

**ADVISORY
STANDARDS**

101

**ADVISORY STANDARDS
FOR
CONSTRUCTION, OPERATION AND MAINTENANCE OF
SUSPENDED SCAFFOLDS
USED FOR WINDOW CLEANING AND LIGHT MAINTENANCE**

**AS AMENDED
EFFECTIVE
January 1, 2010**

**ADVISORY STANDARDS FOR CONSTRUCTION. OPERATION AND
MAINTENANCE OF
SUSPENDED SCAFFOLDS
USED FOR WINDOW CLEANING AND LIGHT MAINTENANCE
AS 101-1 PREFACE**

1) **101-1.1 INTRODUCTION.**

- a) These advisory standards may be used in all matters in the consideration of applications for approval of suspended scaffolds under the provisions herein quoted of Industrial Code Part (Rule No.) 21, section 21.9, subdivision (c): “*Suspended Scaffolds — 75 feet or more.* Every suspended scaffold so used including both manually and power operated types shall be approved if it is or is intended to be suspended from any point which has an elevation 75 feet or more above the nearest street or ground surface.” Please note:
 - i) A scaffold which is suspended above a building setback is required to be approved if the suspension point is 75 feet or more above the nearest street or ground surface, even though the setback elevation may be less than 75 feet below the suspension point.
 - ii) Where the elevation of the street or ground surface below the scaffold suspension point varies around the perimeter of the building, the lowest point of such street or ground surface elevation should be used in determining the vertical distance to the point of suspension.
 - iii) Where the suspension point is less than 75 feet above the nearest street or ground surface scaffolds are not required to be approved. (See Industrial Code Part (Rule No.) 21, section 21.9, subdivision (d)).
- b) These advisory standards supersede and replace Advisory Standards AS-21, adopted July 1, 1965, and supersede all previous versions of Advisory Standards 101.
- c) These advisory standards are minimum standards and the Department in its discretion may at any time amend them or take other appropriate action in regard thereto to assure safety.
- d) In regard to any proposed deviation from these standards the applicant should submit such a Variance Request to Engineering Services Unit (ESU) with an application before proceeding with the design of such deviation.

2) **101-1.2 APPLICATION FOR APPROVAL — DATA REQUIRED.**

- a) An application for approval of a suspended scaffold to be used for window cleaning and light maintenance should be accompanied by the following information submitted in duplicate:
 - i) **Application form and letter of authorization.** Applicants should file a Special Approval Application (SH-753) with the New York State Department of Labor. These forms may be obtained at the New York State Department of Labor offices or obtained on the Department’s website <http://www.labor.state.ny.us> . Where the building owner is not the applicant, any agent should be provided with a letter of authorization from the building owner to act as such agent.

- ii) **Contract drawings of building sections involved.** All drawings required by this subdivision must be prepared by or under the supervision of a registered architect or professional engineer licensed to practice in the State of New York and should bear their seal and signature. Applicants should file the following drawings of all building sections involved in the suspension scaffold installation:
- (1) Complete set of architectural elevations with vertical dimensions.
 - (2) Complete plot plan with horizontal dimensions to adjacent streets and with building setback dimensions.
 - (3) Architectural roof plans and sections taken through track systems or runways showing complete details of any parapets, safety guard railings and other equipment on the roof or setback area, and the location of all proposed window washing equipment including all davit bases, anchors, and other support equipment.
 - (4) Structural drawings which include:
 - (a) Plans and sections of building area affected by the scaffold installation.
 - (b) Details of structural anchorages and connections for the scaffold installation.
 - (c) Stabilization equipment details.
- iii) **Structural data for scaffold installation.** Structural data to be prepared by or under the supervision of a registered architect or professional engineer licensed to practice in the State of New York and should bear his or her seal and signature. Submitted data must include:
- (1) Manufacturers rated breaking strength and recommended working load of wire rope, shackles, safety hooks, beam clamps, trolley units, inserts and similar components of the suspension scaffold as well as any integral glass handling unit or ancillary equipment.
 - (2) Detailed data on live and dead loads used in designing the device or component.
 - (3) Structural design computations of the building sections which are to sustain the imposed loads of the scaffold. Such imposed loads may include but are not limited to track systems, davits, davit bases, runways, outrigger assemblies, carriages, scaffold platforms, stirrups, anchorages and similar load bearing components.
 - (a) Where load test reports, as conducted by a recognized testing agency acceptable to the ESU, are available for components they may be submitted in lieu of structural analyses. Such load tests should show that each component will sustain its intended load with a minimum safety factor of four. In no case should the working load exceed that recommended by the manufacturer of the component. Such tests should be performed on prototype models only, and components used in load tests shall not be put into service.
- iv) **Data on previously approved components.** Applications for approval of suspension scaffolds which contain previously approved components should include the name, model number and BSA Approval or Resolution of Special Approval Number of each such component.
- v) **Welding.** All welding should be performed by welders certified by the American Welding Society or licensed by the New York State Department of Transportation. Non-destructive tests of all critical welds should be performed as prescribed by the design engineer or in accordance with manufacturer's recommendations and reports of such tests should be submitted to the Department. (See section 101 -3 (14) of these standards.)

- vi) **Description.** A description of the suspension scaffold and of its operating procedure should accompany the application for approval, which should include the following:
- (1) Date of the System Description.
 - (2) Purpose of the Equipment: a general description of the purpose of the installation; i.e. for window cleaning and light maintenance.
 - (3) Reason for Approval – Is the system new or are modifications being made to an existing system? If modifications are being made, what is the NYSDOL Approval Number and date of the existing system?
 - (4) Description of the service drops planned for this equipment identified by elevation and by building orientation (North, South, East or West). This description should address the height of the drops and, access and egress points.
 - (5) Description of any integral material handling units.
 - (6) Description of building parapet or safety rail including height and material composition.
 - (7) List of equipment including socket bases, davits, motorized davits, outriggers, counter weighed beams, push out devices, roof carriages, tracks, powered platform, etc.
 - (8) Equipment Specifications
 - (a) Powered Platform - Whether a two point drop or a four point drop, weight, height, speed, dimensions, guardrails, face rollers, drive motors, brakes and electric control features, operation and safety features, minimum number of people required to operate the platform, storage location and methods for all platform configurations.
 - (b) Wire rope dimensions and manufacturer's rated breaking strength and recommended working load of wire rope.
 - (c) Platform Stabilization - type of stabilization (continuous, intermittent, and/or angulated roping) and locations.
 - (d) Roof Equipment (carriage, rails, tracks, davits, davit bases, electrical outlets and eyebolts) – dimensions, locations and specifications.
 - (e) Name, model number, NYSDOL Approval Number and approval date for hoist and platform
 - (f) Advertising literature, photographs and illustrations.
- vii) **Certifications.** The following certification documents must be provided:
- (1) Certification by building structural engineer, confirming design for imposed loads (including stabilization equipment) with a safety factor of four.
 - (2) Certification by contractor installing track system, davit bases, or anchors confirming installation in accordance with design drawings.
 - (3) Certification of inspection and/or testing of track systems, davit bases or anchors in accordance with the structural drawings and acceptance of such.
 - (4) Weld inspection report for the non-destructive testing of all critical welds of the scaffold or certification that all welding was performed by welders certified by the American Welding Society or licensed by the New York State Department of Transportation.
 - (5) Certification that pull out strength of Intermittent Stabilization Anchors is a minimum of 600 Lbs.

3) PROCESSING OF APPLICATIONS.

- a) Applications for approval are processed by the ESU in the order in which they are received. The filing of letters or forms without complete supporting data and detailed plans will not be considered as a proper application for processing.
- b) Failure on the part of the applicant to submit data requested by the ESU necessary for proper evaluation of the application for approval within 30 days after such request may result in a recommendation for dismissal of the application for approval.
- c) General Approvals of suspended scaffold equipment are granted by the ESU authorizing the inclusion of specific model numbered equipment for proposal for Special Approval. Special Approvals are unique to each structure; only after receiving special approval may a suspended scaffold be used for window cleaning or light maintenance in New York State. Special Approvals are also unique to building ownership and must be amended whenever there is a change in ownership or change of the agent acting on behalf of the owner in matters with the Dept. of Labor.
- d) Prior to approval all equipment must be demonstrated to the satisfaction of the Commissioner. During this demonstration it will be required that the Professional Engineer whose seal and name is on the equipment drawings be present on the site.
- e) Once granted Special Approval each scaffold must be operated and maintained in accordance with the manufacturer's recommendations, the approval and the requirements of *Appendix 101A Standard Conditions for Operation and Maintenance of Suspended Scaffolds Used for Window Cleaning and Light Maintenance*. Any change to equipment or operation requires an amendment to the approval.

