wardens so that employees can be swiftly moved from the danger location to the safe areas. Generally, one warden for each twenty employees in the workplace should be able to provide adequate guidance and instruction at the time of a fire emergency. The employees selected or who volunteer to serve as wardens should be trained in the complete workplace layout and the various alternative escape routes from the workplace. All wardens and fellow employees should be made aware of handicapped employees who may need extra assistance, such as using the buddy system, and of hazardous areas to be avoided during emergencies. Before leaving, wardens should check rooms and other enclosed spaces in the workplace for employees who may be trapped or otherwise unable to evacuate the area.

After the desired degree of evacuation is completed, the wardens should be able to account for or otherwise verify that all employees are in the safe areas.

In buildings with several places of employment, employers are encouraged to coordinate their plans with the other employers in the building. A building-wide or standardized plan for the whole building is acceptable provided that the employers inform their respective employees of their duties and responsibilities under the plan. The standardized plan need not be kept by each employer in the multi-employer building, provided there is an accessible location within the building where the plan can be reviewed by affected employees. When multi-employer building-wide plans are not feasible, employers should coordinate their plans with the other employers within the building to assure that conflicts and confusion are avoided during times of emergencies. In multi-story buildings where more than one employer is on a single floor, it is essential that these employers coordinate their plans with each other to avoid conflicts and confusion.

4. *Fire prevention housekeeping.* The standard calls for the control of accumulations of flammable and combustible waste materials.

It is the intent of this standard to assure that hazardous accumulations of combustible waste materials are controlled so that a fast developing fire, rapid spread of toxic smoke, or an explosion will not occur. This does not necessarily mean that each room has to be swept each day. Employers and employees should be aware of the hazardous properties of materials in their workplaces, and the degree of hazard each poses. Certainly oil soaked rags have to be treated differently than general paper trash in office areas. However, large accumulations of waste paper or corrugated boxes, etc., can pose a significant fire hazard. Accumulations of materials which can cause large fires or generate dense smoke that are easily ignited or may start from spontaneous combustion, are the types of materials with which this standard is concerned. Such combustible materials may be easily ignited by matches, welder's sparks, cigarettes and similar low level energy ignition sources.

5. *Maintenance of equipment under the fire prevention plan.* Certain equipment is often installed in workplaces to control heat sources or to detect fuel leaks. An example is a temperature limit switch often found on deep fat food fryers found in restaurants. There may be similar switches for high temperature dip tanks, or flame failure and flashback arrester devices on furnaces and similar heat producing equipment. If these devices are not properly maintained or if they become inoperative, a definite fire hazard exists. Again employees and supervisors should be aware of the specific type of control devices on equipment involved with combustible materials in the workplace and should make sure, through periodic inspection or testing, that these controls are operable. Manufacturers' recommendations should be followed to assure proper maintenance procedures.

[45 FR 60714, Sept. 12, 1980]

Subpart F—Powered Platforms, Manlifts, and Vehicle-Mounted Work Platforms

AUTHORITY: Secs. 4, 6, and 8 of the Occupational Safety and Health Act of 1970 (29 U.S.C. 653, 655, and 657); Secretary of Labor's Order No. 12–71 (36 FR 8754), 8–76 (41 FR 25059), 9–83 (48 FR 35736), or 1–90 (55 FR 9033), as applicable; and 29 CFR part 1911.

§ 1910.66 Powered platforms for building maintenance.

(a) *Scope.* This section covers powered platform installations permanently dedicated to interior or exterior building maintenance of a specific structure or group of structures. This section does not apply to suspended scaffolds (swinging scaffolds) used to service buildings on a temporary basis and covered under subpart D of this part, nor to suspended scaffolds used for construction work and covered under subpart L of 29 CFR part 1926. Building maintenance includes, but is not limited to, such tasks as window cleaning, caulking, metal polishing and reglazing.

(b) *Application*—(1) *New installations.* This section applies to all permanent installations completed after July 23, 1990. Major modifications to existing installations completed after that date

are also considered new installations under this section.

(2) *Existing installations.* (i) Permanent installations in existence and/or completed before July 23, 1990 shall comply with paragraphs (g), (h), (i), (j) and appendix C of this section.

(ii) In addition, permanent installations completed after August 27, 1971, and in existence and/or completed before July 23, 1990, shall comply with appendix D of this section.

(c) *Assurance.* (1) Building owners of new installations shall inform the employer before each use in writing that the installation meets the requirements of paragraphs (e)(1) and (f)(1) of this section and the additional design criteria contained in other provisions of paragraphs (e) and (f) of this section relating to: required load sustaining capabilities of platforms, building components, hoisting and supporting equipment; stability factors for carriages, platforms and supporting equipment; maximum horizontal force for movement of carriages and davits; design of carriages, hoisting machines, wire rope and stabilization systems; and design criteria for electrical wiring and equipment.

(2) Building owners shall base the information required in paragraph (c)(1) of this section on the results of a field test of the installation before being placed into service and following any major alteration to an existing installation, as required in paragraph (g)(1) of this section. The assurance shall also be based on all other relevant available information, including, but not limited to, test data, equipment specifications and verification by a registered professional engineer.

(3) Building owners of all installations, new and existing, shall inform the employer in writing that the installation has been inspected, tested and maintained in compliance with the requirements of paragraphs (g) and (h) of this section and that all protection anchorages meet the requirements of paragraph (I)(c)(10) of appendix C.

(4) The employer shall not permit employees to use the installation prior to receiving assurance from the building owner that the installation meets the requirements contained in paragraphs (c)(1) and (c)(3) of this section.

(d) *Definitions.*

Anemometer means an instrument for measuring wind velocity.

Angulated roping means a suspension method where the upper point of suspension is inboard from the attachments on the suspended unit, thus causing the suspended unit to bear against the face of the building.

Building face roller means a rotating cylindrical member designed to ride on the face of the building wall to prevent the platform from abrading the face of the building and to assist in stabilizing the platform.

Building maintenance means operations such as window cleaning, caulking, metal polishing, reglazing, and general maintenance on building surfaces.

Cable means a conductor, or group of conductors, enclosed in a weatherproof sheath, that may be used to supply electrical power and/or control current for equipment or to provide voice communication circuits.

Carriage means a wheeled vehicle used for the horizontal movement and support of other equipment.

Certification means a written, signed and dated statement confirming the performance of a requirement of this section.

Combination cable means a cable having both steel structural members capable of supporting the platform, and copper or other electrical conductors insulated from each other and the structural members by nonconductive barriers.

Competent person means a person who, because of training and experience, is capable of identifying hazardous or dangerous conditions in powered platform installations and of training employees to identify such conditions.

Continuous pressure means the need for constant manual actuation for a control to function.

Control means a mechanism used to regulate or guide the operation of the equipment.

Davit means a device, used singly or in pairs, for suspending a powered platform from work, storage and rigging locations on the building being serviced. Unlike outriggers, a davit reacts its operating load into a single roof socket or carriage attachment.

Equivalent means alternative designs, materials or methods 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.

Ground rigging means a method of suspending a working platform starting from a safe surface to a point of suspension above the safe surface.

Ground rigged davit means a davit which cannot be used to raise a suspended working platform above the building face being serviced.

Guide button means a building face anchor designed to engage a guide track mounted on a platform.

Guide roller means a rotating cylindrical member, operating separately or as part of a guide assembly, designed to provide continuous engagement between the platform and the building guides or guideways.

Guide shoe means a device attached to the platform designed to provide a sliding contact between the platform and the building guides.

Hoisting machine means a device intended to raise and lower a suspended or supported unit.

