed on mud sills or other foundations adequate to support the maximum intended load.

5. The frames shall be placed one on top of the other with coupling or stacking pins to provide proper vertical alignment of the legs.

6. Where uplift may occur, panels shall be locked together vertically by pins or other equivalent suitable means.

7. Guardrails not less than 2 x 4 inches or the equivalent and not less than 36 inches or more than 42 inches high, with a mid-rail, when required, of 1- x 4-inch lumber or equivalent, and toe-boards, shall be installed at all open sides on all scaffolds more than 10 feet above the ground or floor. Toe-boards shall be a minimum of 4 inches in height. Where employees are required to work or pass under the scaffold, #18 U.S. Standard wire 1/2 inch mesh or equivalent shall be installed between the toe-board and the guardrail along the entire length of the opening.

8. All tubular metal scaffolds shall be constructed and erected to support four times the maximum intended loads.

9. To prevent movement, the scaffold shall be secured to the building or structure at intervals not to exceed 30 feet horizontally and 26 feet vertically.

10. Maximum permissible spans of planking shall be in conformity with **Table 13:**

Table 13. Maximum Permissible Spans

	Material				
	Full thickness undressed lumber			Nominal thickness lumber*	
Working Load (lb/ft ²)	25	50	75	25	50
Permissible span (ft)	10	8	6	8	6

*Note: nominal lumber is not recommended for heavy duty use.

11. Drawings and specifications for all frame scaffolds over 125 feet in height above the base plates shall be designed by a registered professional engineer and copies made available to the employer and for inspection purposes.

12. All tubular welded frame scaffolds shall be erected by competent and experienced personnel.

13. Frames and accessories for scaffolds shall be maintained in good repair and every defect, unsafe condition, or noncompliance with this section shall be immediately corrected before further use of the scaffold. Any broken, bent, excessively rusted, altered, or otherwise structurally damaged frames or accessories shall not be used.

14. Periodic inspections shall be made of all welded frames and accessories, and any maintenance, including painting, or minor corrections authorized by the manufacturer, shall be made before further use.

PART D: MANUALLY PROPELLED MOBILE SCAFFOLDS

1. When free-standing mobile scaffolds towers are used, the height shall not exceed four times the minimum base dimension.

2. Casters shall be properly designed for strength and dimensions to support four times the maximum intended load. All casters shall be provided with a positive locking device to hold the scaffold in position.

3. Scaffolds shall be properly braced by cross bracing or diagonal braces, or both, for securing vertical members together laterally, and the cross braces shall be of such length as will automatically square and aline vertical members so that the erected scaffold is always plumb, square, and rigid. All brace connections shall be made secure.

4. Platforms shall be tightly planked for the full width of the scaffold except for necessary entrance opening. Platforms shall be secured in place.

5. A ladder or stairway shall be provided for proper access and exit and shall be affixed or built into the scaffold and so located that when in use it will not have a tendency to tip the scaffold. A landing platform must be provided at intervals not to exceed 35 feet.

6. The force necessary to move the mobile scaffold shall be applied near or as close to the base as practicable and provision shall be made to stabilize the tower during movement from one location to another. Scaffolds shall only be moved on level floors, free from obstructions and openings.

7. The employer shall not allow employees to ride on manually propelled scaffolds unless the following condition exist:

- a. The floor or surface is within 3° of level and free pits, holes, or obstructions;
- b. The minimum dimension of the scaffold base when ready for rolling, is at least 1/2 of the height. Outriggers, if used, shall be installed on both sides of staging;
- c. The wheels are equipped with rubber or similar resilient tires;
- d. All tools and materials are secured or removed from the platform before the mobile scaffold is moved.

8. Scaffolds in use by any persons shall rest upon a suitable footing and shall stand plumb. The casters or wheels shall be locked to prevent any movement.

9. Mobile scaffolds constructed of metal members shall also conform to applicable provisions of Parts A, B and C of this Appendix, depending on the material of which they are constructed.

10. Guardrails made of lumber, not less than 2- x 4- inches (or other material providing equivalent protection), approximately 42 inches high, with a midrail, of 1- x 6- inch lumber (or other material providing equivalent protection), and toeboards, shall be installed at all open sides and ends shall be a minimum of 4 inches in height.

Where employees are required to work or pass under the scaffold, #18 U.S. Standard wire 1/2 inch mesh or equivalent shall be provided between the toeboard and the guardrail.

PART E: OUTRIGGER SCAFFOLDS

1.Outrigger beams shall extend not more than 6 feet beyond the face of the building. The inboard end of outrigger beams, measured from the fulcrum point to the extreme point of support, shall be not less than one and one-half times the outboard end in length. The beams shall rest on edge, the sides shall be plumb, and the edges shall be horizontal. The fulcrum point of the beam shall rest on a secure bearing at least 6 inches in each horizontal dimension. The beam shall be secured in place against movement and shall be securely braced at the fulcrum point against tipping.