AS 101-2 GENERAL STANDARDS

1) **101-2.1 DEFINITIONS.**

- a) *allowable stresses*: the working stress limitations imposed by a nationally recognized standards promulgating organization.
- b) *angulated roping*: a means of stabilization where the upper point of suspension is inboard from the attachments on the suspended unit, causing the suspended unit to bear against the face of the building.
- c) *brake, primary*: a brake designed to be automatically applied whenever power to the prime mover is interrupted or discontinued.
- d) *brake, secondary*: a brake designed to prevent the descent of the suspended or supported equipment in the event of an over speed condition or any primary brake failure.
- e) *brake types*
 - i) *disc*: a brake in which the holding effect is obtained by frictional resistance between faces of rotating discs or shoes.
 - ii) *self energizing band*: a unidirectional brake in which the braking action is obtained by frictional resistance between a stationary flexible brake band and a rotating drum, whereby the friction force increases the holding force or pressure on the friction surfaces.

- iii) *shoe brake*: a brake in which the holding effect is obtained by applying pressure on two or more stationary segmental friction elements against a rotating cylindrical wheel or drum.
- iv) *wire rope engaging*: a brake that grips onto a wire rope, without damage to the rope, to prevent the descent of a suspended unit.
- f) *building*: a structure wherein people may live, work, or otherwise make use of the facilities offered within the structure.
- g) *building face roller*: a guide roller designed to ride on the face of the building wall to prevent the suspended or supported equipment from abrading the face of the building.
- h) *building maintenance*: exterior or interior operations such as window cleaning, caulking, metal polishing, reglazing, and general light maintenance or repairs on building surfaces.
- i) *cable*: a conductor, or group of conductors, enclosed in a weatherproof sheath, which may be used to supply electrical power or control currents for equipment and to provide voice communication circuits.
- j) *carriage*: a wheeled vehicle used normally for the horizontal movements and support of equipment.
- k) *catalog strength*: the rated strength of any product or material as designated by its manufacturer or vendor, based on standard testing procedures or acceptable engineering design practices.
- l) *certified*: accepted by design, evaluation, or inspection by a New York State licensed professional engineer.
- m) *combination cable*: ropes having both steel structural members for support of the equipment and copper or other electrical conductors insulated from each other and the structural members by nonconductive barriers.
- n) *continuous pressure*: the requirement for a constant manual actuation of an operating control or device.
- o) *control*: a mechanism used to regulate or guide the operation of the equipment.
- p) *davit*: a device for suspending a powered platform. Unlike outriggers, a davit reacts its operating moment load into a single pedestal, socket, carriage attachment, or other connection.
- q) *dropline*: a vertical line from a fixed anchorage, independent of the work platform and its rigging, to which a lanyard is affixed. Droplines are also variously called lifelines, safety lines, ratlines, scarelines, etc.
- r) *dynamic load*: loading induced by masses undergoing changes in velocity and loads varying with time. In application a simulated static load surcharge may be assumed to be equivalent to dynamic effects.
- s) *electrical ground*: a conducting connection between an electrical circuit of the equipment and the earth, or a conducting body that serves in place of the earth.
- t) *equipment tie-in*: a positive-type connection provided to secure a working platform or suspension rope to the building.

- u) *failure*: a deficiency of a structural element that makes it unable to continue the load-bearing function for which it was originally designed.
- v) *fairlead*: the uppermost guide for the suspension wire rope.
- w) *fairlead roller*. a roller provided to allow a minor change in the direction of travel of a suspension rope.
- x) *four-rope suspended platform*: a platform suspended by four load carrying wire ropes arranged such that the failure of any one support rope or its fastenings will not cause the platform to upset (substantially alter the normal position). (Also known as four rope, four line, and multi-rope. See *two-rope suspended platform*.)
- y) *ground rigging*: a method of suspending a self-powered working platform from a safe horizontal surface to an acceptable point of suspension above the safe surface.
- z) *guide roller*: a rotating cylindrical member, operating separately or as a part of a guide assembly, that provides continuous engagement between the suspended or supported equipment and the building guides.
- aa) *guide shoe*: equivalent to guide rollers, except shoes provide a sliding contact between the building guides and the shoe.
- bb) *hoisting machine*: a device intended to raise and lower a suspended or supported unit.
- cc) *installation*: the total affected parts of a building and the equipment associated with the intended operation.
- dd) *interlock*: a device to ensure operations or motions in proper sequence.
- ee) *Intermittent stabilization*: a means to stabilize a suspended unit by securing the suspension rope(s) to vertically spaced building anchors.
- ff) *lanyard*: a flexible line used to secure a wearer of a safety belt or harness to a dropline, lifeline, or fixed anchorage.
- gg) *lifeline* see *dropline*.
- hh) *light maintenance*: replacement of window glass and caulking of glass and frames, painting and repair of windows, pointing up masonry joints, waterproofing of walls, cleaning, painting and repair of walls and window frames.
- ii) *live load (static)*: the total static weight of personnel, tools, parts, and supplies that the equipment is designed to support.
- jj) *multiple wrap (layer) drum hoist*: a type of hoisting machine that accumulates the suspension wire rope in more than one successive layer on the surface of the drum of the hoist.
- kk) *nondestructive tests*: those tests required to ensure the reliability or soundness of a product but which do not have a detrimental effect on the product.

- ll) *obstruction detector*: a device 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.
- mm) *operating device*: a device actuated manually to activate a control.
- nn) *outrigger*: a device for suspending a powered platform. Unlike a davit, an outrigger reacts its operating moment load into at least two opposing vertical components acting into two or more distinct reaction points and /or attachments.
- oo) *powered boatswain's chair*: a powered seat for one person suspended by a double line that is designed to be raised and lowered by the user.
- pp) *powered platform*: suspended or supported manned equipment that provides access to the face of a building for the purpose of maintenance.
- qq) *prime mover*: the source of mechanical power for a machine.
- rr) *qualified person*: a person with training and experience in the use, service, and repair of specific equipment. Training may be provided by the equipment manufacturer.
- ss) *rated load*: as assigned by the manufacturer, the total load permitted on a hoist. The load includes the static weight of the suspended supported unit plus the weight of the live load imposed on the hoist.
- tt) *registered professional engineer*: a person who has been duly registered and licensed by the State of New York to practice the profession of engineering.
- uu) *registered professional architect*: a person who has been duly registered and licensed by the State of New York to practice the profession of architecture.
- vv) *remedial work*: restoration, renovation, or modifications employing crafts associated with the construction industry, such as masonry, glazing, caulking, and carpentry.
- ww) *remote powered platform and equipment*: a powered platform or suspended equipment where the means of raising and lowering the suspended unit is located at an elevation or location other than on the platform or suspended unit.
- xx) *reverse bend*: a reverse bend in a wire rope is one where a rope bends around one sheave followed by bending around a second sheave in the opposite direction.
- yy) *rope lay length*: the length, parallel to the longitudinal axis, in which a wire makes one complete turn about the axis of the strand or a strand about the axis of a rope. In this connection it is also referred to as lay length or pitch.
- zz) *safe surface*: a horizontal surface intended to be occupied by personnel, which is so protected that it can be reasonably assured that said occupants will be protected against injury or from falling.
- aaa) *scaffold*: For the purposes of these standards, the term "scaffold" includes the following:
 - i) all scaffold parts, materials, components and devices.
 - ii) the means of suspension.
 - iii) attachment of the suspension assembly to the building or structure.