Hoist rated load means the hoist manufacturer's maximum allowable operating load.

Installation means all the equipment and all affected parts of a building which are associated with the performance of building maintenance using powered platforms.

Interlock means a device designed to ensure that operations or motions occur in proper sequence.

Intermittent stabilization means a method of platform stabilization in which the angulated suspension wire rope(s) are secured to regularly spaced building anchors.

Lanyard means a flexible line of rope, wire rope or strap which is used to secure the body belt or body harness to a deceleration device, lifeline or anchorage.

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.

Live load means the total static weight of workers, tools, parts, and supplies that the equipment is designed to support.

Obstruction detector means a control that will stop the suspended or supported unit in the direction of travel if an obstruction is encountered, and will allow the unit to move only in a direction away from the obstruction.

Operating control means a mechanism regulating or guiding the operation of equipment that ensures a specific operating mode.

Operating device means a device actuated manually to activate a control.

Outrigger means a device, used singly or in pairs, for suspending a working platform from work, storage, and rigging locations on the building being serviced. Unlike davits, an outrigger reacts its operating moment load as at least two opposing vertical components acting into two or more distinct roof points and/or attachments.

Platform rated load means the combined weight of workers, tools, equipment and other material which is permitted to be carried by the working platform at the installation, as stated on the load rating plate.

Poured socket means the method of providing wire rope terminations in which the ends of the rope are held in a tapered socket by means of poured spelter or resins.

Primary brake means a brake designed to be applied automatically whenever power to the prime mover is interrupted or discontinued.

Prime mover means the source of mechanical power for a machine.

Rated load means the manufacturer's recommended maximum load.

Rated strength means the strength of wire rope, as designated by its manufacturer or vendor, based on standard testing procedures or acceptable engineering design practices.

Rated working load means the combined static weight of men, materials, and suspended or supported equipment.

Registered professional engineer means a person who has been duly and currently registered and licensed by an authority within the United States or its

territories to practice the profession of engineering.

Roof powered platform means a working platform where the hoist(s) used to raise or lower the platform is located on the roof.

Roof rigged davit means a davit used to raise the suspended working platform above the building face being serviced. This type of davit can also be used to raise a suspended working platform which has been ground-rigged.

Rope means the equipment used to suspend a component of an equipment installation, i.e., wire rope.

Safe surface means a horizontal surface intended to be occupied by personnel, which is so protected by a fall protection system that it can be reasonably assured that said occupants will be protected against falls.

Secondary brake means a brake designed to arrest the descent of the suspended or supported equipment in the event of an overspeed condition.

Self powered platform means a working platform where the hoist(s) used to raise or lower the platform is mounted on the platform.

Speed reducer means a positive type speed reducing machine.

Stability factor means the ratio of the stabilizing moment to the overturning moment.

Stabilizer tie means a flexible line connecting the building anchor and the suspension wire rope supporting the platform.

Supported equipment means building maintenance equipment that is held or moved to its working position by means of attachment directly to the building or extensions of the building being maintained.

Suspended equipment means building maintenance equipment that is suspended and raised or lowered to its working position by means of ropes or combination cables attached to some anchorage above the equipment.

Suspended scaffold (swinging scaffold) means a scaffold supported on wire or other ropes, used for work on, or for providing access to, vertical sides of structures on a temporary basis. Such scaffold is not designed for use on a specific structure or group of structures.

Tail line means the nonsupporting end of the wire rope used to suspend the platform.

Tie-in guides means the portion of a building that provides continuous positive engagement between the building and a suspended or supported unit during its vertical travel on the face of the building.

Traction hoist means a type of hoisting machine that does not accumulate the suspension wire rope on the hoisting drum or sheave, and is designed to raise and lower a suspended load by the application of friction forces between the suspension wire rope and the drum or sheave.

Transportable outriggers means outriggers designed to be moved from one work location to another.

Trolley carriage means a carriage suspended from an overhead track structure.

Verified means accepted by design, evaluation, or inspection by a registered professional engineer.

Weatherproof means so constructed that exposure to adverse weather conditions will not affect or interfere with the proper use or functions of the equipment or component.

Winding drum hoist means a type of hoisting machine that accumulates the suspension wire rope on the hoisting drum.

Working platform means suspended or supported equipment intended to provide access to the face of a building and manned by persons engaged in building maintenance.

Wrap means one complete turn of the suspension wire rope around the surface of a hoist drum.

(e) *Powered platform installations—Affected parts of buildings*—(1) *General requirements.* The following requirements apply to affected parts of buildings which utilize working platforms for building maintenance.

(i) Structural supports, tie-downs, tie-in guides, anchoring devices and any affected parts of the building included in the installation shall be designed by or under the direction of a registered professional engineer experienced in such design;

(ii) Exterior installations shall be capable of withstanding prevailing climatic conditions;

(iii) The building installation shall provide safe access to, and egress from, the equipment and sufficient space to conduct necessary maintenance of the equipment;

(iv) The affected parts of the building shall have the capability of sustaining all the loads imposed by the equipment; and,

(v) The affected parts of the building shall be designed so as to allow the equipment to be used without exposing employees to a hazardous condition.

(2) *Tie-in guides.* (i) The exterior of each building shall be provided with tie-in guides unless the conditions in paragraph (e)(2)(ii) or (e)(2)(iii) of this section are met.

NOTE: See Figure 1 in appendix B of this section for a description of a typical continuous stabilization system utilizing tie-in guides.

(ii) If angulated roping is employed, tie-in guides required in paragraph (e)(2)(i) of this section may be eliminated for not more than 75 feet (22.9 m) of the uppermost elevation of the building, if infeasible due to exterior building design, provided an angulation force of at least 10 pounds (44.4 n) is maintained under all conditions of loading.

(iii) Tie-in guides required in paragraph (e)(2)(i) of this section may be eliminated if one of the guide systems in paragraph (e)(2)(iii)(A), (e)(2)(iii)(B) or (e)(2)(iii)(C) of this section is provided, or an equivalent.

(A) Intermittent stabilization system. The system shall keep the equipment in continuous contact with the building facade, and shall prevent sudden horizontal movement of the platform. The system may be used together with continuous positive building guide systems using tie-in guides on the same building, provided the requirements for each system are met.

(*1*) The maximum vertical interval between building anchors shall be three floors or 50 feet (15.3 m), whichever is less.

(*2*) Building anchors shall be located vertically so that attachment of the stabilizer ties will not cause the platform suspension ropes to angulate the platform horizontally across the face of the building. The anchors shall be positioned horizontally on the building face so as to be symmetrical about the platform suspension ropes.

(*3*) Building anchors shall be easily visible to employees and shall allow a stabilizer tie attachment for each of the platform suspension ropes at each vertical interval. If more than two suspension ropes are used on a platform, only the two building-side suspension ropes at the platform ends shall require a stabilizer attachment.

(*4*) Building anchors which extend beyond the face of the building shall be free of sharp edges or points. Where cables, suspension wire ropes and lifelines may be in contact with the building face, external building anchors shall not interfere with their handling or operation.

(*5*) The intermittent stabilization system building anchors and components shall be capable of sustaining without failure at least four times the maximum anticipated load applied or transmitted to the components and anchors. The minimum design wind load for each anchor shall be 300 (1334 n) pounds, if two anchors share the wind load.

(*6*) The building anchors and stabilizer ties shall be capable of sustaining anticipated horizontal and vertical loads from winds specified for roof storage design which may act on the platform and wire ropes if the platform is stranded on a building face. If the building anchors have different spacing than the suspension wire rope or if the building requires different suspension spacings on one platform, one building anchor and stabilizer tie shall be capable of sustaining the wind loads.