2.The inboard ends of outrigger beams shall be securely supported either by means of struts bearing against sills in contact with the overhead beams or ceiling, or by means of tension members secured to the floor joists underfoot, or by both if necessary. The inboard ends of outrigger beams shall be secured against tipping and the entire supporting structure shall be securely braced in both directions to prevent any horizontal movement.

3.Unless outrigger scaffolds are designed by a licensed professional engineer, they shall be constructed and erected in accordance with **Table 14**. Outrigger scaffolds designed by a registered professional engineer shall be constructed and erected in accordance with such design. A copy of the detailed drawings and specifications showing the sizes and spacing of members shall be kept on the job.

4.Planking shall be laid tight and shall extend to within 3 inches of the building wall. Planking shall be nailed or bolted to outriggers.

5.Where there is danger of material falling from the scaffold, a wire mesh or other enclosure shall be provided between the guardrail and the toe-board.

6.Where additional working levels are required to be supported by the outrigger method, the plans and specifications of the outrigger and scaffolding structure shall be designed by a registered professional engineer.

7.Guardrails made of lumber not less than 2 x 4 inches (or other material providing equivalent protection), approximately 42 inches high with a mid-rail of 1 x 6 inch lumber (or other material providing equivalent protection), and toe-boards, shall be installed at all open sides and ends on all scaffolds more than 10 feet above the ground or floor. Toe boards shall be a minimum of 4 inches in height. Wire mesh shall be installed between the top rail and the toe-board when there are employee passing or working beneath the scaffolding.

Table 14. Minimum Nominal Size and Maximum Spacing of Members of Outrigger Scaffold

	Light duty	Medium duty
Maximum scaffold load.....	25 p.s.f.....	50 p.s.f.
Outrigger size.....	2 x 10 in.....	3 x 10 in.
Maximum outrigger spacing...	10 ft. 0 in....	6 ft. 0 in.
Planking.....	2 x 9 in.....	2 x 9 in.
Guardrail.....	2 x 4 in.....	2 x 4 in.
Guardrail uprights.....	2 x 4 in.....	2 x 4 in.
Toeboards (minimum).....	4 in.....	4 in.

PART F: MASONS' ADJUSTABLE MULTIPLE-POINT SUSPENSION SCAFFOLDS

1.The scaffold shall be capable of sustaining a working load of 50 pounds per square foot and shall not be loaded in excess of that figure.

2.The scaffold shall be provided with hoisting machines that meet the requirements of a nationally recognized testing laboratory.

3.The platform shall be supported by wire ropes capable of supporting at least 6 times the maximum intended load.

4.The scaffold outrigger beams shall consist of structural metal securely fastened or anchored to the frame or floor system of the building or structure.

5.Each outrigger beam shall be equivalent in strength to at least a standard 7-inch, 15.3-pound steel I-beam, be at least 15 feet long, and shall not project more than 6 feet 6 inches beyond the bearing point.

6.Where the overhang exceeds 6 feet 6 inches, outrigger beams shall be composed of stronger beams or multiple beams and be installed in accordance with approved designs and instructions.

7.If channel iron outrigger beams are used in place of I-beams, they shall be securely fastened together with the flanges turned out.

8.All outrigger beams shall be set and maintained with their webs into vertical position.

9.A stop bolt shall be placed at each end of every outrigger beam.

10.The outrigger beam shall rest on suitable wood-bearing blocks.

11.All parts of the scaffold such as bolts, nuts, fittings, clamps, wire rope, and outrigger beams and their fastenings, shall be maintained in sound and good working condition and shall be inspected before each installation and periodically thereafter.

12.The free end of the suspension wire ropes shall be equipped with proper size thimbles and be secured by splicing or other equivalent means. The running ends shall be securely attached to the hoisting drum and at least four turns of rope shall at all times remain on the drum.

13.Where a single outrigger beam is used, the steel shackles or clevises with which the wire ropes are attached to the outrigger beams shall be placed directly over the hoisting drums.

14.The scaffold platform shall be equivalent in strength to at least 2-inch planking. The maximum spans shall comply with **Table 13** above.

15.Guardrails not less than 2 x 4 inches or the equivalent and not less than 36 inches or more than 42 inches high, with a mid-rail, when required, of 1 x 4-inch lumber or equivalent, and toeboards, shall be installed at all open sides on all scaffolds more than 10 feet above the ground or floor. Toeboards shall be a minimum of 4 inches in height. Where employees are required to work or pass under the scaffold, #18 U.S. Standard wire 1/2 inch mesh or equivalent shall be provided between the toeboard and guardrail along the entire opening.

16.Overhead protection shall be provided on the scaffold, not more than 9 feet above the platform, consisting of 2-inch planking or material of equivalent strength laid tight, when men are at work on the scaffold and an overhead hazard exists.