- bbb) *self-powered platform*: a powered platform where the hoist(s) is located on the platform.
- ccc) *shall*: mandatory
- ddd) *should*: advisory.
- eee) *single wrap (layer) drum hoist*: a type of winding drum hoist that accumulates the suspension wire rope in a single layer on the surface of the hoisting drum.
- fff) *speed reducer*: a positive-type speed-reducing machine.
- ggg) *stability factor*: the ratio of the stabilizing moment to the overturning moment.
- hhh) *strain relief anchor*: a positive device used for the mechanical anchorage of cable to prevent undue strain on the cable connectors.
- iii) *supported equipment*: any 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.
- jjj) *suspended equipment (suspended scaffold)*: any building maintenance equipment that is suspended or moved to its working position by means of ropes or combination cables attached to some anchorage above the equipment.
- kkk) *tail line*: the nonsupporting end of a suspension wire rope.
- lll) *tie-in-device*: the portion of a suspended unit that positively engages the building tie-in-guides.
- mmm) *tie-in-guides*: the portion of a building that provides continuous positive engagement between the building and a suspended unit during its vertical travel of the face of the building.
- nnn) *traction or sheave hoist*: a type of hoisting machine that does not accumulate the suspension wire rope, but is designed to raise and lower a suspended load by the application of friction forces between the suspension wire rope and the hoist's drum.
- ooo) *transfer drum*: a drum incorporated within a hoist to transfer wire rope from one traction drum groove to an adjacent groove.
- ppp) *transportable equipment*: ground-rigged powered platforms or supported equipment brought to a building site for the purpose of maintenance, as covered by this Standard.
- qqq) *transportable outriggers and davits*: outriggers and davits designed to be moved from one work location to another.
- rrr) *traveling ladders and gantries (TLG)*: site-specific permanently installed traveling ladders or gantries used to service surfaces of a building such as an atrium roof, skylight, or building facade.
- sss) *traveling cable*: a cable intended to contain electrical power, control, or communication conductors from the power or communication source to a suspended or supported unit or between the source and a carriage.

- ttt) *trolleyline/dogline*: a horizontal lifeline secured to the guardrail and structural portions of a platform.
- uuu) *trolley system*: a track-mounted carriage suspended from an overhead structure.
- vvv) *two-rope suspended platform*: (a) a platform suspended by two load-carrying wire ropes (b) a platform suspended by two load-carrying wire ropes and with two secondary wire ropes such that the failure of any one support rope or its fastenings will not cause the platform to upset (substantially alter the normal position). Also known as *two rope*, *two line*, and *dual-rope*. See *four-rope suspended platform*.)
- www) *weatherproof*: equipment or component protection constructed so that exposure to adverse weather conditions will not affect or interfere with the proper use or functions of the equipment or component.
- xxx) *winding drum hoist*: a type of hoisting machine that accumulates the suspension wire rope on the drum of the hoist.
- yyy) *working platform*: a suspended or supported platform arranged to provide access to the building.
- zzz) *wrap*: one complete turn of the suspension wire rope around the surface of a hoist drum.

2. COMPONENTS.

- a. **Design and construction.** Every component of a suspension scaffold should be of such design, fabrication, strength and durability as to assure safety under all normal conditions of use.
- b. **Stresses.** The actual stress of any component except the suspension wire should not exceed one-half the allowable stress as set forth in recognized standards acceptable to the ESU.
 - i. For a list of recognized standards acceptable to the ESU see subpart 101-4 of these standards.
 - ii. Wire rope used to suspend the platform of a suspended scaffold should have a safety factor of not less than ten, based on the ultimate strength and the total dead plus live loads
- c. **Overturning safety factor.** Any mobile roof unit or portable outrigger used to suspend scaffolds, when either tied down to the roof or properly counterweighted and with normal static dead plus live loads imposed, should have a safety factor of not less than four against overturning. Any mobile roof unit which is to be tied down to the building at each work station should be gravity stable with a safety factor of at least 2.0 when not tied down, based on a load imposed equal to the design dead plus live loads.
- d. **Redundancy of support.** Suspended scaffolds must be designed so that equipment will not upset or fall as a result of failure of any support wire or its fastenings. Thus a single point suspended platform (single man platform or boatswain chair) would require a minimum of two support wires and a multiple point suspended platform would require a minimum of four support wires.

- e. **Previously approved components.** Hoisting machinery, staging and other components of any suspended scaffold previously approved for other uses will not necessarily be required to be re-approved for window cleaning. The ESU may consider applications for general approval for such components. The method and means of the installation and use and the manner of operation of such approved components, including safe working capacity and modifications or adaptations, will be evaluated as to their effect upon the safety of the suspension scaffold as a whole. A resolution approving any such component as part of a special suspension scaffold for a particular location should not be construed as a general statewide approval of such component for other suspension scaffolds. An application for approval should state the name, model number and BSA Approval or Resolution of Special Approval Number of any such previously approved component used as part of the suspension scaffold cited in the application.
- f. **Design loads for architects and engineers.** The manufacturer of a suspended scaffold should indicate on the equipment drawings the maximum loads which will be imposed on the building or structure by such scaffold.
- g. **Acceptable Means of Suspension.** The scaffold suspension design shall be one of the following:
 - i. **Carriage**
 - ii. **Davits**
 - iii. **Outriggers**
 - iv. **Cranes**
 - v. **Trolley Systems**
- h. **Material Hoists.** If a material hoist is included in the design for platform support equipment, maximum loading of the material hoist must be assumed at all times when calculating design loads.
- i. **All ancillary equipment integral to the window washing equipment must be included in the design.**
- j. **Height Restriction.** Buildings with vertical platform travel exceeding 500 feet must employ powered equipment with the hoists located at the roof level.

3. BUILDING DESIGN

- a. **Load bearing building components.** Portions or components of a building or structure which are to be subjected to imposed loads or forces by the installation and operation of a suspension scaffold should be designed, constructed, installed and maintained to support such loads and forces in accordance with section 101-2 (2) of these standards concerning safety factors, and must be certified as such by a New York State Licensed Engineer.
- b. **Roof parapet or railing.** In order for a suspension scaffold to be considered for approval, the building or structure on which such scaffold is proposed to be installed should have a substantial parapet or a substantial guard railing and midrail constructed of metal including a kick plate at bottom six inches. Such parapet or guardrail should not be less than 42 inches in height from the roof surface, carriage runway or top of horizontal track. The guard railing should be installed at the perimeter of the roof not more than one foot back from the roof

edge. The parapet or guard railing should be designed to resist a lateral force at the top equivalent to a minimum linear load of 50 pounds per foot.

AS 101-3 DESIGN COMPONENTS

1) MOBILE ROOF CARRIAGE SUSPENSION

- a) **Unit movement control.** A means for guidance and control of mobile roof carriages during movement should be provided. Structural stops or curbs must be provided to prevent movement of the carriage beyond its designated limits.
- b) **Tie-down to building.**
 - i) Any tie-down assembly for a mobile roof unit where required should be interlocked with the power circuit of the scaffold to prevent vertical scaffold movement unless such tie-down assembly is properly attached to the tie-down fixture of the building or structure.
 - ii) Position indicators should be painted on the roof surface of each work station to mark the wheel positions of the mobile unit to assist the operator in properly aligning and positioning the unit.
 - iii) Where a mobile roof unit is equipped with a means of continuous engagement in a track system, an interlocked tie-down assembly at each workstation may be eliminated. Such a system should be provided with a means for the operator to properly position the mobile roof unit at each workstation.
- c) **Access to roof carriage or scaffold platform.** Suitable runways, ladders stairs or platforms, not less than 24 inches wide, should be installed to provide safe access for persons boarding the roof carriage or scaffold platform from the roof, setback or equivalent surface. Any runway, stair, platform or similar structure located at an elevation of more than 30 inches above the roof, setback or equivalent surface or at such an elevation as to create a danger of falling over the side of the building should be provided with a guard rail not less than 42 inches in height and a midrail plus a kick plate at bottom six inches. Such guard and midrails should be capable of resisting a horizontal concentrated force of 100 pounds at the midspan between vertical supports.
- d) **Guarding dangerous machinery.** Dangerous machinery located on the mobile roof unit or scaffold platform should be guarded.
- e) **Power roof carriages.**
 - (1) **Lateral movement interlock.** Every powered roof carriage should be equipped with an interlock to prevent lateral movement of the roof carriage while the scaffold is in any other position than the uppermost position.

- (2) **Unauthorized operation.** Every powered roof carriage should be equipped with a lock or with key-operated controls to prevent operation by unauthorized persons. The keys to such locks or controls should be in the possession of the owner, his authorized agent or a designated person authorized by the owner to operate the unit.
- (3) **Maximum speed.** Power driven roof carriage units should have a maximum traversing speed of 50 feet per minute.
- (4) An automatically applied braking or locking system shall be provided to prevent unintentional movement of the carriage.
- f) **Protection from elements.** All components of a mobile roof unit exposed to the elements should be protected and maintained, so far as practicable, with a suitable surface coating of paint or similar protective material.

