

**ADVISORY  
STANDARDS**

**101**

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

**AS AMENDED  
EFFECTIVE  
MAY 23, 1983**



**NEW YORK STATE  
DEPARTMENT OF LABOR  
BOARD OF STANDARDS AND APPEALS  
11 NORTH PEARL STREET  
ALBANY, NEW YORK 12207**

**New York State Board of Standards and Appeals**  
**ADVISORY STANDARDS FOR CONSTRUCTION, OPERATION AND**  
**MAINTENANCE OF**  
**SUSPENDED SCAFFOLDS**  
**USED FOR WINDOW CLEANING AND LIGHT MAINTENANCE**  
**AS 101-1 PREFACE**

**101-1.1 INTRODUCTION.**

(a) These advisory standards may be used by and before the Board in all matters in the consideration of applications for approval of suspend 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.”

**NOTE: (1)** 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.

(2) 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.

(3) Where the suspension point is less than 75 feet above the nearest street or ground surface to be approved by Industrial Code Part (Rule No.) 23 are required to be approved. (See Industrial Code Part (Rule No.) 21, section 21.9, subdivision (d), paragraph (1)).

(b) These advisory standards supersede and replace Advisory Standards AS-21, adopted by the Board on July 1, 1965.

(c) These advisory standards are minimum standards and the Board 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 proposal to the Board with an application before proceeding with the design of such deviation.

**101-1.2 APPLICATION FOR APPROVAL — DATA REQUIRED.** 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:

**(a) Application form, and letter of authorization.** Applicants should file a Special Approval Application (SH-753) with the New York State Department of Labor, State Office Campus, Building 12, Room 154, Albany, New York 12240. These forms may be obtained at the New York State Department of Labor offices at the above address or at the New York State Department of Labor, 345 Hudson Street, Room 7009, New York, New York 10014. 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.

**(b) Contract drawings of building sections involved.** 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 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.
- (4) Structural drawings.
  - (i) Plans and sections of building area affected by the scaffold installation.
  - (ii) Details of structural anchorages and connections for the scaffold installation.

**NOTE:** All such drawings required by this subdivision (b) should 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 seal and signature.

**(c) Structural data for scaffold installation.**

- (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.
- (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, runways, outrigger assemblies, carriages, scaffold platforms, stirrups, anchorages and similar load bearing components.

**NOTE:** (1) Where load test reports as conducted by a recognized testing agency acceptable to the Board 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 loads 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.

(2) Structural computations should be prepared by a professional engineer licensed to practice in the State of New York and should bear his seal and signature.

(d) **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 Number of each such component.

(e) **Welding.** All welding should be performed by welders certified to American Welding Society or other standards acceptable to the Board. Non-destructive tests of all critical welds should be performed and reports of such tests should be submitted to the Board. (See section 101 -3.8 of these standards.)

(f) **Description.** A brief description of the suspension scaffold and of its operating procedure should accompany the application for approval.

### **101-1.3 PROCESSING OF APPLICATIONS.**

(a) Applications for approval are processed by the Board 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. The filing of data not directly applicable to the specific installation cited in the application may be considered as grounds for dismissal of the application.

(b) At the time an application for approval of a suspension scaffold is received by the Board it will be placed on an inactive list with proper priority unless it is indicated that the scaffold installation will be completed within 30 days from the date of such filing. In order for an application for approval to be placed on a Hearing and Inspection Schedule, the applicant should notify the Board of the intended completion date of the scaffold installation not less than 30 days prior to such completion date. Hearing and inspections concerning an application for approval will be scheduled upon receipt by the Board of a written request by the applicant.

(c) Failure on the part of the applicant to submit data requested by the Board 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.

## **AS 101-2 GENERAL STANDARDS**

**101-2.1 SCAFFOLD DEFINITION.** For the purposes of these standards, the term “scaffold” includes the following:

- (a) all scaffold parts, materials, components and devices;
- (b) the means of suspension; and
- (c) the attachment of the suspension assembly to the building or structure.

### **101-2.2 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 Board.

**NOTE: (1)** For a list of recognized standards acceptable to the Board see subpart 101-4 of these standards.

**(2)** For wire rope requirements see section 101-3.4 of these standards.

**(c) Overturning safety factor.** Any mobile roof unit or portable outrigger used to suspend scaffolds, when either tied down to the roof or properly counterweigh 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 1.5 when not tied down, based on a load imposed equal to the design dead plus live loads.

**(d) 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 Board 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 Number of any such previously approved component used as part of the suspension scaffold cited in the application.