NOTE: See Figure 2 in appendix B of this section for a description of a typical intermittent stabilization system.

(B) Button guide stabilization system.

(*1*) Guide buttons shall be coordinated with platform mounted equipment of paragraph (f)(5)(vi) of this section.

(*2*) Guide buttons shall be located horizontally on the building face so as to allow engagement of each of the guide tracks mounted on the platform.

(*3*) Guide buttons shall be located in vertical rows on the building face for proper engagement of the guide tracks mounted on the platform.

(*4*) Two guide buttons shall engage each guide track at all times except for the initial engagement.

(*5*) Guide buttons which extend beyond the face of the building shall be free of sharp edges or points. Where cables, ropes and lifelines may be in contact with the building face, guide buttons shall not interfere with their handling or operation.

(*6*) Guide buttons, connections and seals shall be capable of sustaining without damage at least the weight of the platform, or provision shall be made in the guide tracks or guide track connectors to prevent the platform and its attachments from transmitting the weight of the platform to the guide buttons, connections and seals. In either case, the minimum design load shall be 300 pounds (1334 n) per building anchor.

NOTE: See paragraph (f)(5)(vi) of this section for relevant equipment provisions.

NOTE: See Figure 3 in appendix B of this section for a a description of a typical button guide stabilization system.

(C) System utilizing angulated roping and building face rollers. The system shall keep the equipment in continuous contact with the building facade, and shall prevent sudden horizontal movement of the platform. This system is acceptable only where the suspended portion of the equipment in use does not exceed 130 feet (39.6 m) above a safe surface or ground level, and where the platform maintains no less than 10 pounds (44.4 n) angulation force on the building facade.

(iv) Tie-in guides for building interiors (atriums) may be eliminated when a registered professional engineer determines that an alternative stabilization system, including systems in paragraphs (e)(2)(iii) (A), (B) and (C), or a platform tie-off at each work station will provide equivalent safety.

(3) *Roof guarding.* (i) Employees working on roofs while performing building maintenance shall be protected by a perimeter guarding system which meets the requirements of paragraph (c)(1) of § 1910.23 of this part.

(ii) The perimeter guard shall not be more than six inches (152 mm) inboard of the inside face of a barrier, i.e. the parapet wall, or roof edge curb of the building being serviced; however, the perimeter guard location shall not exceed an 18 inch (457 mm) setback from the exterior building face.

(4) *Equipment stops.* Operational areas for trackless type equipment shall be provided with structural stops, such as curbs, to prevent equipment from traveling outside its intended travel areas and to prevent a crushing or shearing hazard.

(5) *Maintenance access.* Means shall be provided to traverse all carriages and their suspended equipment to a safe area for maintenance and storage.

(6) *Elevated track.* (i) An elevated track system which is located four feet (1.2 m) or more above a safe surface, and traversed by carriage supported equipment, shall be provided with a walkway and guardrail system; or

(ii) The working platform shall be capable of being lowered, as part of its normal operation, to the lower safe surface for access and egress of the personnel and shall be provided with a safe means of access and egress to the lower safe surface.

(7) *Tie-down anchors.* Imbedded tie-down anchors, fasteners, and affected structures shall be resistant to corrosion.

(8) *Cable stabilization.* (i) Hanging lifelines and all cables not in tension shall be stabilized at each 200 foot (61 m) interval of vertical travel of the working platform beyond an initial 200 foot (61 m) distance.

(ii) Hanging cables, other than suspended wire ropes, which are in constant tension shall be stabilized when the vertical travel exceeds an initial 600 foot (183 m) distance, and at further intervals of 600 feet (183 m) or less.

(9) *Emergency planning.* A written emergency action plan shall be developed and implemented for each kind of working platform operation. This plan shall explain the emergency procedures which are to be followed in the event of a power failure, equipment failure or other emergencies which may be encountered. The plan shall also explain that employees inform themselves about the building emergency escape routes, procedures and alarm systems before operating a platform. Upon initial assignment and whenever the plan is changed the employer shall review with each employee those parts of the

plan which the employee must know to protect himself or herself in the event of an emergency.

(10) *Building maintenance.* Repairs or major maintenance of those building portions that provide primary support for the suspended equipment shall not affect the capability of the building to meet the requirements of this standard.

(11) *Electrical requirements.* The following electrical requirements apply to buildings which utilize working platforms for building maintenance.

(i) General building electrical installations shall comply with §§1910.302 through 1910.308 of this part, unless otherwise specified in this section;

(ii) Building electrical wiring shall be of such capacity that when full load is applied to the equipment power circuit not more than a five percent drop from building service-vault voltage shall occur at any power circuit outlet used by equipment regulated by this section;

(iii) The equipment power circuit shall be an independent electrical circuit that shall remain separate from all other equipment within or on the building, other than power circuits used for hand tools that will be used in conjunction with the equipment. If the building is provided with an emergency power system, the equipment power circuit may also be connected to this system;

(iv) The power circuit shall be provided with a disconnect switch that can be locked in the ''OFF'' and ''ON'' positions. The switch shall be conveniently located with respect to the primary operating area of the equipment to allow the operators of the equipment access to the switch;

(v) The disconnect switch for the power circuit shall be locked in the ''ON'' position when the equipment is in use; and

(vi) An effective two-way voice communication system shall be provided between the equipment operators and persons stationed within the building being serviced. The communications facility shall be operable and shall be manned at all times by persons stationed within the building whenever the platform is being used.

(f) *Powered platform installations—Equipment*—(1) *General requirements.* The following requirements apply to equipment which are part of a powered platform installation, such as platforms, stabilizing components, carriages, outriggers, davits, hoisting machines, wire ropes and electrical components.

(i) Equipment installations shall be designed by or under the direction of a registered professional engineer experienced in such design;

(ii) The design shall provide for a minimum live load of 250 pounds (113.6 kg) for each occupant of a suspended or supported platform;

(iii) Equipment that is exposed to wind when not in service shall be designed to withstand forces generated by winds of at least 100 miles per hour (44.7 m/s) at 30 feet (9.2 m) above grade; and

(iv) Equipment that is exposed to wind when in service shall be designed to withstand forces generated by winds of at least 50 miles per hour (22.4 m/s) for all elevations.

(2) *Construction requirements.* Bolted connections shall be self-locking or shall otherwise be secured to prevent loss of the connections by vibration.

(3) *Suspension methods.* Elevated building maintenance equipment shall be suspended by a carriage, outriggers, davits or an equivalent method.

(i) *Carriages.* Carriages used for suspension of elevated building maintenance equipment shall comply with the following:

(A) The horizontal movement of a carriage shall be controlled so as to ensure its safe movement and allow accurate positioning of the platform for vertical travel or storage;

(B) Powered carriages shall not exceed a traversing speed of 50 feet per minute (0.3 m/s);

(C) The initiation of a traversing movement for a manually propelled carriage on a smooth level surface shall not require a person to exert a horizontal force greater than 40 pounds (444.8 n);

(D) Structural stops and curbs shall be provided to prevent the traversing of the carriage beyond its designed limits of travel;

(E) Traversing controls for a powered carriage shall be of a continuous pressure weatherproof type. Multiple controls when provided shall be arranged to permit operation from only one control station at a time. An emergency stop device shall be provided on each end of a powered carriage for interrupting power to the carriage drive motors;

(F) The operating controls(s) shall be so connected that in the case of suspended equipment, traversing of a carriage is not possible until the suspended portion of the equipment is located at its uppermost designed position for traversing; and is free of contact with the face of the building or building guides. In addition, all protective devices and interlocks are to be in the proper position to allow traversing of the carriage;

(G) Stability for underfoot supported carriages shall be obtained by gravity, by an attachment to a structural support, or by a combination of gravity and a structural support. The use of flowing counterweights to achieve stability is prohibited.