2) DAVIT SUSPENSION

- a) Each installation shall be designed by, or under the direction of, a New York State Licensed Professional Engineer and shall comply with the following requirements.
 - i) Davit Installations. The scaffold platform can be raised above the building face being serviced and translated inboard for storage, rigging, and access to or egress from the scaffold platform. For this type of installation:
 - (1) access to and egress from the platform shall be from a safe surface. Access or egress shall not require persons to climb over a building's parapet or guard railing.
 - (2) the scaffold platform and davits shall be provided with wheels, casters, or a carriage for traversing horizontally to workstations or storage positions.
 - (3) the davits shall be high enough to prevent a suspended scaffold from striking any building components.
 - (4) davits shall be provided with bearings that allow the davits to be readily rotated.
 - (5) the davit mast must not be assemble on site it must be made of a single piece.
 - (6) drops suspended from davits must be less than 500 feet.
 - (7) Davits may be used on buildings to support ground-rigged self-powered platforms where the point of suspension does not exceed 130 ft above ground level.
 - ii) Davit Installations Requiring Relocations of Davits for Other Work Locations on Same Elevations. For this type of installation:
 - (1) the davits shall be inserted into sockets secured and rigged with the suspension ropes before being raised to their vertical position.
 - (2) the davit sockets shall be positioned to prevent their being raised at less than 7 degrees in respect to the facade being serviced.
 - (3) shall be provided with wheels or a cart to assist in traversing.
 - iii) For all davit installations:
 - (1) the sockets shall be made from structural steel hot-dipped galvanized or other corrosion-resistant material.
 - (2) all bolts, nuts, and pins shall be made from stainless steel.
 - iv) Davit Reach.
 - (1) Davits that are not permanently dedicated to one specific socket or base location shall have a maximum reach of 8 ft 6 in.

- v) Davits that are not permanently dedicated to one specific socket or base location shall have a maximum, fully assembled weight of 300 lb.
- vi) Davits shall not be transferred between roof levels.
- vii) Davit base pairs supporting a scaffold must be located at the same elevation.
- viii) Davit bases must be flush with or raised from the roof or setback surface; recessed davit bases will not be permitted.
- ix) **Design Consideration.** Each davit or rotatable outrigger installation shall be designed and installed to ensure that it has a stability factor of 4 against failure based on the rated capacity of the hoist being used. The following shall be considered in the design calculation of stability:
 - (1) the rated load considered with the platform in its most outboard position with respect to the davit anchorage.
 - (2) the inclusion of moments due to appropriate wind forces for exterior installations.
 - (3) dynamic loads that need not be considered concurrently with wind loads.
 - (4) deflection of the davit(s) due to the foregoing.

3) OUTRIGGERS

- a) Outriggers may be used on buildings to support ground-rigged self-powered platforms where the point of suspension does not exceed 130 ft above ground level. The initial installation shall be designed by, or under the direction of, a New York State Licensed Professional Engineer to comply with the following safety requirements:
 - i) Platforms shall be required to be disengaged from the outriggers after each day's use or the platforms shall be secured and stored at grade with the power supply disconnected. All suspension wire ropes shall be attached to their outriggers with forged double-locking snap hooks or equivalent devices.
 - ii) All outriggers shall be secured to a certified anchorage on the building during the entire period of use. The anchorages shall provide a stability factor of 4 against overturning or upsetting. Each outrigger may be stabilized by rigid counterweights secured to its inboard ends. It shall also be tied back to a certified anchorage on the building with a minimum of 5/16 in. wire rope. The counterweights shall provide a stability factor of 4 against overturning or upsetting of the outrigger. Each counterweight shall be permanently identified as to its weight.
 - iii) Access and egress shall be from a safe surface such as grade or a roof surface below the elevation of suspension. The installation shall be designed to prevent access to or egress from the platform at the elevation of suspension.
 - iv) Each outrigger shall be designed for lateral stability to prevent rollover.
 - v) Each outrigger shall be designed to support an ultimate load of four times the rated capacity of the hoist to be used with the outrigger.

- vi) Each outrigger shall be so located that the suspension wire ropes for two-point suspended platforms are hung parallel to each other.

4) **CRANES**

- a) Each installation shall be designed by, or under the direction of, a New York State Licensed Professional Engineer and shall comply with the following requirements.
 - i) **Design Consideration.** Each crane installation shall be designed and installed to ensure that it has a stability factor of 4 against failure based on the rated capacity of the hoist being used. The following shall be considered in the design calculation of stability:
 - (1) the rated load considered with the platform in its most outboard position.
 - (2) the inclusion of moments due to appropriate wind forces for exterior installations.
 - (3) dynamic loads that need not be considered concurrently with wind loads.
 - (4) deflection of the boom due to the foregoing.
 - (5) structural connections with parapet or other building elements.

5) **TROLLEY SYSTEMS**

- a) Each installation must meet the requirements of section 101-3 (1) Mobile Roof Carriages.

6) **SCAFFOLD PLATFORM**

- a) **Width.** The scaffold platform of a suspended scaffold should be not less than 24 inches wide.
- b) **Construction.** The scaffold platform of a suspended scaffold should be the ladder or truss type and constructed of structural steel, structural grade aluminum or other metal of equivalent strength.
- c) **Guard rails.** The scaffold platform of a suspended scaffold should be guarded on all side with guardrails, midrails and toe boards. The height of any guardrail on the outboard side (the side away from the building) and on the ends of the platform should be not less than 42 inches above the platform surface. The height of any guardrail on the inboard side of the platform (the side next to the building) may be reduced to 36 inches above the platform surface. Such guardrails should be so constructed that they will resist concentrated horizontal force of 100 pounds at the midspan between vertical supports with stresses not to exceed recognized standards. Midrails installed on suspended scaffold platforms should be of the same size and strength as the guardrails. The height of toe boards should be not less than four inches above the scaffold platform surface.
- d) **Scaffold platform enclosure.**
 - i) A wire mesh or expanded metal enclosure should be installed from the toe board to the level of the top guardrail on the outboard side (side away from the building) and on both ends of the platform of a suspended scaffold. On the inboard side (side next to the building) of the platform such enclosure should be installed from the toe board to the level of the midrail such platforms.
 - ii) The wire mesh or expanded metal used for such enclosures should be not less than No. 18 gauge with no openings that would permit the passage of a three-quarter inch diameter ball. The minimum open area of the wire mesh or expanded metal used for

such enclosures should not exceed 70 per cent of the total area so that wind resistance will be minimized.

- iii) The scaffold may be enclosed with other than wire mesh or expanded metal provided the design of such enclosure is of equivalent strength and offers no more wind resistance at the ends of the scaffold platform than does the wire mesh or expanded metal enclosure and other scaffold components combined.
- e) **Protection of platform openings.** There should be no openings in the scaffold platform or platform enclosure that would permit the passage of a three-quarter inch diameter ball. All necessary openings in the scaffold platform floor that would permit the passage of a three-quarter inch diameter ball should be protected by wire mesh or by a wire mesh basket underneath such openings. Such wire mesh should be not less than No. 18 gauge.
- f) **Hangers and stirrups.** Hangers, stirrups or other devices to which the suspension wire ropes may be attached should be positively fastened to the scaffold platform by welding or by bolts with lock nuts and lock washers or by equivalent fasteners of size and grade as indicated by design engineer. If welds are used they should be designed and constructed to support the total loads imposed on the connections and they should be subjected to non-destructive testing such as magnetic particle, radiographic, ultrasonic or the equivalent. Report of such non-destructive tests should be forwarded to the ESU with the application for approval. Where more than one type of connection is used on the same joint, each type should be designed and constructed to individually support the total load imposed on that joint; imposed loads should not be shared jointly by more than one type of connection.
- g) **Rollers.** Each end of the inboard side (side next to the building) of the scaffold should be equipped with suitable horizontal rollers with a diameter of not less than three inches. Such rollers should be constructed of a resilient and durable material such as neoprene to provide rolling contact with the building. Such rollers should be located at approximately the level of the scaffold platform but in some cases the ESU may require an additional set of rollers at approximately the top guard rail elevation. The length of such rollers should be such as to insure proper contact with the building surface in order to prevent damage to the building or scaffold as well as to provide proper vertical movement of the scaffold. Where building columns or other projecting parts of the building may be contacted by the ends of the scaffold platform such ends should be protected by additional rollers.
- h) **Water tanks and accessories.** Water tanks and other accessories on the scaffold platform should be so located as to minimize interference with the workers on the scaffold platform and should be securely fastened.
- i) **Suspended power cable storage.** Power or control cables suspended from a point above the platform should not be allowed to accumulate on the platform deck or to hang below the elevation of the platform. Proper storage provision should be made for such cables on the platform or at the elevation of the suspension.
- j) **Fire protection.**
 - i) At least one approved type ABC fire extinguisher suitable for extinguishing electrical and other fires should be provided on the scaffold platform and should be securely

attached thereto. Each extinguisher shall be properly maintained and provided with a durable maintenance inspection tag.