17.Each scaffold shall be installed or relocated in accordance with designs and instructions, of a registered professional engineer, and supervised by a competent, designated person.

PART G: TWO-POINT SUSPENSION SCAFFOLDS (swinging scaffolds)

1.Two-point suspension scaffold platforms shall be not less than 20 inches no more than 36 inches wide overall. The platform shall be securely fastened to the hangers by U-bolts or by other equivalent means.

2.The hangers of two-point suspension scaffolds shall be made of wrought iron, mild steel, or other equivalent material having a cross-sectional area capable of sustaining four times the maximum intended load, and shall be designed with a support for guardrail, intermediate rail, and toeboard.

3.When hoisting machines are used on two-point suspension scaffolds, such machines shall be of a design tested and approved by a nationally recognized testing laboratory.

4.The roof irons or hooks shall be of wrought iron, mild steel, or other equivalent material of proper size and design, securely installed and anchored. Tie-backs of three-fourth inch manila rope or the equivalent shall serve as a secondary means of anchorage, installed at right angles to the face of the building whenever possible and secured to a structurally sound portion of the building.

5.Guardrails not less than 2 x 4 inches or the equivalent and not less than 36 inches or more than 42 inches high, with a mid-rail, when required, of 1- x 4-inch lumber or equivalent, and toeboards, shall be installed at all open sides on all scaffolds more than 10 feet above the ground or floor. Toeboards shall be a minimum of 4 inches in height. Where employees are required to work or pass under the scaffold, #18 U.S. Standard wire 1/2 inch mesh or equivalent shall be provided between the toeboard and the guardrail.

6.Two-point suspension scaffolds shall be suspended by wire or fiber ropes capable of supporting at least 6 times the maximum intended load.

7.The blocks for fiber ropes shall be of standard 6-inch size, consisting of at least one double and one single block. The sheaves of all blocks shall fit the size of rope used.

8.All wire ropes, fiber ropes, slings, hangers, platforms, and other supporting parts shall be inspected before every installation. Periodic inspections shall be made while the scaffold is in use.

9.On suspension scaffolds designed for a working load of 500 pounds no more than two men shall be permitted to work at one time. On suspension scaffolds with a working load of 750 pounds, no more than three men shall be permitted to work at one time. Each workman shall be protected by a safety lifeline attached to a lifeline. The lifeline shall be securely attached to substantial members of the structure (not scaffold), or to securely rigged lines, which will safely suspend the workman in case of a fall.

10.Where acid solutions are used, fiber ropes are not permitted unless acid-proof.

11.Two-point suspension scaffolds shall be securely lashed to the building or structure to prevent them from swaying. Window cleaners' anchors shall not be used for this purpose.

12.The platform of every two-point suspension scaffold shall be one of the following types:

a.The side stringer of ladder-type platforms shall be clear straight-grained spruce or materials of equivalent strength and durability. The rungs shall be of straight-grained oak, ash, or hickory, at least 1 1/8 inch in diameter, with seven-eighth inch tenons mortised into the side stringers at least seven-eighth inch. The stringers shall be tied together with the tie rods not less than one-quarter inch in diameter, passing through the stringers and riveted up tight against washers on both ends. The flooring strips shall be spaced not more than five-eighth inch apart except at the side rails where the space may be 1 inch. Ladder-type platforms shall be constructed in accordance with table D-17.

b.Plank-type platforms shall be composed of not less than nominal 2 x 8 inch unspliced planks, properly cleated together on the underside starting 6 inches from each end; intervals in between shall not exceed 4 feet. The plank-type platform shall not extend beyond the hangers more than 18 inches. A bar or other effective means shall be securely fastened to the platform at each end to prevent its slipping off the hanger. The span between hangers for plank-type platforms shall not exceed 10 feet.

c.Beam platforms shall have side stringers of lumber not less than 2 x 6 inches set on edge. The span between hangers shall not exceed 12 feet when beam platforms are used. The flooring shall be supported on 2 and 6 inch crossbeams, laid flat and set into the upper edge of the stringers with a snug fit, at intervals of not more than 4

feet, securely nailed in place. The flooring shall be of 1 x 6 inch material properly nailed. Floorboards shall not be spaced more than one-half inch apart.

