

IWCA I-14.1 2001 WINDOW CLEANING SAFETY STANDARD

This document contains extracts from the "I-14" Standard, an American National Standard (ANSI), relating to fall protection anchorages. For complete data, refer to the actual standard.

The purpose of the Standard is to provide safety to window cleaners and to others, such as a passerby, where window cleaning operations are in progress, by specifying equipment with practical and adequate factors and features, and requiring safe use, design and maintenance of such equipment.

The Standard is also designed for reference by regulatory governmental agencies or to serve these agencies as a guide in the formation of safety rules and regulations and is for use by registered professional engineers and architects and by manufacturers of window cleaning equipment and devices.

PARAGRAPH REFERENCE	REQUIREMENT
Fall Protection 3.8	Fall protection, perimeter guarding, personal fall arrest systems or a personal fall restraint system (as applicable) shall be provided for all work areas (with the exception of working from a ladder supported at grade or using a window cleaner's belt and window cleaner's belt anchors) that expose a worker to a fall hazard when approaching within 6 feet (1800 mm) of an unguarded edge or unguarded skylight. The means or methods used shall comply with the requirements found in Section 9.2 of this Standard
Anchorage 3.9	Building owners and window cleaning contractors shall not allow suspended work to be performed unless it has been determined that the building has provided, identified and certified anchorages complying with Section 9 or 10 for: independent safety lines; tie-backs for outriggers, parapet clamps and cornice hooks; primary support anchorages for powered and manual boatswain's chairs; primary support anchorages for rope descent systems; horizontal (rope) lines or lifelines; and wherever else required
Building Requirements 7.1.1	All buildings where window cleaning is performed in accordance with Section 1.3 and employing suspended equipment shall be equipped with roof anchorages or other approved devices that will provide for safe use of the equipment in conformance with the provisions of this Standard.
7.1.2	Window cleaning performed that employs other methods than those complying with Section 4.1.1 shall have or utilize approved devices that will provide for safe working procedures in conformance with the provisions of this Standard.
7.2.6	Existing buildings without provisions for a window cleaning system may provide a combination of building supplied fall protection and anchorages plus window cleaning contractor supplied transportable equipment or a window cleaner's belt anchor system. Where such a decision is selected, roof anchorages, supporting fixtures, window cleaner's belt anchors and/or transportable equipment shall be designed, manufactured, installed, operated and maintained in accordance with applicable portions of Part B. Fall protection provisions shall comply with Section 9.2. Wind sway protection, where required, shall comply with Section 15.14.
Anchorage and Fall Protection 9.2.1	Anchorage shall be capable of sustaining a 5000 pound (2268 kg) minimum load or a minimum 4-to-1 safety factor, whichever is greater, in any direction that a load may be applied.
9.1.9	Anchorage shall be inspected annually by a qualified person. Anchorages shall be re-certified when re-roofing or renovating (pertinent to the window cleaning system) or at periods not to exceed 10 years. The report of this inspection shall be included in the building's log book. If during the anchorage's inspection an area of suspicion is identified, a test procedure, if necessary, shall be performed under the approval of a registered professional engineer.

9.1.10	Certification and re-certification of anchorages shall be under the supervision of a registered professional engineer.
9.1.11	A horizontal (rope) line may be used as an anchorage or may be a fundamental part of a fall arrest system. In all cases, horizontal lines shall be designed by or under the direct supervision of a registered professional engineer experienced in such designs.
Personal Fall Arrest System 9.2.2. (f) 9.2.2. (g)	<p>Personal fall arrest systems shall not be attached to guardrail systems, nor shall they be attached to hoists.</p> <p>Personal fall arrest systems, when stopping a fall shall:</p> <ol style="list-style-type: none"> 1) limit maximum arresting force on an employee to 1800 pounds (8 kN) when used with a body harness; 2) be rigged such that an employee can neither free fall more than 6 feet (1800 mm), nor contact any lower level; 3) bring an employee to a complete stop and limit maximum deceleration travel distance of an employee to 42 inches (1067 mm); 4) have sufficient strength to withstand twice the potential impact energy of an employee free falling a distance of 6 feet (1800 mm), or the free fall distance permitted by the system, whichever is less.
Boatswain Chair Roof Anchorages 13.2.1 13.2.2	<p>When manual swinging scaffold and boatswain's chairs are used for window cleaning, building owners shall provide anchorages conforming to Sections 9 and 17 of this Standard. All anchorages shall be designed, installed and located under the supervision of a registered professional engineer. Window cleaners are not permitted to use anchorages for any other purpose than the one identified in the plan of maintenance for the building.</p> <p>An anchorage used for a personal fall arrest system shall be independent from the anchorage used for the suspension system. Fall arrest anchorages shall be provided by the building owner and comply with Sections 9 and 17 of this Standard.</p>
Transportable Suspended Powered Platforms (single- and multiple suspension) 15.2.1 15.2.2	<p>Occupants of powered platforms shall have means to prevent them from falling more than 6 feet (1800 mm) in the event one or more suspension point fails. When operating a platform suspended from a single point system with two wire rope support, means shall be provided for an independent vertical lifeline attached to a certified anchorage on the roof.</p> <p>When operating a platform suspended from a two point system with two wire rope support, means shall be provided for an independent vertical lifeline attached to a certified anchorage on the roof. When operating a platform suspended from a two point system with four rope support, means shall be provided for an independent vertical lifeline attached to a certified anchorage on the roof or to an engineered horizontal lifeline (dog line) structurally affixed to the work platform.</p>
Ground Rigged Platforms 15.15.1 15.15.2	<p>Ground rigged scaffolding may be suspended from roof support equipment (complying with Section 17), providing the height of suspension does not exceed 300 feet (91 m) unless continuous engagement is employed to provide wind sway protection.</p> <p>Where suspension heights exceed 130 feet (40 m) and where rigging must be suspended by hand, mechanical means shall be provided for raising and lowering lines (wire rope, fiber and cable) when the entire line's weight exceeds 55 pounds (25 kg).</p>
Single Point Suspended Working Platforms 15.16	<p>In addition to complying with all applicable provisions of Section 15, powered, single point suspended working platforms shall be equipped with a secondary wire rope separate from the suspension rope which will prohibit the work platform from falling should there be a failure of the primary means of support. Except for powered cages with an overhead obstruction, the operator shall be either secured to the work platform by a full body harness and lanyard or to an independent vertical lifeline.</p>