**(e) 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.

### **101-2.3 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.

**(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. Such parapet or guardrail should not be less than 42 inches in height from the roof surface or carriage runway. 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 DETAILED STANDARDS

#### 101-3.1 MOBILE ROOF CARRIAGE SUSPENSION.

(a) **Lateral movement control.** A means for guidance and control of mobile roof carriages during movement should be provided.

(b) **Tie-down to building.**

(1) 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.

(2) Position indicators should be painted on the roof surface of each workstation to mark the wheel positions of the mobile unit to assist the operator in properly aligning and positioning the unit.

(3) 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. Such guard and midrails should be capable of resisting a horizontal concentrated force of 100 pounds at the midspan between vertical supports with stresses not to exceed recognized standards.

(d) **Guarding dangerous machinery.** Dangerous machinery located on the mobile roof unit or scaffold platform should be guarded in compliance with Industrial Code Part (Rule No.) 19, Guarding of Dangerous Machinery, Vats and Pans.

(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 storage 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 60 feet per minute.

**(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.

### **101-3.2 SCAFFOLD PLATFORM.**

**(a) Width.** The scaffold platform of a suspended scaffold should be not less than 20 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 or it may be constructed of wood in compliance with Industrial Code Part (Rule No.) 23, section 23.16, subdivision (g). The components of such a scaffold platform constructed of wood should not be painted but may be coated with a transparent protective material which will allow visual inspection.

**(c) Guard rails.** The scaffold platform of a suspended scaffold should be guarded on all side with guardrails, midrails and toeboards. 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 toeboards should be not less than four inches above the scaffold platform surface.

**(d) Scaffold platform enclosure.**

(1) A wire mesh or expanded metal enclosure should be installed from the toeboard 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 toeboard to the level of the midrail such platforms.

(2) The wire mesh or expanded metal used for such enclosures should be not less than No. 18 gage 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.

(3) 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 gage.

**(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. 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 board 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 Board 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.**

**(1)** At least one fire extinguisher suitable for extinguishing electrical and other fires should be provided on the scaffold platform and should be securely attached thereto.

**(2)** Flammable or explosive liquids and highly flammable solids should not be used or carried on the scaffold platform unless the Board'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 permitted by the Board under certain conditions, such as on a building less than 150 feet in height, or may be required in addition to other means of communication.

**(l) 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.

**(m) Vertical speed.** The vertical speed of suspended scaffolds should not exceed 60 feet per minute.

**(n) Single point suspension platforms.** Scaffold platforms suspended from a single cable should be properly balanced to operate level with dead load conditions. The cable 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. Scaffolds designed for two-man operation should not be operated with one man or with more than two men on the scaffold platform. Signs should be posted on the scaffold platform stating that operation with only one man is prohibited.

### **101-3.3 EQUIPMENT TIE-IN TO BUILDING.**

#### **(a) Buildings erected after January 1, 1973.**

**(1)** 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.

**(2)** 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 Board. All such provisions should be reviewed by the Board prior to their installation.

**(3)** 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.

**(4)** 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 (b)(2), below, of these standards.

#### **(b) Buildings designed or erected prior to January 1, 1973.**

**(1) 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 Board 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.

**(2) 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 Board. 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 angulation should be at least six inches in the horizontal direction.

#### **101-3.4 WIRE ROPE USED FOR SUSPENSION.**

**(a) Type.** Wire rope used to suspend the platform of a suspended scaffold should be performed 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. Poured zinc socket attachments should not be used on suspension wire rope less than one-half inch in diameter.

#### **(d) Suspension wire rope maintenance and replacement.**

**(1)** Suspension wire rope 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

(2) 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 Board.

**(c) Rope tag required.**

(1) 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.

(2) 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.

**101-3.5 SAFETY BELTS AND LIFELINES.**

(a) **Safety belts.** An approved safety belt should be provided for each person on any suspended scaffold platform. Each such belt should have a tail line not exceeding four feet in length from belt to anchorage. Each such tail line should be attached to a hanging lifeline by an approved device to permit vertical adjustment or to a scaffold anchorage.

**(b) Lifelines and emergency scaffold suspension systems.**

(1) On all scaffolds suspended 300 feet or less below the suspension point and on all single-point suspension scaffolds there should be provided a separate hanging lifeline for each person on the scaffold platform or as an alternative an approved method of secondary emergency scaffold suspension.

(2) 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. Not more than 300 feet of lifeline should hang free below its anchorage.

(3) 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.