PART H: STONE SETTERS' ADJUSTABLE MULTIPLE-POINT SUSPENSION SCAFFOLDS

- 1.The scaffold shall be capable of sustaining a working load of 25 pounds per square foot and shall not be overloaded. Scaffolds shall not be used for storage of stone or other heavy materials.
- 2.The hoisting machine and its supports shall be of a type tested and listed by a nationally recognized testing laboratory.
- 3.The platform shall be securely fastened to the hangers by U-bolts or other equivalent means.
- 4.The scaffold unit shall be suspended from metal outriggers, iron brackets, wire rope slings, or iron hooks which will safely support the maximum intended load.
- 5.Outriggers when used shall be set with their webs in a vertical position, securely anchored to the building or structure and provided with stop bolts at each end.
- 6.The scaffold shall be supported by wire rope capable of supporting at least 6 times the maximum intended load.
- 7.The free ends of the suspension wire ropes shall be equipped with proper size thimbles, secured by splicing or other equivalent means. The running ends shall be securely attached to the hoisting drum and at least four turns of rope shall remain on the drum at all times.
- 8.Guardrails not less than 2 by 4 inches or the equivalent and not less than 36 inches or more than 42 inches high, with a mid-rail, when required, of 1 by 4 inch lumber or equivalent, and toeboards, shall be installed at all open sides on all scaffolds more than 10 feet above the ground or floor. Toeboards shall be a minimum of 4 inches in height. Where employees are required to work or pass under the scaffold, #18 U.S. Standard wire 1/2 inch mesh or equivalent shall be provided between the toeboard and the guardrail.
- 9.When two or more scaffolds are used on a building or structure they shall not be bridged one to the other but shall be maintained at even height with platforms butting closely.
- 10.Each scaffold shall be installed or relocated in accordance with designs and instructions of a registered professional engineer, and such installation or relocation shall be supervised by a competent designated person.

PART I: SINGLE-POINT ADJUSTABLE SUSPENSION SCAFFOLDS

- 1.The scaffolding, including power units or manually operated winches, shall be a type tested and listed by a nationally recognized testing laboratory.
- 2.All power-operated gears and brakes shall be enclosed.
- 3.In addition to the normal operating brake, all-power driven units must have an emergency brake which engages automatically when the normal speed of descent is exceeded.
- 4.Guards, mid-rails, and toeboards shall completely enclose the cage or basket. Guardrails shall be no less than 2 by 4 inches or the equivalent installed no less than 36 inches nor more than 42 inches above the platform. Mid-rails shall be 1 by 6 inches or the equivalent; installed equidistant between the guardrail and the platform. Toeboards shall be a minimum of 4 inches in height.
- 5.The hoisting machines, cables, and equipment shall be regularly serviced and inspected after each installation and every 30 days thereafter.
- 6.When units are combined to form a two-point suspension scaffold, they shall also comply with the requirements outlined in Part G of this Appendix.
- 7.The supporting cable shall be vertical for its entire length, and the operator shall not sway the basket and fix the cable to any intermediate points to change his original path of travel.
- 8.Equipment shall be maintained and used in accordance with the manufacturers' instructions.

9. Suspension methods shall conform to applicable provisions of Parts F and G of this Appendix.

PART J: BOATSWAIN'S CHAIRS

1. The chair seat shall be not less than 12 by 24 inches, and of 1 inch thickness. The seat shall be reinforced on the underside to prevent the board from splitting.
2. The two fiber rope seat slings shall be of 5/8 inch diameter, reeved through the four seat holes so as to cross each other on the underside of the seat.
3. Seat slings shall be of at least 3/8 inch wire rope when a workman is conducting a heat producing process such as gas or arc welding.
4. The workman shall be protected by a safety harness attached to a lifeline. The lifeline shall be securely attached to substantial members of the structure (not scaffold), or to securely rigged lines, which will safely suspend the worker in case of a fall.
5. The tackle shall consist of correct size ball bearing or bushed blocks and properly spliced 5/8 inch diameter first-grade manila rope.
6. The roof irons, hooks, or the object to which the tackle is anchored shall be securely installed. Tiebacks when used shall be installed at right angles to the face of the building and securely fastened to a chimney

PART K: CARPENTERS' BRACKET SCAFFOLDS

1.The brackets shall consist of a triangular wood frame not less than 2 by 3 inches in cross section, or of metal of equivalent strength. Each member shall be properly fitted and securely joined.

- 2.Each bracket shall be attached to the structure by means of one of the following:
- a. A bolt no less than five-eighths inch in diameter which shall extend through the inside of the building wall.
 - b. A metal stud attachment device
 - c. Welding to steel tanks
 - d. Hooking over a well-secured and adequately strong supporting member. The brackets shall be spaced no more than 10 feet apart.

3.No more than two persons shall occupy any given 10 feet of a bracket scaffold at any one time. Tools and materials shall not exceed 75 pounds in addition to the occupancy.

4.The platform shall consist of not less than two 2 by 10 inch nominal size planks extending not more than 12 inches or less than 6 inches beyond each end support.

5.Guardrails not less than 2 by 4 inches or the equivalent and not less than 36 inches or more than 42 inches high, with a mid-rail, when required, of 1 by 6 inch lumber or equivalent, and toeboards. shall be installed at all open sides on all scaffolds more than 10 feet above the ground or floor. Toeboards shall be a minimum of 4 inches in height. Where employees are required to work or pass under the scaffold, #18 U.S. Standard wire 1/2 inch mesh or equivalent shall be provided along the entire opening.