- ii) Flammable or explosive liquids and highly flammable solids should not be used or carried on the scaffold platform unless the ESU's resolution of approval sets forth specific authorization and requirements therefore.
- k) **Communication requirements.** Adequate means of communication between the scaffold platform and personnel within the building or structure should be provided for use by the scaffold operator. A telephone or two-way voice radio located on the scaffold platform in contact with a continuously manned switchboard phone or base station will be considered as adequate. A bullhorn on the scaffold platform may be required in addition to other means of communication.
- l) **Power indicator.** All platforms should contain a light to indicate power is present at the platform.
- m) **Operating controls.** All operating controls should be clearly marked for and for direction of travel. Such controls should be of the constant pressure or deadman type. Platform operation must not require simultaneous action by two operators.
- n) **Vertical speed.** The vertical speed of suspended scaffolds should not exceed 50 feet per minute.
- o) **Maximum tilt.** The design shall limit the maximum tilt of the platform to 10 degrees
- p) **Single point suspension equipment either single man platform or boatswain chair.** Scaffold platforms suspended from a single point with multiple cables shall be properly balanced to operate level with dead load conditions. The cables should pass through a fairlead or guide located not less than four feet above the suspended platform so as to stabilize the platform during unbalanced live loading.
- q) **Ground Rigging.** Self powered platforms are permitted to be ground rigged where the point of suspension does not exceed 130 ft above ground level.
- r) **Maximum Length.** The Maximum length of a single man platform shall be five feet and the maximum length of a multi-man platform shall be 36 feet.
- s) **Stops.** Platforms require at least one emergency stop button for each occupant.
- t) **Obstruction Detectors.** Lower obstruction detectors and upper limit switches are required for all platforms.

7) PLATFORM STABILIZATION

- a) **Continuous tie-in guides.**
 - i) Every public building on which suspended scaffold equipment is to be installed and where the suspension points of such equipment will be 75 feet or more above the ground or grade elevation should be provided with continuous tie-in guides. Such tie-in guides should be of the positive engaging type and should engage the suspended equipment during the complete descent and ascent of such equipment.

- ii) The upper termination of every such tie-in guide should be the uppermost elevation of the building traversed by the suspended scaffold equipment. In cases where building designs prohibit the installation of such tie-in guides at such uppermost elevations, vertical travel of the suspended equipment without tie-in guides for a distance of not more than fifty feet may be considered, provided other detailed provisions are made to assure safety for the persons using such suspended scaffold equipment and that such other provisions are acceptable to the ESU. All such provisions should be reviewed by the ESU prior to their installation.
- iii) The lower termination of any such tie-in guide should be approximately at the lowest intended working level of the suspended equipment. If such equipment is to be lowered below the lower termination of any tie-in guide, provisions should be made to guide such vertical travel by the use of tag lines.
- iv) Minimum tie-in-guide dimensions. The continuous tie-in-guides shall be one of the following types:
 - (1) internal track (restricted opening). Such guides are imbedded in other building members with only the opening exposed. The minimum opening shall be 3/4 in., and the interior shall provide a 3/4 in. minimum clear width each side of the opening and a minimum clear depth of 1 3/4 in. Track design shall incorporate a method for unencumbered insertion and removal of the engagement device.
 - (2) external tracks. These guides are installed external to the other building members and are fully or partially exposed. For this type of installation:
 - (a) square or rectangular guides shall have vertical openings and dimensions in accordance with 101-3 (7) (a) (iv) (1).
 - (b) flanged beam or angle shapes (H- or L-shapes) shall be large enough to allow free passage for at least one roller or guide shoe of 1 1/2 in. diameter, and provide a clear contact surface width of 3/4 in.
 - (c) round or oval shaped guides shall have a minimum diameter of 2 in.
- v) Joints in building tie-in-guides shall be mechanically aligned to prevent interference with the proper functioning of the equipment's guide assemblies. Joint openings should be limited to 3/4 in. maximum.

b) Intermittent Tie-ins

- i) **Intermittent stabilization anchors** used as an alternative to continuous tie-in guides may be considered for approval by ESU provided all of the following conditions are met:
 - (1) The building must be less than 600 feet in height.
 - (2) The building must be square or rectangular with vertical walls.
 - (3) The scaffold platform shall initiate its travel at the top of the building.
 - (4) The scaffold shall be in constant contact with the face of the building. At least 2 inches of angulated roping shall be provided and the face of the building shall be flush.

- (5) Scaffold platform shall not extend beyond the building corners.
- (6) Scaffold platforms shall not exceed 30 feet in length.
- (7) Any scaffold multi person platform which is less than 10 feet in length shall be provided with building face rollers at least 10 feet apart so as to insure scaffold platform stability.
- (8) Maximum permissible scaffold speed shall not exceed 35 feet per minute.
- (9) Limit switches shall be provided which will disconnect the power to the hoists if a tie-in is not removed while the scaffold is proceeding in the "up" direction.
- (10) Tie-ins are to be of an acceptable design and shall not exceed 40 feet center to center spacing. An acceptable design will include but is not limited to:
 - (a) Will develop a 600 pound load in any direction.
 - (b) Is easily visible to workers as they descend the building.
 - (c) Cannot become unintentionally disengaged.
 - (d) Is of proper length, or properly adjustable to serve its function.
 - (e) Tie-ins shall not be adhesive type.
 - (f) Tie-ins shall not be recessed (mushroom head) type.
- (11) Level sensors are required to maintain scaffold within 10 degrees of level.

c) **Angulated roping**

- i) Systems utilizing angulated roping and building face rollers shall be considered as an alternative to continuous tie-ins provided:
 - (1) Suspended portion of equipment in use does not exceed 130 feet.
 - (2) The equipment shall be kept on continuous contact with the building façade and shall prevent sudden horizontal movement of the platform.
 - (3) The platform maintains no less than 10 pounds angulation force on the building façade.
- d) On any such public building where the suspension points for any suspended scaffold installation are less than 75 feet above the ground or grade elevation and where continuous tie-in guides are not intended to be installed, provisions should be made for the installation of working level tie-ins in accordance with the provisions of paragraph 101-3 (7) (e) (ii) of these standards.

e) **Buildings designed or erected prior to January 1, 1973.**

- i) **Friction-type continuous tie-in guides.** On public buildings designed or erected prior to January 1, 1973 where positive-engaging type continuous tie-in guides are impossible to install because of building design, the ESU may consider friction type tie-in guides. Such guides should provide for the entire vertical travel of the

suspended scaffold platform. Such frictional contact should be sufficient to minimize sideways or other lateral movement to the scaffold platform.

- ii) **Positive work station tie-ins.** Every such public building where a suspended scaffold is or is intended to be installed for the purpose of cleaning the building windows or exterior surfaces and where continuous tie-in guides cannot be installed should be provided with working level tie-ins which are acceptable to the ESU. Such tie-ins should be located at every working level position of the suspended scaffold platform and the platform should be tied-in whenever any cleaning of windows or exterior surfaces is being performed. Each such working level tie-in should have a breakaway device which will hold the suspended equipment under any imposed force up to 80 pounds and will break away or release the suspended equipment when any such imposed force reaches the 80 to 100 pound range with a maximum of 100 pounds. Where such working level tie-in guides are employed, the suspension wire ropes should be angulated to cause a horizontal thrust against the building. Such angulations should be at least six inches in the horizontal direction. This option will not be considered for new buildings or for building drops in excess of 600 ft.

8) **CABLE STABILIZATION**

- a) Where the vertical travel of the scaffold platform exceeds 150 feet, a means shall be provided to stabilize the separate hanging lifelines, support cables, and the electrical power and control cables to the building to prevent displacement by wind or any other force. Such stabilizing means shall be provided for each additional 150 feet of vertical travel.