**(c) Tail line attachments.** On two or more point suspension scaffolds where the distance from the scaffold suspension point to the platform exceeds 300 feet or where the Board determines that it is otherwise impractical to use independent life-lines, either an approved method of emergency scaffold suspension or means to securely anchor safety belt tail lines to the scaffold should be provided. Acceptable means of such attachment may be to a substantial and safe part of the scaffold platform or to a single piece horizontal anchorage cable of galvanized improved plow steel at least five-sixteenths of an inch in diameter. Such anchorage cable should extend taut between the ends of the scaffold platform or between the stirrup hangers and be firmly secured to the scaffold platform at its midpoint as well as at each end. Any such end connection should be a spliced eye thimble, safety hook or mechanical fitting. Cable clips should not be used.

**(d) Strength of lifelines.** 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 400 pounds.

**101-3.6 HOISTING UNIT.**

**(a) Prime mover (motor).**

(1) The prime mover should have sufficient power to raise 125 per cent of the design load of any suspended scaffold platform.

(2) Any electric motor used as a prime mover for a suspended scaffold should be provided with a thermal 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.**

(1) 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 its designed load in the event of scaffold overspeed because of mechanical failure of the hoist. If such a secondary brake is of the instantaneous stopping type, it should stop and hold the scaffold platform before the platform travels a distance of 18 inches at overspeed. If such a secondary brake is of the decelerating type, it should stop and hold the scaffold platform before the platform travels a distance of 48 inches at overspeed.

(2) 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.

(3) 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:

- (i) An instantaneous change in momentum (free fall).
- (ii) An accelerating overspeed.

(4) The secondary or emergency brake should not be used to stop the scaffold platform on other than overspeed conditions. During operation at design speed such a brake should not be actuated before the actuation and application of the primary brake.

(5) The design of any such secondary brake should include a provision for periodic testing of the brake under simulated overspeed conditions.

**(d) Hoisting drums.**

**(1) Traction drum.**

(i) 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.

(ii) 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.

(iii) Where traction drums are used a minimum of four turns of the suspension wire rope should be maintained on the drums.

**(2) Single wrap winding drum.**

**(i)** A single wrap winding drum is one that accumulates the suspension wire rope in a single layer on a spirally grooved drum.

**(ii)** Where such drums are used provisions should be made to insure level winding of the suspension wire ropes.

**(iii)** Where such drums are used a minimum of four turns of the suspension wire ropes should be maintained on the drums.

**(3) Multiple wrap winding drum.**

**(i)** A multiple wrap winding drum is one that accumulated the suspension wire ropes in two or more layers.

**(ii)** Where such drums are used provisions should be made to insure level winding of the suspension wire ropes.

**(iii)** Where such drums are used a minimum of four turns of suspension wire ropes should be maintained on the drums.

**(e) 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 overspeed of the scaffold platform. Two drums connected by a common shaft will be considered as separate drums.

**(f) Lubrication.** All moving parts of a suspended scaffold hoisting unit should have adequate means for lubrication. Each compartment should be provided with individual lubrication.

**(g) 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.

**101-3.7 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.**

(1) All power cables used for suspended scaffold should be equipped with lock type plugs and strain-relieving devices to prevent tension on the cables from dislodging or damaging the plugs or outlets.

(2) 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.

(3) Power cables serving the hoisting units should be hung from outriggers where applicable.

(4) Cables hung from outriggers should have fittings equipped with safety hooks.

(5) 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.

### **101-3.8 WELDING.**

(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 other standards acceptable to the Board to perform such types of welding.

(b) Applications for approval of suspended scaffolds should include reports of non-destructive welding tests. 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 Board with the approval application or as soon thereafter as the welding has been completed.

**NOTE:** In lieu of non-destructive testing of welds, the Board 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.

**101-3.9 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 Board 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.**

**(1)** 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 Board 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.

**(2)** 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.

**(3)** Portable type suspension scaffolds should not have suspension wire ropes exceeding the 150 feet in length.

**(4)** Provisions should be made for the safe rigging of portable type suspension scaffolds.

**(5)** 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.

**101-3.10 MANUALLY POWERED SUSPENDED SCAFFOLDS.** Manually powered suspended scaffolds should not be used where the vertical distance from the suspension point to the street, ground or building setback level exceeds 100 feet.

**101-3.11 EMERGENCY RECOVERY.** Means should 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.

**101-3.12 INSPECTION AND MAINTENANCE.** For the guidance of applicants and owners the following standard requirements for inspection and maintenance should be made a part of any Resolution of Approval granted by the Board.