PART L: BRICKLAYERS' SQUARE SCAFFOLDS

- 1.The squares shall not exceed 5 feet in width and 5 feet in height.
- 2.Members shall be not less than those specified in Table 15.

Table 15. Minimum Dimensions For Bricklayers'square Scaffold Members

Members	Dimensions (Inches)
Bearers or horizontal members.....	2 by 6
Legs.....	2 by 6
Braces at corners.....	1 by 6
Braces diagonally from center frame..	1 by 8

3.The squares shall be reinforced on both sides of each corner with 1 by 6 inch gusset pieces. They shall also have braces 1 by 8 inches on both sides running from center to center of each member, or other means to secure equivalent strength and rigidity.

4.The squares shall be set not more than 5 feet apart for medium duty scaffolds, and not more than 8 feet apart for light duty scaffolds. Bracing 1 x 8 inches, extending from the bottom of each square to the top of the next square, shall be provided on both front and rear sides of the scaffold.

5.Platform Planks shall be at least 2 by 10 inch nominal size. The ends of the planks shall overlap the bearers of the squares and each plank shall be supported by not less than three squares.

6. Bricklayers' square scaffolds shall not exceed three tiers in height and shall be so constructed and arranged that one square shall rest directly above the other. The upper tiers shall stand on a continuous row of planks laid across the next lower tier and be nailed down or otherwise secured to prevent displacement.

7. Scaffolds shall be level and set upon a firm foundation.

PART M: HORSE SCAFFOLDS

1. Horse scaffolds shall not be constructed or arranged more than two tiers or 10 feet in height.
2. The members of the horses shall be not less than those specified in Table D-19.
3. Horses shall be spaced not more than 5 feet for medium duty and not more than 8 feet for light duty.
4. When arranged in tiers, each horse shall be placed directly over the horse in the tier below.
5. On all scaffolds arranged in tiers the legs shall be nailed down to the planks to prevent displacement or thrust and each tier shall be substantially cross braced.

Table 16. Minimum Dimensions For Horse Scaffold Members

Members	(Inches)
Horizontal members or bearers	3 by 4
Legs	1 1/4 by 4 1/2
Longitudinal brace between legs	1 by 6
Gusset brace at top of legs	1 by 8
Half diagonal braces	1 1/4 by 4 1/2

6. Horses or parts which have become weak or defective shall not be used.
7. Guardrails not less than 2 by 4 inches or the equivalent and not less than 36 inches or more than 42 inches high with a mid-rail, when required, of 1 by 4 inch lumber or equivalent and toeboards, shall be installed at all open sides on all scaffolds more than 10 feet above the ground or floor. Toeboards shall be a minimum of 4 inches in height. Where employees are required to work or pass under the scaffold, #18 U.S. Standard wire 1/2 inch mesh or equivalent shall be provided between the toeboard and the guardrail along the length of the open side.

PART N: NEEDLE BEAM SCAFFOLDS

1. Wood needle beams shall be maintained in a safe condition and shall not be altered or moved horizontally while they are in use or occupied. All planking shall be Scaffold Grade as recognized by the grading rules for the species of wood used and shall be not less than 4 by 6 inches in size, with the greater dimension placed in a vertical direction. Spacing shall comply with **Table 13**.
2. Metal beams shall be capable of supporting at least 4 times the maximum intended load.
3. Ropes or hangers shall be provided for supports. The span between supports on the needle beam shall not exceed 10 feet for 4 by 6 inch timbers. Rope supports shall be equivalent in strength to 1-inch diameter first-grade manila rope.
4. The ropes shall be attached to the needle beams by a scaffold hitch or a properly made eye splice. The loose end of the rope shall be tied by a bowline knot or by a round turn and one-half hitch.
5. The platform span between the needle beams shall not exceed 8 feet when using 2-inch scaffold plank. For spans greater than 8 feet, platforms shall be designed based on design requirements for the special span. The overhang of each end of the platform planks shall be not less than 6 inches and not more than 12 inches.
6. When one needle beam is higher than the other or when the platform is not level the platform shall be secured against slipping.

7. All unattached tools, bolts, and nuts used on needle beam scaffolds shall be kept in suitable containers.

8. One end of a needle beam scaffold may be supported by a permanent structural so long as it is capable of supporting at least 4 times the maximum intended load.

9. Each person working on a needle beam scaffold 20 feet or more above the ground or floor and working with both hands, shall be protected by a safety life belt attached to a lifeline. The lifeline shall be securely attached to substantial members of the structure (not scaffold), or to securely rigged lines, which will safely suspend the workman in case of a fall.

PART O: PLASTERERS', DECORATORS', and LARGE AREA SCAFFOLDS

1. Plasterers', decorators', lathers'; and ceiling workers' inside scaffolds shall be constructed in accordance with the general requirements set forth for independent wood pole scaffolds.