9) **BOATSWAIN CHAIRS**

- a) Boatswain chairs may be used for locations where suspended point height is 75 feet or less above the nearest street or ground surface if the requirements of Code Rule 21 are met:
 - i) Must have a safety harness and lifeline.
 - ii) Protection of street or ground area.
 - iii) Operators must be trained in the use of the equipment.
 - iv) Boatswain's chairs and all supports must be designed and constructed to sustain without failure a minimum load of 600 pounds.
 - v) If block and tackle is used, tackle must consist of rope at least equal in strength to five-eighths inch first grade Manila rope and proper sized blocks. Rope attachment to a block must be thimble and splice. Hooks must be provided with means to prevent accidental disengagement. The object to which the tackle is anchored must be rigid and of ample strength.
 - vi) Stabilization must be provided and used (tie-ins or worker below).
 - vii) Parapet clamps are not allowed (unless the owner can demonstrate and provide certification by a licensed New York State Professional Engineer that the parapet can support a 5000 pound load).
 - viii) A powered boatswain's chair must be equipped with a NYS DOL approved hoist.
 - ix) For a single line chair, a separate anchor or davit must be provided for the descent line and the lifeline.
 - x) A double line chair must provide for an anchor or davit for the descent line and a chair tie-off connector capable of supporting a 5000 pound load.

- xi) Anchorage points must be capable of supporting a 5000 pound load, must be located in line with the suspended worker or be offset no more than 15 degrees from in line. Anchorage points must be no more than 12 feet apart.
- b) Boatswain chairs require approval for elevations 75 feet above the nearest street or ground surface and must meet the following requirements:
 - i) The use of the boatswain's chair over 130 feet is prohibited.
 - ii) Controlled descent devices are prohibited.
 - iii) Approval will be considered if other authorized means of cleaning the windows have been found impracticable or impossible due to the exterior features of the building.
 - iv) Protection of street or ground area.
 - v) Workers must be trained on use of the equipment.
 - vi) Boatswain's chairs and all supports must be designed and constructed to sustain without failure a minimum load of 600 pounds.
 - vii) If block and tackle is used, tackle must consist of rope at least equal in strength to five-eighths inch first grade Manila rope and proper sized blocks. Rope attachment to a block must be thimble and splice. Hooks must be provided with means to prevent accidental disengagement. The object to which the tackle is anchored must be rigid and of ample strength.
 - viii) A powered boatswain's chair must be equipped with a NYSDOL approved hoist.
 - ix) A double line chair must provide for an anchor or davit for the descent line and a chair tie-off connector capable of supporting a 5000 pound load.
 - x) A N.Y. State licensed P.E. must provide stamped and signed anchor drawings and details including the design requirements used and the structural strength of the anchors. The anchors must be capable of sustaining a 5000 pound load.
 - xi) New York State licensed Professional Engineer or Architect must provide a stamped and signed approval of the placement and installation of the anchors. Anchors are to be placed in line with the suspended worker and may be offset no more than 15 degrees from in line. Anchorage points must be spaced no more than 12 feet apart.
 - xii) Stabilization must be provided and used (tie-ins or worker below).
 - xiii) All outrigger beams and davit bases shall be designed to support the rated load imparted by the boatswain's chair with a safety factor of at least four.
 - xiv) Outriggers must be tied down to an approved anchor on the building with a wire rope equivalent in strength to the suspension rope. The outrigger must be attached to the anchorage with minimal slack.

10) WIRE ROPE USED FOR SUSPENSION

- a) **Type.** Wire rope used to suspend the platform of a suspended scaffold should be preformed improved plow steel with a diameter of not less than five-sixteenths of an inch. Such suspension wire rope should have an independent wire rope or strand core; however, a fiber or equivalent flexible core may be substituted where there is not more than one layer of suspension wire rope on the drum.
- b) **Safety factor.** Wire rope used to suspend the platform of a suspended scaffold should have a safety factor of not less than ten, based on the ultimate strength and the total dead plus live loads.
- c) **Fittings and connections.** A hand-tucked eye splice with protective thimble, poured zinc socket, swaged socket or compression fitting should be used to connect the suspension cable to the anchorage point on outriggers, hoist drum or scaffold platform, with the following limitations:

- i) Connections shall be capable of developing at least 80 percent of the rated breaking strength of the wire rope.
- ii) Poured zinc socket attachments should not be used on suspension wire rope less than one-half inch in diameter.
- iii) Aluminum fittings shall not be used.
- iv) Proper testing utilizing the manufacturer's gauge of swaged socket or compression fittings (such as the NICO press sleeve) must be performed and documented prior to use of the platform, and gauge must be maintained onsite to inspect fittings before each use of the scaffold.

d) Suspension wire rope maintenance and replacement.

- i) Suspension wire rope, both primary and secondary, should be maintained in accordance to manufacturer's recommendation and should be replaced after the following periods of use, depending on the minimum ratio of drum or sheave tread diameter to wire rope diameter:

<u>Minimum Ratio</u>	<u>Wire Rope Replacement Schedule</u>
10	18 months
20	24 months
30	30 months
40	36 months

- ii) Suspension wire rope of the 6x19 class should not be used on drums or sheaves where the ratio of drum or sheave tread diameter to the wire rope diameter is less than 20, unless such use can be substantiated as safe and adequate by complete test reports and technical data submitted to the ESU.

e) Rope tag required. A corrosion-resistant metal data tag should be attached to one of the wire rope fittings on each wire rope used for suspension of the scaffold platform. The following information should be stamped or etched on each such metal tag:

- i) Rope diameter in inches.
- ii) Manufacturer's rated ultimate strength.
- iii) Grade of steel used.
- iv) Date of rope installation - month and year.
- v) Construction classification.
- vi) Person or firm who installed rope.
- vii) Name of rope manufacturer.

- f) Whenever replacement suspension wire ropes are installed, new tags should be attached and cotter pins or equivalent locking devices used in previous attachments should be replaced.

11) FALL PROTECTION AND LIFELINES

- a) All persons shall be provided with and shall use a personal fall protection system complying with ANSI Z359.1-1992(R1999), Safety Requirements for Personal Fall Arrest

Systems, Subsystems and Components. An independent vertical lifeline is required for each worker on suspended equipment where a failure of any supports wire or its fastenings allows the suspended equipment to upset. Suspended equipment that does not upset as a result of failure of a support wire rope or its fastenings may incorporate a trolleyline complying with the following requirements:

- i) Trolleylines shall be designed to provide fall protection for workers.
 - ii) The trolleyline shall be not less than 5/16 in. in diameter galvanized or stainless steel wire rope.
 - iii) The trolleyline, the platform members it is attached to, and fastenings shall be designed to maintain a minimum safety factor of 2.
- b) Separate hanging lifelines shall not be used when a powered platform has an overhead structure that would restrict emergency egress of the occupants. In such cases, the suspended equipment shall be designed such that failure of any support wire rope shall not allow the suspended equipment to upset or fall. The occupants in such cases shall be secured to the suspended equipment by fall protection system equipment.
- c) Separate hanging lifelines will only be permitted for personnel suspended less than 300 feet, and must meet the following requirements:
- i) Each such separate hanging lifeline should be securely attached to a sufficient anchorage above the working level and should extend in a continuous unspliced length to the grade or setback below.
 - ii) Lifeline and secondary emergency suspension system anchorages should be independent of the primary scaffold suspension system, except that they may be an integral part of a mobile roof unit.
 - iii) All lifelines used in connection with suspended scaffolds should be five-sixteenths inch diameter wire rope, first grade manila or synthetic fiber rope of equivalent characteristics with a breaking strength of not less than 5000 lb.