(a) The owner of a suspension scaffold should furnish the Industrial Commissioner in writing a proposed program of inspection and maintenance procedures such owner expects to follow. Such a proposed program should be acceptable of the Industrial Commissioner as adequate and may be subject to further modifications as he 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 Industrial 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 Industrial Commissioner and the scaffold has been found to be in good repair.

(d) A written report on any service which the Industrial Commissioner may require to be reported should be submitted to the Industrial 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.

#### **AS 101-4 RECOGNIZED DESIGN STANDARDS ACCEPTABLE TO THE BOARD**

**101-4.1** The following list of recognized design standards are acceptable to the Board 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) ASIM — 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

**101-4.2** 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.

**ADVISORY  
STANDARDS**

**110**

**ADVISORY STANDARDS  
FOR  
MOBILE SCAFFOLDS**

**Effective  
July 16, 1969**

**NEW YORK STATE  
DEPARTMENT OF LABOR  
BOARD OF STANDARDS AND APPEALS  
11 North Pearl Street  
Albany, New York 12207**

STATE OF NEW YORK )  
DEPARTMENT OF LABOR ) SS.:  
BOARD OF STANDARDS AND APPEALS)

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In the Matter of  
Advisory Standards  
For: Mobile Scaffolds

ADMINISTRATIVE  
RESOLUTION  
No. 133

IT IS HEREBY RESOLVED: That the attached standards be and are hereby adopted subject to further action by the Board in its discretion. Said standards are advisory in purpose and intent and are in no respect intended to be mandatory or to be any part of the rules of the Board or to have the force and effect of law, or to contravene any provision of the Labor Law and the rules of the Board inconsistent therewith. Said standards will be referred to by the Board in the interpretation, construction and application of the rules of the Board and in consideration of all relevant matters and proceedings before the Board, including applications for approval of materials and devices and petitions for variations.

IN WITNESS WHEREOF WE, the undersigned chairman and member of the Board of Standards and Appeals, have hereunto set our hands and caused the seal of office of the Department of Labor of the State of New York to be hereunto affixed.

Harry R. Mason, Chairman

George Archinal, Member

Dated at Albany, New York State  
July 16, 1969

**New York State Board of Standards and Appeals**  
**ADVISORY STANDARDS FOR CONSTRUCTION, OPERATION AND**  
**MAINTENANCE OF**  
**MOBILE SCAFFOLDS**

**AS-110.1 INTRODUCTION.** (a) These advisory standards may be used by and before the Board in all matters in the consideration of applications for approval of mobile scaffolds under the provisions of Industrial Code Part (Rule No.) 23, herein quoted:

(1) Section 23.25, subdivision (b) “*New equipment.* Manually propelled mobile scaffolds which were not in use prior to November 1, 1959 shall be approved and, subject to the provisions of the resolution of approval, shall be constructed and used as above provided.”

(2) Section 23.26 “*Special scaffolds — approval required.* Scaffolds not named or described in this Part (rule) shall not be used unless approved.”

(b) These advisory standards pertain to mobile scaffolds where the scaffold platform is located above, or may be raised above, the supporting wheels or casters of the scaffold. Such scaffolds may be of the sectional built-up type, the telescoping type or the elevating platform type.

**110.2 GENERAL STANDARDS.** (a) **Scaffold definition.** For the purposes of these standards the term “*scaffold*” includes all scaffold parts, materials, components, devices and means of support.

(b) **Safety factor required.** Section 240, subdivision 3 of the New York State Labor Law states: “All scaffolding shall be so constructed as to bear four times the maximum weight required to be dependent therefrom or placed thereon when in use.” The maximum weight should be construed to mean both dead and live loads.

**NOTE:** The Board at its discretion may request the submission of reports of tests made by a laboratory acceptable to the Board in order to substantiate the above requirements of the Labor Law.

(c) **Mobile scaffold platform.** (1) The scaffold platform of any mobile scaffold should be at least 18 inches in the least dimension.

(2) Mobile scaffold platforms should be provided with (i) guard rails at least 36 inches in height above the platform deck; (ii) mid rails; and (iii) toe boards at least four inches in height above the platform deck.

**Exception:** Scaffold platforms having an area of less than four square feet are not required to be provided with mid rails or toe boards.

(d) **Scaffold platform access.** A safe means of access to any mobile scaffold platform should be provided. Ladders or steps leading to the scaffold platform should be a part of the scaffold or rigidly attached thereto. Proper handholds should be provided for safe passage from the ladder or steps to scaffold platform deck.