(*1*) The stability factor against overturning shall not be less than two for horizontal traversing of the carriage, including the effects of impact and wind.

(*2*) The carriages and their anchorages shall be capable of resisting accidental over-tensioning of the wire ropes suspending the working platform, and this calculated value shall include the effect of one and one-half times the stall capacity of the hoist motor. All parts of the installation shall be capable of withstanding without damage to any part of the installation the forces resulting from the stall load of the hoist and one half the wind load.

(*3*) Roof carriages which rely on having tie-down devices secured to the building to develop the required stability against overturning shall be provided with an interlock which will prevent vertical platform movement unless the tie-down is engaged;

(H) An automatically applied braking or locking system, or equivalent, shall be provided that will prevent unintentional traversing of power traversed or power assisted carriages;

(I) A manual or automatic braking or locking system or equivalent, shall be provided that will prevent unintentional traversing of manually propelled carriages;

(J) A means to lock out the power supply for the carriage shall be provided;

(K) Safe access to and egress from the carriage shall be provided from a safe surface. If the carriage traverses an elevated area, any operating area on the carriage shall be protected by a guardrail system in compliance with the provisions of paragraph (f)(5)(i)(F) of this section. Any access gate shall be self-closing and self-latching, or provided with an interlock;

(L) Each carriage work station position shall be identified by location markings and/or position indicators; and

(M) The motors shall stall if the load on the hoist motors is at any time in excess of three times that necessary for lifting the working platform with its rated load.

(ii) *Transportable outriggers.* (A) Transportable outriggers may be used as a method of suspension for ground rigged working platforms where the point of suspension does not exceed 300 feet (91.5 m) above a safe surface. Tie-in guide system(s) shall be provided which meet the requirements of paragraph (e)(2) of this section.

(B) Transportable outriggers shall be used only with self-powered, ground rigged working platforms.

(C) Each transportable outrigger shall be secured with a tie-down to a verified anchorage on the building during the entire period of its use. The anchorage shall be designed to have a stability factor of not less than four against overturning or upsetting of the outrigger.

(D) Access to and egress from the working platform shall be from and to a safe surface below the point of suspension.

(E) Each transportable outrigger shall be designed for lateral stability to prevent roll-over in the event an accidental lateral load is applied to the outrigger. The accidental lateral load to be considered in this design shall be not less than 70 percent of the rated load of the hoist.

(F) Each transportable outrigger shall be designed to support an ultimate load of not less than four times the rated load of the hoist.

(G) Each transportable outrigger shall be so located that the suspension wire ropes for two point suspended working platforms are hung parallel.

(H) A transportable outrigger shall be tied-back to a verified anchorage on the building with a rope equivalent in strength to the suspension rope.

(I) The tie-back rope shall be installed parallel to the centerline of the outrigger.

(iii) Davits. (A) Every davit installation, fixed or transportable, rotatable or non-rotatable shall be designed and installed to insure that it has a stability factor against overturning of not less than four.

(B) The following requirements apply to roof rigged davit systems:

(*1*) Access to and egress from the working platform shall be from a safe surface. Access or egress shall not require persons to climb over a building's parapet or guard railing; and

(*2*) The working platform shall be provided with wheels, casters or a carriage for traversing horizontally.

(C) The following requirements apply to ground rigged davit systems:

(*1*) The point of suspension shall not exceed 300 feet (91.5 m) above a safe surface. Guide system(s) shall be provided which meet the requirements of paragraph (e)(2) of this section;

(*2*) Access and egress to and from the working platform shall only be from a safe surface below the point of suspension.

(D) A rotating davit shall not require a horizontal force in excess of 40 pounds (177.9 n) per person to initiate a rotating movement.

(E) The following requirements shall apply to transportable davits:

(*1*) A davit or part of a davit weighing more than 80 pounds (36 kg) shall be provided with a means for its transport, which shall keep the center of gravity of the davit at or below 36 inches (914 mm) above the safe surface during transport;

(*2*) A davit shall be provided with a pivoting socket or with a base that will allow the insertion or removal of a davit at a position of not more than 35 degrees above the horizontal, with the complete davit inboard of the building face being serviced; and

(*3*) Means shall be provided to lock the davit to its socket or base before it is used to suspend the platform.

(4) *Hoisting machines.* (i) Raising and lowering of suspended or supported equipment shall be performed only by a hoisting machine.

(ii) Each hoisting machine shall be capable of arresting any overspeed descent of the load.

(iii) Each hoisting machine shall be powered only by air, electric or hydraulic sources.

(iv) Flammable liquids shall not be carried on the working platform.

(v) Each hoisting machine shall be capable of raising or lowering 125 percent of the rated load of the hoist.

(vi) Moving parts of a hoisting machine shall be enclosed or guarded in compliance with paragraphs (a)(1) and (2) of § 1910.212 of this part.

(vii) Winding drums, traction drums and sheaves and directional sheaves used in conjunction with hoisting machines shall be compatible with, and sized for, the wire rope used.

(viii) Each winding drum shall be provided with a positive means of attaching the wire rope to the drum. The attachment shall be capable of developing at least four times the rated load of the hoist.

(ix) Each hoisting machine shall be provided with a primary brake and at least one independent secondary brake, each capable of stopping and holding not less than 125 percent of the lifting capacity of the hoist.

(A) The primary brake shall be directly connected to the drive train of the hoisting machine, and shall not be connected through belts, chains, clutches, or set screw type devices. The brake shall automatically set when power to the prime mover is interrupted.

(B)(*1*) The secondary brake shall be an automatic emergency type of brake that, if actuated during each stopping cycle, shall not engage before the hoist is stopped by the primary brake.

(*2*) When a secondary brake is actuated, it shall stop and hold the platform within a vertical distance of 24 inches (609.6 mm).

~~(x) Any component of a hoisting machine which requires lubrication for its protection and proper functioning shall be provided with a means for that lubrication to be applied.~~

~~(5) *Suspended equipment*—(i) *General requirements.* (A) Each suspended unit component, except suspension ropes and guardrail systems, shall be capable of supporting, without failure, at least four times the maximum intended live load applied or transmitted to that component.~~

~~(B) Each suspended unit component shall be constructed of materials that will withstand anticipated weather conditions.~~

(C) Each suspended unit shall be provided with a load rating plate, conspicuously located, stating the unit weight and rated load of the suspended unit.

(D) When the suspension points on a suspended unit are not at the unit ends, the unit shall be capable of remaining continuously stable under all conditions of use and position of the live load, and shall maintain at least a 1.5 to 1 stability factor against unit upset.

(E) Guide rollers, guide shoes or building face rollers shall be provided, and shall compensate for variations in building dimensions and for minor horizontal out-of-level variations of each suspended unit.

(F) Each working platform of a suspended unit shall be secured to the building facade by one or more of the following methods, or by an equivalent method:

(*1*) Continuous engagement to building anchors as provided in paragraph (e)(2)(i) of this section;

(*2*) Intermittent engagement to building anchors as provided in paragraph (e)(2)(iii)(A) of this section;

(*3*) Button guide engagement as provided in paragraph (e)(2)(iii)(B) of this section; or

(*4*) Angulated roping and building face rollers as provided in paragraph (e)(2)(iii)(C) of this section.