2. Guardrails not less than 2 by 4 inches or the equivalent and not less than 36 inches or more than 42 inches high, with a mid-rail, when required, of 1 by 6 inch lumber or equivalent, and toeboards, shall be installed at all open sides on all scaffolds more than 6 feet above the ground or floor. Toeboards shall be a minimum of 4 inches in height. Where employees are required to work or pass under the scaffold, #18 U.S. Standard wire 1/2 inch mesh or equivalent shall be provided between the toeboard and the guardrail along the length of the opening.

3. All platform planks shall be laid with the edges close together.

4. When independent pole scaffold platforms are erected in sections, such sections shall be provided with connecting runways equipped with substantial guardrails.

PART P: INTERIOR HUNG SCAFFOLDS

1. The suspended steel wire rope shall be capable of supporting at least 6 times the intended load. In addition, Wire may be used providing it is capable of supporting at least 6 times the maximum intended load.

2. For hanging wood scaffolds, the following minimum nominal size material is recommended:

a. Supporting bearers 2 by 10 inches on edge.

b. Planking 2 by 10 inches, with maximum span 7 feet for heavy duty and 10 feet for light duty or medium duty.

3. Steel tube and coupler members may be used for hanging scaffolds with both types of scaffold designed to sustain a uniform distributed working load up to heavy duty scaffold loads with a safety factor of four

4. When a hanging scaffold is supported by means of wire rope, such wire rope shall be wrapped at least twice around the supporting members and twice around the bearers of the scaffold, with each end of the wire rope secured by at least three standard wire-rope clips.

5. All overhead supporting members shall be inspected and checked for strength before the scaffold is erected.

6. Guardrails not less than 2 by 4 inches or the equivalent and not less than 36 inches or more than 42 inches high, with a mid-rail, when required, of 1 by 6 inch lumber or equivalent, and toeboards, shall be installed at all open sides on all scaffolds more than 10 feet above the ground or floor. Toeboards shall be a minimum of 4 inches in height. Where employees are required to work or pass under the scaffold, #18 U.S. Standard 1/2 inch wire mesh shall be installed along the entire length of the opening.

PART Q: LADDER-JACK SCAFFOLDS

1. All ladder-jack scaffolds shall be limited to light duty and shall not exceed a height of 20 feet above the floor or ground.

2. All ladders used in connection with ladder-jack scaffolds shall be heavy-duty ladders and shall be designed and constructed in accordance with Section IX of this Standard.

3.The ladder jack shall be so designed and constructed that it will bear on the side rails in addition to the ladder rungs, or if bearing on rungs only, the bearing area shall be at least 10 inches on each rung.

4.Ladders used in conjunction with ladder jacks shall be so placed, fastened, held, or equipped with devices so as to prevent slipping.

5.The wood platform planks shall be not less than 2 inches nominal in thickness. Both metal and wood platform planks shall overlap the bearing surface not less than 12 inches. The span between supports for wood shall not exceed 8 feet. Platform width shall be not less than 18 inches.

6.Not more than two persons shall occupy any given 8 feet of any ladder-jack scaffold at any one time.

PART R: WINDOW-JACK SCAFFOLDS

1.Window-jack scaffolds shall be used only for the purpose of working at the window opening through which the jack is placed.

2.Window jacks shall not be used to support planks placed between one window jack and another or for other elements of scaffolding.

3.Window-jack scaffolds shall be provided with suitable guardrails unless safety belts with lifelines are attached and provided for the workman. Window-jack scaffolds shall be used by one man only.

4.Not more than one employee shall occupy a window jack scaffold at any one time.

PART S: ROOFING BRACKETS

1.Roofing brackets shall be constructed to fit the pitch of the roof.

2.Brackets shall be secured in place by nailing in addition to the pointed metal projections. The nails shall be driven full length into the roof. When rope supports are used, they shall consist of first-grade manila of at least three-quarter-inch diameter, or equivalent.

3.A substantial catch platform shall be installed below the working area of roofs more than 16 feet from the ground to eaves with a slope greater than 4 inches in 12 inches without a parapet. In width the platform shall extend 2 feet beyond the projection of the eaves and shall be provided with a safety rail, mid-rail, and toeboard. This provision shall not apply where employees engaged in work upon such roofs are protected by a safety belt attached to a lifeline.

PART T: CRAWLING BOARDS OR CHICKEN LADDERS

1.Crawling boards shall be not less than 10 inches wide and 1 inch thick, having cleats 1 x 1 1/2 inches. The cleats shall be equal in length to the width of the board and spaced at equal intervals not to exceed 24 inches. Nails shall be driven through and clinched on the underside. The crawling board shall extend from the ridge pole to the eaves when used in connection with roof construction, repair, or maintenance.