(e) **Wheel locks.** Each supporting wheel or caster of a mobile scaffold or of any outboard support or outrigger used with such a scaffold should be provided with a locking device in order to prevent lateral movement of the scaffold while such scaffold is in use.

### 110.3 DETAILED STANDARDS.

#### (a) Sectional built-up type mobile scaffolds.

(1) **Scaffold stability.** Any sectional built-up type mobile scaffold when extended to its maximum height should be capable of sustaining, without tipping, a horizontal force of 50 pounds applied at any point on the perimeter of the scaffold platform.

(2) **Means of obtaining stability.** The stability against tipping required by these standards may be obtained by one or more of the following methods or by other means approved by the Board.

(i) **Dimensional stability.** The maximum height of the scaffold should not exceed four times the least fixed base dimension without the use of outboard supports or outriggers or equivalent devices to increase the base dimension.

(ii) **Use of counterweights.** The required scaffold stability may be obtained by the use of counterweights which are securely and permanently attached to the scaffold. Such a counterweight should be located at least six inches but not more than 36 inches above the ground, floor or equivalent surface whenever the scaffold platform is in an elevated position. Any counterweight used to obtain scaffold stability should be of such size and weight as to obtain the resistance against scaffold tipping required by these standards.

(iii) **Outboard supports.** Outboard supports or outriggers may be used to obtain scaffold stability for sectional built-up type mobile scaffolds. When such outboard supports are used, the maximum height of the scaffold platform should not exceed four times the least base dimension of the scaffold including the extended outboard supports. When such outboard supports are used to obtain scaffold stability, a conspicuous sign with letters not less than one-fourth inch high should be provided on the scaffold stating that the outboard supports must be extended and locked whenever the scaffold platform is elevated to a height more than four times the least fixed base dimension. Outboard supports should be capable of being locked in their extended positions.

(iv) **Tie downs.** Tie downs may be used to obtain scaffold stability. However, when this method is used such a scaffold will not be considered for General Approval but only for Special Approval at a specific location. Such tie downs should be securely attached to suitable anchorages in the ground, floor or equivalent surface.

(3) **Platform loading.** The maximum load rating of any sectional built-up type mobile scaffold, in pounds per square foot, at the maximum elevation of the scaffold platform should not exceed one-fourth of the allowable caster or scaffold leg load.

#### (b) Telescoping or elevating type mobile scaffolds.

(1) **Scaffold stability.** Any telescoping or elevating type mobile scaffold when extended to its maximum height should be capable of sustaining, without tipping, a horizontal force of 50 pounds applied at any point on the perimeter of the scaffold platform.

**(2) Means of obtaining stability.** The stability against tipping required by these standards may be obtained by one or more of the following methods or by other means approved by the Board.

**(i) Dimensional stability.** The maximum height of the scaffold should not exceed four times the least fixed base dimension without the use of outboard supports or outriggers or equivalent devices to increase the base dimension.

**(ii) Use of counterweights.** The required scaffold stability may be obtained by the use of counterweights which are securely and permanently attached to the scaffold. Such a counterweight should be located at least six inches but not more than 36 inches above the ground, floor or equivalent surface whenever the scaffold platform is in an elevated position. Any counterweight used to obtain scaffold stability should be of such size and weight as to obtain the resistance against scaffold tipping required by these standards.

**(iii) Outboard supports. (a) General.** Outboard supports or outriggers may be used to obtain scaffold stability for telescoping or elevating type mobile scaffolds. When such outboard supports are used, the maximum height of the scaffold platform should not exceed four times the least base dimension of the scaffold including the extended outboard supports. Such outboard supports should be capable of being locked in their extended positions.

**(b) Manually elevated scaffolds.** When outboard supports are used to obtain scaffold stability for mobile scaffolds which are elevated manually, a conspicuous sign with letters not less than one-fourth inch high should be provided on the scaffold stating that the outboard supports must be extended and locked whenever the scaffold platform is elevated to a height more than four times the least fixed base dimension.

**(c) Power elevated scaffolds.** When outboard supports are used to obtain scaffold stability for mobile scaffolds which are power elevated, such outboard supports should be so interlocked as to prevent the elevation of the scaffold platform unless such supports are extended and locked in their extended position.

**(3) Level indicators.** Any telescoping or elevating type mobile scaffold should be provided with a permanently mounted spirit level or equivalent indicator in order to assure proper leveling of the scaffold platform. Such a spirit level or equivalent indicator should be mounted on the scaffold base not more than five feet above the ground, floor or equivalent surface and should indicate whether or not the supporting structure of the scaffold platform is plumb.