(G) Each working platform of a suspended unit shall be provided with a guardrail system on all sides which shall meet the following requirements:

(*1*) The system shall consist of a top guardrail, midrail, and a toeboard;

(*2*) The top guardrail shall not be less than 36 inches (914 mm) high and shall be able to withstand at least a 100-pound (444 n) force in any downward or outward direction;

(*3*) The midrail shall be able to withstand at least a 75-pound (333 n) force in any downward or outward direction; and

(*4*) The areas between the guardrail and toeboard on the ends and outboard side, and the area between the midrail and toeboard on the inboard side, shall be closed with a material that is capable of withstanding a load of 100 pounds (45.4 KG.) applied horizontally over any area of one square foot (.09 m^2). The material shall have all openings small enough to reject passage of life lines and potential falling objects which may be hazardous to persons below.

(*5*) Toeboards shall be capable of withstanding, without failure, a force of at least 50 pounds (222 n) applied in any downward or horizontal direction at any point along the toeboard.

(*6*) Toeboards shall be three and one-half inches (9 cm) minimum in length from their top edge to the level of the platform floor.

(*7*) Toeboards shall be securely fastened in place at the outermost edge of the platform and have no more than one-half inch (1.3 cm) clearance above the platform floor.

(*8*) Toeboards shall be solid or with an opening not over one inch (2.5 cm) in the greatest dimension.

(ii) *Two and four-point suspended working platforms.* (A) The working platform shall be not less than 24 inches (610 mm) wide and shall be provided with a minimum of a 12 inch (305 mm) wide passage at or past any obstruction on the platform.

(B) The flooring shall be of a slip-resistant type and shall contain no opening that would allow the passage of life lines, cables and other potential falling objects. If a larger opening is provided, it shall be protected by placing a material under the opening which shall prevent the passage of life lines, cables and potential falling objects.

(C) The working platfrom shall be provided with a means of suspension

that will restrict the platform's inboard to outboard roll about its longitudinal axis to a maximum of 15 degrees from a horizontal plane when moving the live load from the inboard to the outboard side of the platform.

(D) Any cable suspended from above the platform shall be provided with a means for storage to prevent accumulation of the cable on the floor of the platform.

(E) All operating controls for the vertical travel of the platform shall be of the continuous-pressure type, and shall be located on the platform.

(F) Each operating station of every working platform shall be provided with a means of interrupting the power supply to all hoist motors to stop any further powered ascent or descent of the platform.

(G) The maximum rated speed of the platform shall not exceed 50 feet per minute (0.3 ms) with single speed hoists, nor 75 feet per minute (0.4 ms) with multi-speed hoists.

(H) Provisions shall be made for securing all tools, water tanks, and other accessories to prevent their movement or accumulation on the floor of the platform.

(I) Portable fire extinguishers conforming to the provisions of §1910.155 and §1910.157 of this part shall be provided and securely attached on all working platforms.

(J) Access to and egress from a working platfrom, except for those that land directly on a safe surface, shall be provided by stairs, ladders, platforms and runways conforming to the provisions of subpart D of this part. Access gates shall be self-closing and self-latching.

(K) Means of access to or egress from a working platform which is 48 inches (1.2 m) or more above a safe surface shall be provided with a guardrail system or ladder handrails that conform to the provisions of subpart D of this part.

(L) The platform shall be provided with a secondary wire rope suspension system if the platform contains overhead structures which restrict the emergency egress of employees. A horizontal lifeline or a direct connection anchorage shall be provided, as part of a fall arrest system which meets the requirements of appendix C, for each employee on such a platform.

(M) A vertical lifeline shall be provided as part of a fall arrest system which meets the requirements of appendix C, for each employee on a working platform suspended by two or more wire ropes, if the failure of one wire rope or suspension attachment will cause the platform to upset. If a secondary wire rope suspension is used, vertical lifelines are not required for the fall arrest system, provided that each employee is attached to a horizontal lifeline anchored to the platform.

(N) An emergency electric operating device shall be provided on roof powered platforms near the hoisting machine for use in the event of failure of the normal operating device located on the working platform, or failure of the cable connected to the platform. The emergency electric operating device shall be mounted in a secured compartment, and the compartment shall be labeled with instructions for use. A means for opening the compartment shall be mounted in a break-glass receptable located near the emergency electric operating device or in an equivalent secure and accessible location.

(iii) *Single point suspended working platforms.* (A) The requirements of paragraphs (f)(5)(ii) (A) through (K) of this section shall also apply to a single point working platform.

(B) Each single point suspended working platform shall be provided with a secondary wire rope suspension system, which will prevent the working platform from falling should there be a failure of the primary means of support, or if the platform contains overhead structures which restrict the egress of the employees. A horizontal life line or a direct connection anchorage shall be provided, as part of a fall arrest system which meets the requirements of appendix C, for each employee on the platform.

(iv) *Ground-rigged working platforms.* (A) Groundrigged working platforms shall comply with all the requirements of paragraphs (f)(5)(ii) (A) through (M) of this section.

(B) After each day's use, the power supply within the building shall be disconnected from a ground-rigged working platform, and the platform shall be either disengaged from its suspension points or secured and stored at grade.

(v) *Intermittently stabilized platforms.* (A) The platform shall comply with paragraphs (F)(5)(ii) (A) through (M) of this section.

(B) Each stabilizer tie shall be equipped with a ''quick connect-quick disconnect'' device which cannot be accidently disengaged, for attachment to the building anchor, and shall be resistant to adverse environmental conditions.

(C) The platform shall be provided with a stopping device that will interrupt the hoist power supply in the event the platform contacts a stabilizer tie during its ascent.

(D) Building face rollers shall not be placed at the anchor setting if exterior anchors are used on the building face.

(E) Stabilizer ties used on intermittently stabilized platforms shall allow for the specific attachment length needed to effect the predetermined angulation of the suspended wire rope. The specific attachment length shall be maintained at all building anchor locations.

(F) The platform shall be in continuous contact with the face of the building during ascent and descent.

(G) The attachment and removal of stabilizer ties shall not require the horizontal movement of the platform.

(H) The platform-mounted equipment and its suspension wire ropes shall not be physically damaged by the loads from the stabilizer tie or its building anchor. The platform, platform mounted equipment and wire ropes shall be able to withstand a load that is at least twice the ultimate strength of the stabilizer tie.

NOTE: See Figure II in appendix B of this section for a description of a typical intermittent stabilization system.

(vi) *Button-guide stabilized platforms.* (A) The platform shall comply with paragraphs (f)(5)(ii) (A) through (M) of this section.

(B) Each guide track on the platform shall engage a minimum of two guide buttons during any vertical travel of the platform following the initial button engagement.

(C) Each guide track on a platform that is part of a roof rigged system shall be provided with a storage position on the platform.

(D) Each guide track on the platform shall be sufficiently maneuverable by platform occupants to permit easy engagement of the guide buttons, and easy movement into and out of its storage position on the platform.

(E) Two guide tracks shall be mounted on the platform and shall provide continuous contact with the building face.

(F) The load carrying components of the button guide stabilization system which transmit the load into the platform shall be capable of supporting the weight of the platform, or provision shall be made in the guide track connectors or platform attachments to prevent the weight of the platform from being transmitted to the platform attachments.

NOTE: See Figure III in appendix B of this section for a description of a typical button guide stabilization system.

(6) *Supported equipment.* (i) Supported equipment shall maintain a vertical position in respect to the face of the building by means other than friction.

(ii) Cog wheels or equivalent means shall be incorporated to provide climbing traction between the supported equipment and the building guides. Additional guide wheels or shoes shall be incorporated as may be necessary to ensure that the drive wheels are continuously held in positive engagement with the building guides.