2.A firmly fastened lifeline of at least three-quarter-inch rope shall be strung beside each crawling board for a handhold.

3.Crawling boards shall be secured to the roof by means of adequate ridge hooks or equivalent effective means.

PART U: FLOAT OR SHIP SCAFFOLDS

1.Float or ship scaffolds shall support not more than three men and a few light tools, such as those needed for riveting, bolting, and welding. They shall be constructed in accordance with parts 2 through 6 below, unless substitute designs and materials provide equivalent strength, stability, and safety.

2.The platform shall be not less than 3 feet wide and 6 feet long, made of three-quarter-inch plywood, equivalent to American Plywood Association Grade B-B, Group I, Exterior.

3. Under the platform, there shall be two supporting bearers made from 2 x 4 inch, or 1 x 10 inch rough, selected lumber, or better. They shall be free of knots or other flaws and project 6 inches beyond the platform on both sides. The ends of the platform shall extend about 6 inches beyond the outer edges of the bearers. Each bearer shall be securely fastened to the platform.

4. An edging of wood not less than 3/4 x 1 1/2 inches, or equivalent, shall be placed around all sides of the platform to prevent tools from rolling off.

5. Supporting ropes shall be 1 inch diameter manila rope or equivalent, free from deterioration, chemical damage, flaws, or other imperfections. Rope connections shall be such that the platform cannot shift or slip. If two ropes are used with each float, each of the two supporting ropes shall be hitched around one end of a bearer and pass under the platforms to the other end of the bearer where it is hitched again, leaving sufficient rope at each end for the supporting ties.

6. Each workman shall be protected by a safety harness attached to a lifeline. The lifeline shall be securely attached to substantial members of the structure (not scaffold), or to securely rigged lines, which will safely suspend the workman in case of a fall.

PART V: FORM SCAFFOLDS

1. From scaffolds shall be constructed of wood or other suitable materials, such as steel or aluminum members or known strength characteristics. All scaffolds shall be designed and erected with a minimum safety factor of 4, computed on the basis of the maximum rated load.

2. All scaffold planking shall be a minimum of 2 x 10 inch nominal Scaffold Grade, as recognized by approved grading rules for the species of lumber used, or equivalent material. Maximum permissible spans shall not exceed 8 feet on centers for 2 x 10 inch nominal planking. Scaffold planks shall be either nailed or bolted to the ledgers or of such length that they shall overlap the ledgers at least 6 inches. Unsupported projecting ends of scaffolding planks shall be limited to a maximum overhang of 12 inches.

3. Scaffolds shall not be loaded in excess of the working load for which they were designed.

4. Figure-four form scaffolds are intended for light duty only and shall be used to support loads exceeding 25 pounds per square foot unless specifically designed for heavier loading. The minimum design shall comply with **Table 17**.

5. Figure-four form scaffold frames shall be spaced not more than 8 feet on centers and constructed from sound lumber, as follows:

a. The outrigger ledger shall consist of two pieces of 1 x 6 inch or heavier material nailed on opposite sides of the vertical form support. Ledgers shall project not more than 3 feet 6 inches from the outside of the form support and shall be substantially braced and secured to prevent tipping or turning. The knee or angle brace shall intersect the ledger at least 3 feet from the form at an angle of approximately 45°, and the lower end shall be nailed to a vertical support. The platform shall consist of two or more 2- x 10-inch planks, which shall be of such length that they extend at least 6 inches beyond ledgers at each end unless secured to the ledgers. When planks are secured to the ledgers (nailed or bolted), a wood filler strip shall be used between the ledgers. Unsupported projecting ends of planks shall be limited to an overhang of 12 inches.

Table 17. Minimum Design For Figure Four Form Scaffolds

<u>Members</u>	<u>Dimensions</u>
Uprights	2- x 4- inch or 2- x 6-inch
Outriggers	1- x 6- inch
Braces	1- x 6- inch
Guardrails	2- x 4- inch
Guardrail height	Approximately 42 inches
Intermediate guardrails	1- x 6- inch
Toe-boards	4 inches (minimum)
Max. length of ledgers	3 foot 6 inch (unsupported)
Planking	2- x 10- inch
Upright spacing	8- foot 0- inch (on centers)

1. Metal bracket form scaffolds shall comply with the following requirements:

- a. Metal brackets or scaffold jacks which are an integral part of the form shall be securely bolted or welded to the form. Folding type brackets shall be either bolted or secured with a locking-type pin when extended for use.
- b. Clip-on or hook-over brackets may be used, provided the form walers are bolted to the form or secured by snap ties or she-bolt extending through the form and securely anchored.
- c. Metal brackets shall be spaced not more than 8 feet on centers.
- d. Scaffold planks shall be either bolted to the metal brackets or of such length that they overlap the brackets at each end by at least 6 inches. Unsupported projecting ends of scaffold planks shall be limited to a maximum overhang of 12 inches.
- e. Metal bracket form scaffolds shall be equipped with wood guardrails, intermediate rails, toeboards, and scaffold planks meeting the minimum dimensions shown in **Table 18**. (Metal may be substituted for wood, providing it affords equivalent or greater design strength.)