**(4) Emergency stop devices.** Each telescoping or elevating type mobile scaffold should be provided with a means to prevent the scaffold platform from descending at a faster rate than the normal controlled speed of descent in case of failure of any elevating component.

**(5) Emergency egress.** Telescoping or elevating type mobile scaffolds should be provided with a means of egress or a means of lowering the scaffold platform in case of emergency.

**(6) Electric powered units.** Telescoping or elevating type mobile scaffolds which are raised or lowered by systems containing electric motors should be provided with

power cords having separate grounding conductors and grounding type plugs except for those units powered by self-contained batteries.

(7) **Scaffolds used by electrical workers.** Any telescoping or elevating type mobile scaffold used for electrical work should be provided with scaffold platform, guard rails and toe boards electrically insulated from the remainder of the scaffold supporting structure.

**ADVISORY  
STANDARDS  
111**

**ADVISORY STANDARDS  
FOR  
HOISTING MACHINES USED FOR SUSPENDED SCAFFOLDS**

**Effective  
March 1, 1971**

**NEW YORK STATE  
DEPARTMENT OF LABOR**

STATE OF NEW YORK )  
DEPARTMENT OF LABOR ) SS:  
BOARD OF STANDARDS AND APPEALS)

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In The Matter of	:	
Advisory Standards	:	ADMINISTRATIVE
for	:	RESOLUTION
Hoisting Machines	:	NO. 138
Used for Suspended Scaffolds	:	

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IT IS HEREBY RESOLVED: That the attached standards be and are hereby adopted subject to further action by the Board in its discretion. Said standards are advisory in purpose and intent and are in no respect intended to be mandatory or to be any part of the rules of the Board at to have the force and effect of law, or to contravene any provision of the Labor Law and the rules of the Board inconsistent therewith. Said standards will be referred to by the Board in the interpretation, construction and application of the rules of the Board and in consideration of all relevant matters and proceedings before the Board, including applications for approval of materials and devices and petitions for variations

IN WITNESS WHEREOF WE, the undersigned chairman and members of the Board of Standards and Appeals, have hereunto set our hands and caused the seal of office of the Department of Labor of the State of New York to be hereunto affixed.

Harry R. Mason, Chairman  
George Archinal, Member  
B. Franklin Spencer, Member

Dated at Albany, New York State  
January 12, 1971

**New York State Board of Standards and Appeals**  
**ADVISORY STANDARDS FOR CONSTRUCTION, OPERATION, AND MAINTENANCE OF**

**HOISTING MACHINES**

**USED FOR SUSPENDED SCAFFOLDS**

**AS-111-1 PREFACE**

**AS-111.1 INTRODUCTION.** (a) These advisory standards may be used by and before the Board in all matters in the consideration of applications for approval of hoisting machines used for suspended scaffolds which are required to be approved by the provisions of Industrial Code Part (Rule No.) 22, (12 NYCRR 22), relating to “Protection in Construction, Demolition and Excavation Work”, Subpart 23-5, Section 22-5.8, Subdivision (d), Paragraph (1), herein quoted: “(1) Any manual or power-operated hoisting machine used for suspended scaffolds shall be approved.”

(b) These advisory standards are minimum standards and the Board in its discretion may at any time mend them or take other appropriate action in regard thereto to assure safety.

(c) In regard to any deviation from these advisory standards, the applicant should submit such a proposal to the Board along with an application for approval before proceeding with the design of any such deviation.

**111-1.2 APPLICATION FOR APPROVAL.** (a) **Procedure and data required.** The following data should be submitted in duplicate with any application for approval of a hoisting machine to be used for a suspended scaffold.

(1) **Application form.** An applicant should file a General Approval Application (SH-753) with the New York State Department of Labor, Building 12, Room 154, Albany, New York 12240. These forms may be obtained from the New York State Department of Labor offices located at the above address or 345 Hudson Street, Room 7009, New York, New York, 10014.

(2) **Hoisting machine drawings.** An applicant should file a complete set of engineering drawings for the hoisting machine. Such drawings should contain dimensions as well as complete delineation and material specifications.

(3) **Design calculations.** An applicant should file a complete stress analysis for the hoisting machine to substantiate the ability of the hoist to raise and hold its maximum design load with stresses that will not exceed those established by recognized national standards when considering impact loading. Maximum loading should be determined by doubling the sum of the live load plus the dead load imposed on the hoist’s suspension rope.