(iii) Launch guide mullions indexed to the building guides and retained in alignment with the building guides shall be used to align drive wheels entering the building guides.

(iv) Manned platforms used on supported equipment shall comply with the requirements of paragraphs (f)(5)(ii)(A), (f)(5)(ii)(B), and (f)(5)(ii) (D) through (K) of this section covering suspended equipment.

(7) *Suspension wire ropes and rope connections.* (i) Each specific installation shall use suspension wire ropes or combination cable and connections meeting the specification recommended by

the manufacturer of the hoisting machine used. Connections shall be capable of developing at least 80 percent of the rated breaking strength of the wire rope.

(ii) Each suspension rope shall have a ''Design Factor'' of at least 10. The ''Design Factor'' is the ratio of the rated strength of the suspension wire rope to the rated working load, and shall be calculated using the following formula:

$$F = \frac{S(N)}{W}$$

Where:

F = Design factor
S = Manufacturer's rated strength of one suspension rope
N = Number of suspension ropes under load
W = Rated working load on all ropes at any point of travel

(iii) Suspension wire rope grade shall be at least improved plow steel or equivalent.

(iv) Suspension wire ropes shall be sized to conform with the required design factor, but shall not be less than 5/16 inch (7.94 mm) in diameter.

(v) No more than one reverse bend in six wire rope lays shall be permitted.

(vi) A corrosion-resistant tag shall be securely attached to one of the wire rope fastenings when a suspension wire rope is to be used at a specific location and will remain in that location. This tag shall bear the following wire rope data:

(A) The diameter (inches and/or mm);

(B) Construction classification;

(C) Whether non-preformed or preformed;

(D) The grade of material;

(E) The manufacturer's rated strength;

(F) The manufacturer's name;

(G) The month and year the ropes were installed; and

(H) The name of the person or company which installed the ropes.

(vii) A new tag shall be installed at each rope renewal.

(viii) The original tag shall be stamped with the date of the resocketing, or the original tag shall be retained and a supplemental tag shall be provided when ropes are resocketed. The supplemental tag shall show the date of resocketing and the name of the person or company that resocketed the rope.

(ix) Winding drum type hoists shall contain at least three wraps of the suspension wire rope on the drum when the suspended unit has reached the lowest possible point of its vertical travel.

(x) Traction drum and sheave type hoists shall be provided with a wire rope of sufficient length to reach the lowest possible point of vertical travel of the suspended unit, and an additional length of the wire rope of at least four feet (1.2 m).

(xi) The lengthening or repairing of suspension wire ropes is prohibited.

(xii) Babbitted fastenings for suspension wire rope are prohibited.

(8) *Control circuits, power circuits and their components.* (i) Electrical wiring and equipment shall comply with subpart S of this part, except as otherwise required by this section.

(ii) Electrical runway conductor systems shall be of a type designed for use in exterior locations, and shall be located so that they do not come into contact with accumulated snow or water.

(iii) Cables shall be protected against damage resulting from overtensioning or from other causes.

(iv) Devices shall be included in the control system for the equipment which will provide protection against electrical overloads, three phase reversal and phase failure. The control system shall have a separate method, independent of the direction control circuit, for breaking the power circuit in case of an emergency or malfunction.

(v) Suspended or supported equipment shall have a control system which will require the operator of the equipment to follow predetermined procedures.

(vi) The following requirements shall apply to electrical protection devices:

(A) On installations where the carriage does not have a stability factor of at least four against overturning, electrical contact(s) shall be provided and so connected that the operating devices for the suspended or supported equipment shall be operative only when the

carriage is located and mechanically retained at an established operating point.

(B) Overload protection shall be provided in the hoisting or suspension system to protect against the equipment operating in the ''up'' direction with a load in excess of 125 percent of the rated load of the platform; and

(C) An automatic detector shall be provided for each suspension point that will interrupt power to all hoisting motors for travel in the ''down'' direction, and apply the primary brakes if any suspension wire rope becomes slack. A continuous-pressure rigging-bypass switch designed for use during rigging is permitted. This switch shall only be used during rigging.

(vii) Upper and lower directional switches designed to prevent the travel of suspended units beyond safe upward and downward levels shall be provided.

(viii) Emergency stop switches shall be provided on remote controlled, roof-powered manned platforms adjacent to each control station on the platform.

(ix) Cables which are in constant tension shall have overload devices which will prevent the tension in the cable from interfering with the load limiting device required in paragraph (f)(8)(vi)(B) of this section, or with the platform roll limiting device required in paragraph (f)(5)(ii)(C) of this section. The setting of these devices shall be coordinated with other overload settings at the time of design of the system, and shall be clearly indicated on or near the device. The device shall interrupt the equipment travel in the ''down'' direction.

(g) *Inspection and tests*—(1) *Installations and alterations.* All completed building maintenance equipment installations shall be inspected and tested in the field before being placed in initial service to determine that all parts of the installation conform to applicable requirements of this standard, and that all safety and operating equipment is functioning as required. A similar inspection and test shall be made following any major alteration to an existing installation. No hoist in an installation shall be subjected to a load in excess of 125 percent of its rated load.

(2) *Periodic inspections and tests.* (i) Related building supporting structures shall undergo periodic inspection by a competent person at intervals not exceeding 12 months.

(ii) All parts of the equipment including control systems shall be inspected, and, where necessary, tested by a competent person at intervals specified by the manufacturer/supplier, but not to exceed 12 months, to determine that they are in safe operating condition. Parts subject to wear, such as wire ropes, bearings, gears, and governors shall be inspected and/or tested to determine that they have not worn to such an extent as to affect the safe operation of the installation.

(iii) The building owner shall keep a certification record of each inspection and test required under paragraphs (g)(2)(i) and (ii) of this section. The certification record shall include the date of the inspection, the signature of the person who performed the inspection, and the number, or other identifier, of the building support structure and equipment which was inspected. This certification record shall be kept readily available for review by the Assistant Secretary of Labor or the Assistant Secretary's representative and by the employer.

(iv) Working platforms and their components shall be inspected by the employer for visible defects before every use and after each occurrence which could affect the platform's structural integrity.

(3) *Maintenance inspections and tests.* (i) A maintenance inspection and, where necessary, a test shall be made of each platform installation every 30 days, or where the work cycle is less than 30 days such inspection and/or test shall be made prior to each work cycle. This inspection and test shall follow procedures recommended by the manufacturer, and shall be made by a competent person.

(ii) The building owner shall keep a certification record of each inspection and test performed under paragraph (g)(3)(i) of this section. The certification record shall include the date of the inspection and test, the signature of the person who performed the inspection and/or test, and an identifier for the platform installation which was

inspected. The certification record shall be kept readily available for review by the Assistant Secretary of Labor or the Assistant Secretary's representative and by the employer.

(4) *Special inspection of governors and secondary brakes.* (i) Governors and secondary brakes shall be inspected and tested at intervals specified by the manufacturer/supplier but not to exceed every 12 months.

(ii) The results of the inspection and test shall confirm that the initiating device for the secondary braking system operates at the proper overspeed.

(iii) The results of the inspection and test shall confirm that the secondary brake is functioning properly.

(iv) If any hoisting machine or initiating device for the secondary brake system is removed from the equipment for testing, all reinstalled and directly related components shall be reinspected prior to returning the equipment installation to service.

(v) Inspection of governors and secondary brakes shall be performed by a competent person.

(vi) The secondary brake governor and actuation device shall be tested before each day's use. Where testing is not feasible, a visual inspection of the brake shall be made instead to ensure that it is free to operate.