Table 18. Minimum Design Criteria For Metal Bracket Form Scaffolds

<u>Members</u>	<u>Dimensions</u>
Uprights	2- x 4- inch
Guardrails	2- x 4- inch
Guardrail height	Approximately 42 inches
Intermediate guardrails	1- x 6- inch
Toe-boards	4 inch (minimum)
Planking	2- x 9- inch

6. Wooden bracket form scaffolds shall comply with the following:

- a. Wooden bracket form scaffolds shall be an integral part of the form panel. The minimum design criteria set forth herein and in **Table 19** cover scaffolding intended for light duty and shall not be used to support loads exceeding 25 pounds per square foot, unless specifically designed for heavier loading.
- b. Scaffold planks shall be either nailed or bolted to the ledgers or of such length that they overlap the ledgers at each end by at least 6 inches. Unsupported projecting ends of scaffold planks shall be limited to a maximum overhang of 12 inches.

Table 19. Minimum Design Criteria For Wooden Bracket From Scaffolds

<u>Members</u>	<u>Dimensions</u>
Uprights	2- x 4- inch or 2- x 6- inch
Support ledgers	2- x 6- inch
Maximum scaffold width	3- foot 6- inch
Braces	1- x 6 inch
Guardrails	2- x 4- inch
Guardrail height	Approximately 42 inches
Intermediate guardrails	1- x 6- inch
Toe-boards	4 inch (minimum)
Upright spacing	8- foot 0-inch (on centers)

- c. Guardrails and toeboards shall be installed on all open sides and ends of platforms and scaffolding over 10 feet above the floor or ground. Guardrails shall be made of lumber 2 x 4 inch nominal dimension (or other material providing equivalent protection), approximately 42 inches high, supported at intervals not to exceed 8 feet. Guardrails shall be equipped with midrails constructed of 1 x 6 inch nominal lumber (or other material providing equivalent protection). Toeboards shall extend not less than 4 inches above the scaffold plank.

PART W: PUMP JACK SCAFFOLDS

1. Pump jack scaffolds shall comply with the following:
 - a. Not carry more than 500 pounds working load and shall be capable of supporting without failure at 4 times the maximum intended load.
 - b. The manufactured components shall not be loaded of the manufacturer's recommended limits.
2. Pump jack brackets, braces, and accessories shall be fabricated from metal plates and angles. Each pump jack brackets shall have two positive gripping mechanism to prevent any failure or slippage.
3. The platform bracket shall be fully decked and the planking secured. Planking, or equivalent, shall conform with the requirements outlined in Part VII Subpart A.
4. When wood scaffold planks are used as platforms, poles used for pump jacks shall not be spaced more than 10 feet center to center. When fabricated platforms are used that fully comply with the requirements outlined herein, pole spacing may exceed 10 feet center to center.
5. Poles shall not exceed 30 feet in height.
6. Poles shall be secured to the work wall by rigid triangular bracing, or equivalent, at the bottom, top, and other points as necessary, to provide a maximum vertical spacing of not more than 10 feet between braces. Each brace shall be capable of supporting a minimum of 225 pounds tension or compression.
7. For the pump jack bracket to pass bracing already installed, an extra brace shall be used approximately 4 feet above the one to be passed until the original brace is reinstalled.
8. All poles shall bear on mud sills or other adequate firm foundations.
9. Pole lumber shall be 2 x 4 inch Douglas Fir, or equivalent, straight-grained, clear, free of cross-grain, shakes, large loose or dead knots, and other defects which might impair strength.
10. When poles are constructed of two continuous lengths, they shall be two by fours, spiked together with the seam parallel to the bracket, and with 10d common nails, no more than 12 inches center to center, staggered uniformly from opposite outside edges.
11. If two by fours are spliced to make up the pole, the splices shall be so constructed as to develop the full strength of the member.
12. A ladder, meeting the requirements of Section IX of this Standard shall be provided.
13. Not more than two persons shall be permitted on a pump jack scaffold at any one time.
14. Pump jack scaffolds shall be provided with standard guardrails 2 x 4 inches, or equivalent, approximately 42 inches high, with a midrail. Supports shall be at intervals not to exceed 8 feet. Toeboards shall be a minimum of 4 inches in height. Safety harnesses and lifelines meeting the requirements of Section V may be substituted in place of the guardrail system.
15. When a work bench is used at an approximate height of 42 inches, the top guardrail may be eliminated, if the work bench is fully decked, the planking secured, and is capable of withstanding 200 pounds pressure in any direction. However, employees shall be prohibited from using the work bench as a scaffold platform.