**NOTE:** For a list of recognized national standards acceptable to the Board see Subpart 111-4 of these advisory standards.

**(d) Test reports.** An applicant may file with the Board a report of tests made by an independent laboratory acceptable to the Board or certified by a professional engineer licensed to practice in the State of New York as an alternative to providing the design calculations required by Paragraph (3) above. Such tests should be made on prototype models only to determine the safety of the hoisting machine and to insure that such machine meets all the requirements of these advisory standards.

**(e) Description.** An applicant should file with the Board a word description of the construction, use, operation and safety features of the hoisting machine.

**111-1.3 MODIFICATION OF APPROVED HOISTING MACHINES.** Prior approval by the Board is required before any modification or alteration of a previously approved hoisting machine is made. When any modification or alteration is anticipated, the applicant should submit a proposal to the Board for its consideration. Such a proposal should include substantiating data.

## **AS-111-2.1 GENERAL STANDARDS**

**111-2.1 DEFINITION OF TERMS.** Whenever used in these advisory standards, the following terms mean:

**(a) *Approved.*** In respect to a device or a material: in compliance with a subsisting resolution of approval adopted by the Board. In respect to action by the Board: made the subject of a resolution of approval.

**(b) *Hoisting machine.*** A device intended to be used to raise or lower a suspended scaffold. The term includes the following:

**(1)** All parts, materials, components, assemblies and devices of the hoisting machine.

**(2)** The method of attachment of the hoisting machine to the suspended scaffold.

**(3)** The means of suspension of the hoisting machine.

**(c) *Prime mover.*** The source of power for the hoisting machine.

**(d) *Speed reducer.*** A gearing device used to reduce the output speed of the prime mover to the desired speed of the hoist.

**(e) *Primary brake.*** A brake used to stop the hoisting machine and its load under normal operating conditions.

**(f) *Secondary brake.*** A brake that is intended to stop the hoist and its load under emergency conditions only.

**(g) *Traction drum.*** A type of drum that does not accumulate the suspension rope but is designed to climb the rope by the application of a friction force between the rope and the drum.

- (h) *Winding drum.* A drum that accumulates the suspension rope.
- (i) *Single wrap drum.* A winding drum that accumulates the suspension rope in a single layer in spiral grooves on the surface of the drum.
- (j) *Multiple wrap drum.* A winding drum that accumulates the suspension rope in more than one layer on the surface of the drum.

### AS-111-3 DETAILED STANDARDS

**113.1 HOISTING MACHINE MINIMUM STANDARDS.** The following are the minimum standards for a hoisting machine to be considered for approval:

(a) **Prime mover.** (1) Any powered type hoisting machine should have a prime mover of sufficient capacity to raise 125 per cent of the design load.

(2) **Electric motors.** Each electric motor of any hoist should be provided with a thermal overload device or a circuit protected by a current limiting device and should be of a weather-proof type construction. Each such motor should bear the manufacturer's name plate which lists the rating and other characteristics of the motor.

(3) **Gasoline motors.** Gasoline motors will not be considered for approval.

(4) **Liquid propane gas motors.** Liquid propane gas motors may be considered for approval provided such motors are in compliance with all the provisions of these advisory standards.

(5) **Air motors.** Air motors may be considered for approval provided such motors are in compliance with all the provisions of these advisory standards.

(b) **Speed reducers.** (1) A hoisting machine should have a speed reducer or an equivalent device to obtain a mechanical advantage. Such speed reducer or other device should contain positive type gearing such as a worm and gear, spur gears or bevel gears.

(2) The speed reducer or other device should be directly connected to the drum of the hoisting machine. Connection by means of belts, clutches or roller chains will not be considered as direct connections.

(3) All gearing should conform to the standards as established by the American Gear Manufacturers' Association in effect on the date that the application for approval is filed with the Board.

(c) **Primary brake.** (1) Every manually-powered hoisting machine should be provided with a primary brake that automatically engages upon the release of effort by the operator on the crank or other operating device.

(2) Every power-operated hoisting machine should be provided with a primary brake that automatically engages whenever power to the prime mover is interrupted.

(3) Any primary brake should be rated to stop and hold 125 per cent of the rated load of the hoisting machine.

(4) Any primary brake should be capable of preventing downward drift of the hoisting machine and its rated load.

(5) Any primary brake should be directly connected to the drive train of the hoisting machine and should not be connected through belts, roller chains or clutches.