(5) *Suspension wire rope maintenance, inspection and replacement.* (i) Suspension wire rope shall be maintained and used in accordance with procedures recommended by the wire rope manufacturer.

(ii) Suspension wire rope shall be inspected by a competent person for visible defects and gross damage to the rope before every use and after each occurrence which might affect the wire rope's integrity.

(iii) A thorough inspection of suspension wire ropes in service shall be made once a month. Suspension wire ropes that have been inactive for 30 days or longer shall have a thorough inspection before they are placed into service. These thorough inspections of suspension wire ropes shall be performed by a competent person.

(iv) The need for replacement of a suspension wire rope shall be determined by inspection and shall be based on the condition of the wire rope. Any of the following conditions or combination of conditions will be cause for removal of the wire rope:

(A) Broken wires exceeding three wires in one strand or six wires in one rope lay;

(B) Distortion of rope structure such as would result from crushing or kinking;

(C) Evidence of heat damage;

(D) Evidence of rope deterioration from corrosion;

(E) A broken wire within 18 inches (460.8 mm) of the end attachments;

(F) Noticeable rusting and pitting;

(G) Evidence of core failure (a lengthening of rope lay, protrusion of the rope core and a reduction in rope diameter suggests core failure); or

(H) More than one valley break (broken wire).

(I) Outer wire wear exceeds one-third of the original outer wire diameter.

(J) Any other condition which the competent person determines has significantly affected the integrity of the rope.

(v) The building owner shall keep a certification record of each monthly inspection of a suspension wire rope as required in paragraph (g)(5)(iii) of this section. The record shall include the date of the inspection, the signature of the person who performed the inspection, and a number, or other identifier, of the wire rope which was inspected. This record of inspection shall be made available for review by the Assistant Secretary of Labor or the Assistant Secretary's representative and by the employer.

(6) *Hoist inspection.* Before lowering personnel below the top elevation of the building, the hoist shall be tested each day in the lifting direction with the intended load to make certain it has sufficient capacity to raise the personnel back to the boarding level.

(h) *Maintenance*—(1) *General maintenance.* All parts of the equipment affecting safe operation shall be maintained in proper working order so that they may perform the functions for which they were intended. The equipment shall be taken out of service when it is not in proper working order.

(2) *Cleaning.* (i) Control or power contactors and relays shall be kept clean.

(ii) All other parts shall be kept clean if their proper functioning would be affected by the presence of dirt or other contaminants.

(3) *Periodic resocketing of wire rope fastenings.* (i) Hoisting ropes utilizing poured socket fastenings shall be resocketed at the non-drum ends at intervals not exceeding 24 months. In resocketing the ropes, a sufficient length shall be cut from the end of the rope to remove damaged or fatigued portions.

(ii) Resocketed ropes shall conform to the requirements of paragraph (f)(7) of this section.

(iii) Limit switches affected by the resocketed ropes shall be reset, if necessary.

(4) *Periodic reshackling of suspension wire ropes.* The hoisting ropes shall be reshackled at the nondrum ends at intervals not exceeding 24 months. When reshackling the ropes, a sufficient length shall be cut from the end of the rope to remove damaged or fatigued portions.

(5) *Roof systems.* Roof track systems, tie-downs, or similar equipment shall be maintained in proper working order so that they perform the function for which they were intended.

(6) *Building face guiding members.* T-rails, indented mullions, or equivalent guides located in the face of a building shall be maintained in proper working order so that they perform the functions for which they were intended. Brackets for cable stabilizers shall similarly be maintained in proper working order.

(7) *Inoperative safety devices.* No person shall render a required safety device or electrical protective device inoperative, except as necessary for tests, inspections, and maintenance. Immediately upon completion of such tests, inspections and maintenance, the device shall be restored to its normal operating condition.

(i) *Operations*—(1) *Training.* (i) Working platforms shall be operated only by persons who are proficient in the operation, safe use and inspection of the particular working platform to be operated.

(ii) All employees who operate working platforms shall be trained in the following:

(A) Recognition of, and preventive measures for, the safety hazards associated with their individual work tasks.

(B) General recognition and prevention of safety hazards associated with the use of working platforms, including the provisions in the section relating to the particular working platform to be operated.

(C) Emergency action plan procedures required in paragraph (e)(9) of this section.

(D) Work procedures required in paragraph (i)(1)(iv) of this section.

(E) Personal fall arrest system inspection, care, use and system performance.

(iii) Training of employees in the operation and inspection of working platforms shall be done by a competent person.

(iv) Written work procedures for the operation, safe use and inspection of working platforms shall be provided for employee training. Pictorial methods of instruction, may be used, in lieu of written work procedures, if employee communication is improved using this method. The operating manuals supplied by manufacturers for platform system components can serve as the basis for these procedures.

(v) The employer shall certify that employees have been trained in operating and inspecting a working platform by preparing a certification record which includes the identity of the person trained, the signature of the employer or the person who conducted the training and the date that training was completed. The certification record shall be prepared at the completion of the training required in paragraph (i)(1)(ii) of this section, and shall be maintained in a file for the duration of the employee's employment. The certification record shall be kept readily available for review by the Assistant Secretary of Labor or the Assistant Secretary's representative.

(2) *Use.* (i) Working platforms shall not be loaded in excess of the rated load, as stated on the platform load rating plate.

(ii) Employees shall be prohibited from working on snow, ice, or other slippery material covering platforms, except for the removal of such materials.

(iii) Adequate precautions shall be taken to protect the platform, wire ropes and life lines from damage due to acids or other corrosive substances, in accordance with the recommendations of the corrosive substance producer, supplier, platform manufacturer or other equivalent information sources. Platform members which have been exposed to acids or other corrosive substances shall be washed down with a neutralizing solution, at a frequency recommended by the corrosive substance producer or supplier.

(iv) Platform members, wire ropes and life lines shall be protected when using a heat producing process. Wire ropes and life lines which have been contacted by the heat producing process shall be considered to be permanently damaged and shall not be used.

(v) The platform shall not be operated in winds in excess of 25 miles per hour (40.2 km/hr) except to move it from an operating to a storage position. Wind speed shall be determined based on the best available information, which includes on-site anemometer readings and local weather forecasts which predict wind velocities for the area.

(vi) On exterior installations, an anemometer shall be mounted on the platform to provide information of on-site wind velocities prior to and during the use of the platform. The anemometer may be a portable (hand held) unit which is temporarily mounted during platform use.

(vii) Tools, materials and debris not related to the work in progress shall not be allowed to accumulate on platforms. Stabilizer ties shall be located so as to allow unencumbered passage along the full length of the platform and shall be of such length so as not to become entangled in rollers, hoists or other machinery.

(j) *Personal fall protection.* Employees on working platforms shall be protected by a personal fall arrest system meeting the requirements of appendix C, section I, of this standard, and as otherwise provided by this standard.

APPENDIX A TO § 1910.66, GUIDELINES (ADVISORY)

1. *Use of the Appendix.* Appendix A provides examples of equipment and methods to assist the employer in meeting the requirements of the indicated provision of the standard. Employers may use other equipment or procedures which conform to the requirements of the standard. This appendix neither adds to nor detracts from the mandatory requirements set forth in § 1910.66.

2. *Assurance.* Paragraph (c) of the standard requires the building owner to inform the employer in writing that the powered platform installation complies with certain requirements of the standard, since the employer may not have the necessary information to make these determinations. The employer, however, remains responsible for meeting these requirements which have not been set off in paragraph (c)(1).