12) **HOISTING UNIT.** All hoists must meet the requirements of Advisory Standard 111 "Hoisting Machines Used for Suspended Scaffolds" and the following:

- a) **Prime mover (motor).**
- i) The prime mover should have sufficient power to raise 125 per cent of the design load of any suspended scaffold platform.
 - ii) Any electric motor used as a prime mover for a suspended scaffold should be provided with a current overload device with an automatic reset.
- b) **Primary brake.** Every hoisting unit of a suspended scaffold should be provided with a primary brake which is automatically actuated whenever power to the motor is shut off. Such a primary brake should be designed, constructed and maintained to stop and hold 125 per cent of the designed load of the suspended scaffold. Such a primary brake should be capable of preventing downward drift of the scaffold platform in excess of three inches after actuation of the brake. The primary brake should be directly connected to the hoist drive train and should not be connected through belts, roller chains or clutches.
- c) **Secondary or emergency brake.**

- i) Every hoisting unit of a suspended scaffold should be provided with a secondary or emergency brake which should automatically engage, stop and hold the platform and 125% of its designed load in the event of scaffold over speed because of mechanical failure of the hoist. When the secondary brake is actuated, it shall stop and hold the platform within a vertical distance of 24 in.
 - ii) Where traction type hoists are used the secondary or emergency brake should act on the suspension wire rope. Where winding drum type hoists are used the secondary or emergency brake should act on the suspension wire rope, or directly on the drum or drum extension. In either case the secondary or emergency brake should act independent of the drive train. The actuating mechanism of such a secondary or emergency brake may be separate from the brake itself.
 - iii) Such a secondary brake should be so designed and installed that it will be actuated to stop and hold the scaffold with design load if any of the following conditions occur during operation.
 - (1) An instantaneous change in momentum (free fall).
 - (2) An accelerating over speed.
 - iv) The secondary or emergency brake should not be used to stop the scaffold platform on other than over speed conditions. During operation at design speed such a brake should not be actuated before the actuation and application of the primary brake.
 - v) The design of any such secondary brake should include a provision for periodic testing of the brake under simulated over speed conditions.
- d) **Hoisting drums.**
- i) **Traction drum.** A traction drum is one that does not accumulate the suspension wire rope. The lifting force is obtained by means of friction between the drum and the suspension wire rope.
 - (1) Where traction drums are used, provisions should be made to accumulate tail lines of suspension wire ropes so that they do not hang free below the scaffold platforms.
 - (2) Where traction drums are used a minimum of four turns of the suspension wire rope should be maintained on the drums.
 - ii) **Single wrap winding drum.** A single wrap winding drum is one that accumulates the suspension wire rope in a single layer on a spirally grooved drum.
 - (1) Where such drums are used provisions should be made to insure level winding of the suspension wire ropes.
 - (2) Each such hoist shall be provided with a wire rope of sufficient length to reach the lowest point of vertical travel of the suspended unit with an excess length of at least 4 ft. more than that needed for the maximum vertical travel of the unit.
 - iii) **Multiple wrap winding drum.** A multiple wrap winding drum is one that accumulates the suspension wire ropes in two or more layers.

- (1) Where such drums are used provisions should be made to insure level winding of the suspension wire ropes.
 - (2) Where such drums are used a minimum of four turns of suspension wire ropes should be maintained on the drums.
- iv) **Multiple hoisting drums.** Where a separate winding drum is used for each suspension wire rope of a suspended scaffold, each such drum should be equipped with an automatic secondary brake which is actuated by over speed of the scaffold platform. Two drums connected by a common shaft will be considered as separate drums.
 - v) **Lubrication.** All moving parts of a suspended scaffold hoisting unit should have adequate means for lubrication. Each compartment should be provided with individual lubrication.
 - vi) **Protection from elements.** Hoisting units of suspended scaffolds should be protected against the elements by design or by a weatherproof cover properly fastened in place.

13) ELECTRICAL EQUIPMENT

- a) **Electrical wiring and equipment.** All electric wiring and equipment used in conjunction with suspended scaffolds, such as on the mobile roof unit and scaffold platform as well as the power circuits from the building control panel to the mobile roof unit and scaffold platform, should conform to the requirements of the National Electrical Code.
- b) **Power supply and control.** Power for a suspension scaffold should be supplied from a single source and should be controlled by a master key-operated control to prevent operation by unauthorized persons. Means should be provided so that all switches are locked in the ON position while the scaffold is in use.
- c) **Location of power outlets.** Outlets for plugs and cables used to supply power to the roof carriage or scaffold platform should be installed and located so as to prevent lengths of cable in excess of 100 feet on the roof surface. Such outlets should be readily accessible and located at the level at which the scaffold is board or at the approximate level of the scaffold suspension point.
- d) **Power cable protection.** All power cables used for suspended scaffold should be equipped with the following:
 - i) lock type plugs and strain-relieving devices to prevent tension on the cables from dislodging or damaging the plugs or outlets.
 - ii) Where power cables under tension contact any part of the building or structure, roof carriage or scaffold platform, they should be protected against abrasion or damage by padding or other means.
 - iii) Power cables serving the hoisting units should be hung from outriggers where applicable.
 - iv) Cables hung from outriggers should have fittings equipped with safety hooks.

- v) Where a roof carriage travels on a track system, the power cable and power outlets should be so located that the cable is free from the track system and cannot become pinched between the track system and any part of the roof carriage or scaffold platform.

14) **WELDS.**

- a) All welding on any part of a suspended scaffold, including attachments to the structural steel of the building on which the scaffold is to be installed should be performed only by welders who have been qualified by tests as prescribed in the American Welding Society code or be a welder licensed by the NYS Department of Transportation or other standards acceptable to the ESU to perform such types of welding.
- b) Applications for approval of suspended scaffolds should include reports of non-destructive welding tests prescribed by design engineer or in accordance with manufacturer's recommendations. Such tests should be performed using the magnetic particle, radiographic, ultrasonic or equivalent method on all welds upon which the scaffold is dependent for structural support. All welds used in the scaffold suspension system, including tie-down weldments, should be included in the testing. Magnetic particle testing methods should be limited to a weld penetration distance of three-eighths of an inch below the weld surface.
- c) The results of such welding tests should be submitted to the ESU with the approval application or as soon thereafter as the welding has been completed. **NOTE:** In lieu of non-destructive testing of welds, the ESU may consider acceptance of a certification by a professional engineer licensed to practice in the State of New York that a detailed inspection of the welded connections has been made by qualified inspectors under the supervision of such licensed professional engineer. Such inspections should include the preparation of the joints, the amperages and voltages used, preheating and stress relief where necessary and the physical characteristics of the completed welds.

15) **PORTABLE TYPE SUSPENSION SCAFFOLDS.** Portable type suspension scaffolds are those which are used at specific sites or buildings periodically and are not permanently installed or attached to the buildings. They are disengaged from their means of suspension after each period of use. In addition to the general and detailed standards heretofore stated, such portable suspension scaffolds should also comply with the following special standards:

- a) **Approval.** A Resolution of Approval by the ESU may be issued to the owner of a portable type suspension scaffold where such owner is not the owner of a building on which a scaffold is to be used. The issuance of such a Resolution of Approval, however, is not to be construed to be relieving the building owner of obligations imposed on him by Section 202 of the Labor Law. The building owner should be responsible for the building components used in conjunction with such a portable type suspension scaffold while the owner of such scaffold should be responsible for all scaffold components.
- b) **Suspension assembly.**
 - i) Portable type suspension scaffolds should be suspended from mobile roof unit or from portable outrigger beams which are continuously tied-down to the building or structure. On buildings or structures erected before January 15, 1969 where such means of suspension are impossible, the ESU may consider other means of

suspension for portable type suspension scaffolds. In no case should roof hooks or irons of the conventional type be used to suspend a portable type suspension scaffold.

- ii) Where the parapets of a building were not designed to support the imposed design loads of a portable type suspension scaffold and where such parapets are attached to the building or structure by mortar bond only, such parapets should not be used as a means of support for a portable type suspension scaffold.
 - iii) Portable type suspension scaffolds should not have suspension wire ropes exceeding the 150 feet in length.
 - iv) Provisions should be made for the safe rigging of portable type suspension scaffolds.
 - v) The suspension point provided by any outrigger for a portable type suspension scaffold should be located not less than two-thirds of the horizontal distance from the center of gravity of the suspension scaffold to the face of the building.
- c) **Building setbacks or projections.** Suspension points for portable type suspension scaffolds on buildings with setbacks or projections should be so located as to eliminate the necessity for descending or ascending scaffold platforms to be maneuvered over any parapet, setback edge or projection.
- d) **Platform access.** Access to the platform of any portable type suspension scaffold should be provided only from a safe surface below the elevation of the suspension point.
- 16) **MANUALLY POWERED SUSPENDED SCAFFOLDS.** Manually powered suspended scaffolds will not be used where the vertical distance from the suspension point to the street, ground or building setback level exceeds 75 feet except where previous approval has been granted.
- 17) **EMERGENCY RECOVERY.** Means must be considered for the emergency recovery of workmen from the platform of any suspended scaffold because of power or equipment failure, workman disability or for any other reason.
- 18) **INSPECTION AND MAINTENANCE.** For the guidance of applicants and owners in addition to the manufacturer's requirements for maintenance of the system the following standard requirements for inspection and maintenance should be made a part of any Resolution of Approval granted by the ESU.
- a) The owner of a suspension scaffold should furnish the Commissioner in writing a proposed program of inspection and maintenance procedures such owner expects to follow. Such a proposed program should be acceptable to the Commissioner as adequate and may be subject to further modifications as he or she may thereafter find essential to secure continued safety.
 - b) The names and addresses of all persons designated by the owner to carry out such a program of inspection and maintenance should be submitted to the Commissioner. No other person should be employed or permitted to perform the provision of any such program. Such designated persons should have reasonable training and experience to inspect service and maintain the suspended scaffold and all its component devices in a competent manner.
 - c) At least two such designated persons should conduct the inspection and maintenance cooperatively. Upon the discovery of any substantial defect or abnormal condition in the

scaffold or in any of its components, the suspended scaffold should not be operated or used until such time as the defect or abnormality has been corrected, the scaffold restored to its normal condition, a re-inspection made by the Commissioner and the scaffold has been found to be in good repair.