**(d) Secondary brakes. (1)** Every hoisting machine should be provided with an automatic emergency-type secondary brake that will stop and hold 125 per cent of the rated load of the hoist. If such a secondary brake is of the instantaneous stopping type it should stop and hold the hoist and its rated load before the hoist travels a vertical distance of 18 inches. If such a secondary brake is of the decelerating type it should stop and hold the hoist and its rated load before the hoist travels a vertical distance of 48 inches.

(2) The secondary brake should act directly on the wire suspension rope on a traction type hoist or winding drum type hoist and may act directly on the drum or drum extension on a winding drum type hoist. Secondary brakes should be independent of the drive trains on all hoists. The actuating mechanism of a secondary brake may be separate from the brake.

(3) Every secondary brake should be so designed, installed and maintained to stop and hold 125 per cent of the rated load of the hoist when any of the following emergency conditions occur:

(i) An instantaneous change in momentum (free fall).

(ii) An accelerating overspeed.

(4) The secondary brake should not be used to stop and hold the hoist except under emergency conditions. Such a brake should not engage before the hoist is stopped by the primary brake in normal operation.

(5) The design of every secondary brake should include a provision for periodic testing under simulated overspeed conditions.

(6) The design, installation and maintenance of every secondary brake should be such that the brake is prevented from being made defective or inoperative by outside contamination.

**(e) Hoisting machine lubrication.** Each separate compartment of every hoisting machine should be provided with a separate means of lubrication to assure that all moving parts of the hoist are adequately lubricated at all times.

**(f) Hoisting drums. (1) General. (i)** The drums of all hoisting machines used for suspended scaffolds should be designed for use with a suspension wire rope of not less than five-sixteenths inch diameter.

(ii) Each winding drum should be provided with a positive means of attachment of the suspension rope. Such attachment should develop a minimum of 80 per cent of the rated breaking strength of the suspension rope.

**(2) Traction drums.** Every traction drum should contain a minimum of four turns or the suspension rope at all times. The diameter of any traction drum should not be less than 18 times the diameter of the suspension rope used.

**(3) Single-wrap winding drums.** **(i)** Every single—wrap winding drum hoisting machine should be provided with a means of level winding of the Suspension rope.

**(ii)** Every single-wrap winding drum should be so designed that the drum will contain a minimum of four wraps of the suspension rope at all times.

**(iii)** The minimum diameter of every single-wrap winding drum should not be less than 25 times the diameter of the suspension rope used.

**(4) Multiple-wrap winding drums.** **(i)** Every multiple-wrap winding drum hoisting machine should be provided with a means for level winding of the suspension rope.

**(ii)** Every multiple-wrap winding drum should contain not less than four wraps of the suspension rope at all times.

**(iii)** The minimum diameter of every multiple-wrap winding drum should not be less than 10 times the diameter of the suspension rope used.

**(g) Electrical wiring and equipment.** **(1)** The electrical wiring and equipment contained on a hoisting machine should comply with the standards established by the National Fire Protection Association in the National Electrical Code and which are in effect on the date the application for approval is filed with the Board.

**(2)** All electrically-powered hoisting machines used in construction should be powered by motors rated at not more than 220 volts.

**(3)** The power supply cable to any hoisting machine should contain a separate conductor which will serve as a ground connection for the hoist.

**(4)** Strain relief devices should be provided for cables supplying power to hoisting machines. Such devices should be located at the receptacles where the cables are plugged in as well as at the cable connections on the hoists.

**(h) Hoisting machine controls.** Controls for all hoisting machines should be of the momentary contact type (dead man controls) which requires the maintenance of constant pressure in order for the hoisting machines to operate.

**(i) Welding.** **(1)** All welds used in the manufacture of any hoisting machine, its associated parts or components should be made only by welders certified to American Welding Society standards and all welds should be made in compliance with such standards.

**(2)** All welds that provide structural support for a hoisting machine or the scaffolds to be suspended should be subjected to non-destructive tests and the reports of such tests should be submitted to the Board.

**AS-111-4 RECOGNIZED DESIGN STANDARDS  
ACCEPTABLE TO THE BOARD**

**111-4.1** The following list of recognized design standards are acceptable to the Board in all matters relating to the applications for approval of hoisting machines used for suspended scaffolds.

- (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 Machines
- (e) AGMA American Gear Manufacturers' Association
- (f) AWS American Welding Society
- (g) Structural Aluminum Design Reynolds Aluminum Company
- (h) ALCOA Structural Handbook Aluminum Company of America

**111-4.2** When submitting design data from such recognized standards in an application for approval of a hoisting machine used for a suspended scaffold, the applicant should refer to the standard and section used in obtaining such data.