3. *Design Requirements.* The design requirements for each installation should be based on the limitations (stresses, deflections, etc.), established by nationally recognized standards as promulgated by the following organizations, or to equivalent standards:

AA—The Aluminum Association, 818 Connecticut Avenue, NW., Washington, DC, 20006

Aluminum Construction Manual

Specifications For Aluminum Structures

Aluminum Standards and Data

AGMA—American Gear Manufacturers Association, 101 North Fort Meyer Dr., Suite 1000, Arlington, VA 22209

AISC—American Institute of Steel Construction, 400 North Michigan Avenue, Chicago, IL 60611

ANSI—American National Standards Institute, Inc., 1430 Broadway, New York, NY 10018

ASCE—American Society of Civil Engineers, 345 East 47th Street, New York, NY 10017

ASME—American Society of Mechanical Engineers, 345 East 47th Street, New York, NY 10017

ASTM—American Society for Testing and Materials, 1916 Race Street, Philadelphia, PA 19103

AWS—American Welding Society, Inc., Box 351040, 550 NW. LeJeunne Road, Miami, FL 33126

JIC—Joint Industrial Council, 2139 Wisconsin Avenue NW., Washington, DC 20007

NEMA—National Electric Manufacturers Association, 2101 L Street, NW., Washington, DC 20037

4. *Tie-in-guides.* Indented mullions, T-rails or other equivalent guides are acceptable as tie-in guides in a building face for a continuous stabilization system. Internal guides are embedded in other building members with only the opening exposed (see Figure 1 of appendix B). External guides, however, are installed external to the other building members and so are fully exposed. The minimum opening for tie-in guides is three-quarters of an inch (19 mm), and the minimum inside dimensions are one-inch (25 mm) deep and two inches (50 mm) wide.

Employers should be aware of the hazards associated with tie-in guides in a continuous stabilization system which was not designed properly. For example, joints in these track systems may become extended or discontinuous due to installation or building settlement. If this alignment problem is not corrected, the system could jam when a guide roller or guide shoe strikes a joint and this would cause a hazardous situation for employees. In another instance, faulty design will result in guide rollers being mounted in a line so they will jam in the track at the slightest misalignment.

5. *Building anchors (intermittent stabilization system).* In the selection of the vertical distance between building anchors, certain factors should be given consideration. These factors include building height and architectural design, platform length and weight, wire rope angulation, and the wind velocities in the building area. Another factor to consider is the material of the building face, since this material may be adversely affected by the building rollers.

External or indented type building anchors are acceptable. Receptacles in the building facade used for the indented type should be kept clear of extraneous materials which will hinder their use. During the inspection of the platform installation, evidence of a failure or abuse of the anchors should be brought to the attention of the employer.

6. *Stabilizer tie length.* A stabilizer tie should be long enough to provide for the planned angulation of the suspension cables. However, the length of the tie should not be excessive and become a problem by possibly becoming entangled in the building face rollers or parts of the platform machinery.

The attachment length may vary due to material elongation and this should be considered when selecting the material to be used. Consideration should also be given to the use of ties which are easily installed by employees, since this will encourage their use.

7. *Intermittent stabilization system.* Intermittent stabilization systems may use different equipment, tie-in devices and methods to restrict the horizontal movement of a powered platform with respect to the face of the building. One acceptable method employs corrosion-resistant building anchors secured in the face of the building in vertical rows every third floor or 50 feet (15.3 m), whichever is less. The anchors are spaced horizontally to allow a stabilization attachment (stabilizer tie) for each of the two platform suspension wire ropes. The stabilizer tie consists of two parts. One part is a quick connect-quick disconnect device which utilizes a corrosion-resistant yoke and retainer spring that is designed to fit over the building anchors. The second part of the stabilizer tie is a lanyard which is used to maintain a fixed distance between the suspension wire rope and the face of the building.

In this method, as the suspended powered platform descends past the elevation of each anchor, the descent is halted and each of the platform occupants secures a stabilizer tie between a suspension wire rope and a building anchor. The procedure is repeated as each elevation of a building anchor is reached during the descent of the powered platform.

As the platform ascends, the procedure is reversed; that is, the stabilizer ties are removed as each elevation of a building anchor is reached. The removal of each stabilizer tie is assured since the platform is provided with stopping devices which will interrupt power to its hoist(s) in the event either stopping device contacts a stabilizer during the ascent of the platform.

Figure 2 of appendix B illustrates another type of acceptable intermittent stabilization system which utilizes retaining pins as the quick connect-quick disconnect device in the stabilizer tie.

8. *Wire Rope Inspection.* The inspection of the suspension wire rope is important since the rope gradually loses strength during its useful life. The purpose of the inspection is to determine whether the wire rope has sufficient integrity to support a platform with the required design factor.

If there is any doubt concerning the condition of a wire rope or its ability to perform the required work, the rope should be replaced. The cost of wire rope replacement is quite small if compared to the cost in terms of human injuries, equipment down time and replacement.

No listing of critical inspection factors, which serve as a basis for wire rope replacement in the standard, can be a substitute for an experienced inspector of wire rope. The listing serves as a user's guide to the accepted standards by which ropes must be judged.

Rope life can be prolonged if preventive maintenance is performed regularly. Cutting off an appropriate length of rope at the end termination before the core degrades and valley breaks appear minimizes degradation at these sections.

9. *General Maintenance.* In meeting the general maintenance requirement in paragraph (h)(1) of the standard, the employer should undertake the prompt replacement of broken, worn and damaged parts, switch contacts, brushes, and short flexible conductors of electrical devices. The components of the electrical service system and traveling cables should be replaced when damaged or significantly abraded. In addition, gears, shafts, bearings, brakes and hoisting drums should be kept in proper alignment.

10. *Training.* In meeting the training requirement of paragraph (i)(1) of the standard,

employers should use both on the job training and formal classroom training. The written work procedures used for this training should be obtained from the manufacturer, if possible, or prepared as necessary for the employee's information and use.

Employees who will operate powered platforms with intermittent stabilization systems should receive instruction in the specific ascent and descent procedures involving the assembly and disassembly of the stabilizer ties.

An acceptable training program should also include employee instruction in basic inspection procedures for the purpose of determining the need for repair and replacement of platform equipment. In addition, the program should cover the inspection, care and use of the personal fall protection equipment required in paragraph (j)(1) of the standard.

In addition, the training program should also include emergency action plan elements. OSHA brochure #1B3088 (Rev.) 1985, ''How to Prepare for Workplace Emergencies,'' details the basic steps needed to prepare to handle emergencies in the workplace.

Following the completion of a training program, the employee should be required to demonstrate competency in operating the equipment safely. Supplemental training of the employee should be provided by the employer, as necessary, if the equipment used or other working conditions should change.

An employee who is required to work with chemical products on a platform should receive training in proper cleaning procedures, and in the hazards, care and handling of these products. In addition, the employee should be supplied with the appropriate personal protective equipment, such as gloves and eye and face protection.

11. *Suspension and Securing of Powered Platforms (Equivalency).* One acceptable method of demonstrating the equivalency of a method of suspending or securing a powered platform, as required in paragraphs (e)(2)(iii), (f)(3) and (f)(5)(i)(F), is to provide an engineering analysis by a registered professional engineer. The analysis should demonstrate that the proposed method will provide an equal or greater degree of safety for employees than any one of the methods specified in the standard.

APPENDIX B TO § 1910.66—EXHIBITS (ADVISORY)

The three drawings in appendix B illustrate typical platform stabilization systems which are addressed in the standard. The drawings are to be used for reference purposes only, and do not illustrate all the mandatory requirements for each system.