- d) A written report on any service which the Commissioner may require to be reported should be submitted to the Commissioner in such form as may be acceptable immediately upon the completion of such service.
- e) Suspension scaffolds should be operated only by designated persons who have been thoroughly instructed in its use and control. Such persons should be directed to discontinue operation immediately upon observing any abnormality and should report the same forthwith to the owner.
- f) 7 Years after approval is initially granted and then that at least once every 5 years or sooner if conditions warrant the system installation shall be inspected by a licensed NY State Professional Engineer with experience in window washing equipment who shall in writing certify to the Engineering Services Unit (ESU) of the NYS DOL:
 - i) All components of the system are safe and functioning as originally designed.
 - ii) All components of the system are free from defects or wear which would require replacement.
 - iii) According to all available records maintenance of equipment is in accordance with manufacturer's recommendation and Appendix 101A.
 - iv) Structural components continue to be capable of supporting all loading required by design.

**AS 101-4 RECOGNIZED DESIGN STANDARDS
ACCEPTABLE TO THE DEPARTMENT OF LABOR**

- 1) The following list of recognized design standards are acceptable to the ESU in matters relating to the Applications for Approval of suspended scaffolds used for window cleaning and light maintenance. These recognized design standards are referred to in section 101-2.2(b) as well as in other sections of these advisory standards.
 - a) AISC — American Institute of Steel Construction
 - b) ASCE — American Society of Civil Engineers
 - c) ASME — American Society of Mechanical Engineers
 - d) ASTM — American Society for Testing Material
 - e) AGMA — American Gear Manufacturer's Association
 - f) Structural Aluminum Design — Reynolds Aluminum Company
 - g) ALCOA Structural Handbook — Aluminum Company of America
- 2) When submitting design data from such recognized standards in an Application for Approval of a suspended scaffold, applicants should refer to the standard and section used in obtaining such data.

APPENDIX 101A
STANDARD CONDITIONS FOR OPERATION AND
MAINTENANCE OF SUSPENDED SCAFFOLDS
USED FOR WINDOW CLEANING
AND LIGHT MAINTENANCE

- 1) The scaffold shall bear, by the impression or stamped metal plate, the identification authorized therefore.
- 2) Access to and egress from the suspended scaffold shall be restricted to the area designated in the Resolution, except in the case of an emergency.
- 3) Before each daily operation the scaffold shall be subjected to inspection and test to assure its safe condition.
- 4) The scaffold shall be used in normal operation only by persons who have been thoroughly instructed in its use and control. Such persons shall be directed to discontinue operation of the scaffold immediately upon observing any defect or abnormality and to report the same forthwith to the owner or his agent.
- 5) Each person on the suspended scaffold shall be provided with and shall use a fall protection system in accordance with Advisory Standard 101 section 101-3 (11)
- 6) Fall protection systems must be used, preserved, maintained, and inspected in accordance with manufacturer's guidelines and their approved design.
- 7) Where power cables under tension contact any part of the building, mobile unit, or scaffold platform, such cables shall be protected against abrasion or damage by padding or other means. Power cables hung from, or supported by, any part of the mobile unit or scaffold platform shall be provided with adequate fittings to prevent damage. Power cables hung from outriggers shall have fittings equipped with safety hooks.
- 8) The roof slab or other supporting surface shall be marked with painted lines or other permanent indicators to assist the operator in aligning the scaffold with the face of the building for each working position.
- 9) A fire extinguisher meeting the requirements of Advisory Standard 101 section 101-3 (5) (j) must be securely attached to the scaffold and maintained in working order at all times.
- 10) When a telephone or two-way voice radio is provided for emergency communication between the suspended scaffold and the building, the communication station in the building shall be manned whenever the scaffold is being used. Such communication system shall be tested prior to the daily use of the scaffold and at intervals during such use to assure its proper operation.
- 11) The operating controls on the suspended scaffold shall be properly and permanently labeled to identify their respective functions.
- 12) Power at electrical outlets used for the scaffold shall be available only while the scaffold is in use and shall not be available at any other time.
- 13) The scaffold shall not be used when the prevailing wind velocity exceeds 25 miles per hour.
- 14) Accessories, containers, tools or other materials on the scaffold platform shall be secured to prevent their movement and to prevent their falling off the scaffold platform.

- 15) A plate indicating the maximum loading and number of persons required to operate the scaffold shall be attached to the platform in a conspicuous location. The lettering on such plate shall be legible and shall be not less than one-eighth (1/8) inch in height.
- 16) The suspended scaffold and all its components shall be maintained in good repair.
- 17) The scaffold owner shall furnish the Commissioner in writing, a proposed program of maintenance procedures. Such a program shall be acceptable to the Commissioner and shall be subject to such modifications as the Commissioner may thereafter find essential in order to assure continued safety.
- 18) The name and address of the person or firm designated by the owner to carry out such maintenance program shall be submitted, in writing, to the Commissioner and shall be acceptable to him or her. No other person or firm shall be employed or permitted to perform the required servicing and maintenance of the scaffold. Such designated person or firm shall be competent by reason of training and experience to service and maintain the scaffold.
- 19) Each maintenance inspection of a suspended scaffold shall be conducted by two such designated persons cooperatively.
- 20) Upon the discovery of any substantial defect or abnormal condition in the scaffold or in any part thereof, the scaffold shall not be operated until such time as the defect or condition has been corrected; the scaffold restored to its normal condition and reinspected by the Commissioner and found acceptable to him or her. A written report, in such form as the Commissioner may require, shall be submitted to him or her immediately upon completion of each inspection or service which the Commissioner may require to be reported.
- 21) Any repairs or maintenance required or performed on the roof slab or other supporting surface shall be performed under the supervision of a professional engineer licensed to practice in the State of New York. Upon completion of such repairs or maintenance, the professional engineer shall submit to the Commissioner, in writing, certification that the supporting surface and anchors, if originally provided, conform to at least the original design specifications and meet the design strength.
- 22) All repair welding shall be performed by certified welders. Non-destructive tests of all critical repair welds shall be performed and reports of such tests shall be submitted to the Commissioner.
- 23) Paintings of aluminum alloy members shall conform to the specifications of ASCE (American Society of Civil Engineers), paper No. 3341.
- 24) Wire rope shall be maintained as follows:
 - a) Wire rope hoisting cables and their fastenings shall be renewed as required by Resolution unless conditions of wear, corrosion or other safety considerations warrant prior renewal.
 - b) A non-corrosive metal data tag shall be attached to a rigid part of the hoist, to one of the rope fittings or to each rope. Such tag shall contain the following information stamped or etched in letters not less than one-sixteenth (1/16) inch in height.
 - i) Diameter in inches.
 - ii) Manufacturer's rated breaking strength.
 - iii) Grade of steel used.
 - iv) Date of installation (month and year).
 - v) Construction classification.
 - vi) Person or firm installing ropes.
 - vii) Name of rope manufacturer.

- c) Whenever such a rope is replaced a new metal tag shall be provided.
- 25) No changes or alterations affecting safety shall be made in or upon the scaffold nor shall any additions or accessories be attached thereto unless previously authorized, in writing, by the Commissioner. Except for the replacement of identical equipment or accessories, any changes or additions shall be subject to final approval by amendment of the Resolution of Special Approval.
- 26) All pertinent provisions of Industrial Code Rule Part 21, and Industrial Code rule Part 23 shall apply.
- 27) A copy of the Approval Resolution and a set of filed data, including drawings, description of the equipment and operating procedures, shall be kept on the premises of the scaffold installation readily available to the persons using the equipment for their information and training, to the maintenance personnel and to the Commissioner.
- 28) Where the vertical travel of the scaffold platform exceeds 150 feet, a means shall be provided to stabilize the separate hanging lifelines and the electrical power and control cables to the building to prevent displacement by wind or any other force. Such stabilizing means shall be provided for each additional 150 feet of vertical travel.