<p>(Note: Powered Boatswain's Chairs similar)</p> <p>Roof Support Equipment 17.1.4</p>	<p>Horizontal lines constructed of wire rope are permissible for use as a tie-back provided:</p> <ol style="list-style-type: none"> the line(s) is (are) permanently left in place; they are attached to certified anchorages, excluding parapet clamps; its wire rope and wire rope end attachments comply with Section.9.1.1; the wire is inspected prior to each use in accordance with Section 9.1.9.
<p>Davits and Davit Fixtures 17.2.1</p> <p>17.2.2</p>	<p>Davits may be used to support window cleaning activities providing they are no used within 10 feet (3 m) of high-voltage lines and :</p> <ol style="list-style-type: none"> the davit is designed by a registered professional engineer; the davit has a stability factor of at least 4 to 1 against overturning. Each davit shall be designed to support an ultimate load of not less than 4 times the rated load (based upon the rated load of the hoist when supporting a powered access platform); the davit has a load rating plate permanently affixed to it stating the davits weight, the manufacturer's name, date of manufacture and maximum allowable load and that the working load is not to be exceeded during its use; the suspension rope (s) shall be attached to the davit with a safety hook or screw pin shackle; the davit is not craned to the roof level where it is to be used; the davit's butt or base fixture mates to the building's socket; means are provided to lock the davit to its socket or base before it is used to suspend the platform; the roof socket meets all requirements of Section 17.3: the davit weighs less than 80 pounds (36.2 kg) or is equipped with wheels. <p>Portable davits shall not have an arm reach exceeding eight (8) foot, six (6) inches (2.6 m) measured from the primary rope support to the centerline of the davits' mast.</p>
<p>Sockets 17.3.1</p> <p>17.3.2</p>	<p>Roof or parapet mounted sockets may be used to support portable davits providing:</p> <ol style="list-style-type: none"> the socket has a load rating plate and that the load is not exceeded; the socket allows for the davit to be tipped down for insertion of the davit butt into the socket and the angle of tip down shall not exceed a maximum of 15 degrees above the horizon; if the direction of tip down is parallel to the parapet, provisions shall be provided so as to prohibit the davit from being accidentally dropped over the side of the building; any parapet exceeding six feet in height, to which a socket is mounted, shall provide means for the: <ol style="list-style-type: none"> safe access of personnel to rig the tip of the davit; davit erection; rotation of the davit arm is necessary for the specific application; safe boarding of the suspended unit. <p>When portable sockets are used they shall:</p> <ol style="list-style-type: none"> be designed to be used with the davit and the roof fixture to which it mates; be fitted with wheels to allow ready movement from pedestal to pedestal; not require lifting to mate with the pedestal; shall have a pedestal pin attachment connection or positive locking pin connection to the pedestal; socket/pedestal connections requiring bolts or other threaded fasteners shall not be used.

<p>Counterweighted Outriggers 17.5.1</p>	<p>Transportable, counterweighted outriggers may be used to support ground rigged window cleaning activities and RDS, providing:</p> <ol style="list-style-type: none"> a) the outrigger is designed by a registered professional engineer; b) the outrigger has a stability factor of four against overturning or upsetting of the outrigger. Each outrigger shall be designed to support an ultimate load of not less than 4 times the rated load (based upon the rated load of the hoist when supporting a powered access platform). The fulcrum point of the beam shall rest on leg(s) or equivalent supports securely attached to the beam and so arranged as to prevent lateral overturning of the beam. Each outrigger shall be designed for lateral stability to prevent rollover in the event an accidental lateral load is applied to the outrigger. The accidental lateral load to be considered in this design shall not be less than 15% of the rated load; c) the inboard end of outrigger beams, measured from the fulcrum point to the anchorage point, shall be not less than 1-½ times the outboard end in length; d) solid counterweights are secured to the inboard end of the outrigger; e) the outrigger has a load rating plate permanently affixed to it and readily visible, bearing the following information in letters at least ¼ inch (6.4 mm) in height: <ol style="list-style-type: none"> 1) the beam's rated load; 2) manufacturer's name; 3) precautionary warning message prohibiting use of the beam within 10 feet of high voltage lines; f) the suspension rope(s) shall be attached to the outrigger with a safety hook or screw pin shackle; g) the outrigger is not craned to the roof level where it is to be used; h) each outrigger shall be tied back to a certified anchorage on the building with a wire rope equivalent in strength to the suspension rope, but in no case less than 5/16 inch (8mm) in diameter. The tie-back rope shall be installed parallel to the center line (longitudinal axis) of the outrigger. All tie-down fittings at the inboard end of the beam shall be of a type that vibration effects shall not produce accidental disengagement. Safety hooks for beam tie-down shall not be used. i) the outrigger shall be so located that the suspension wires for a two point suspended working platform are hung parallel and any portion of the outrigger or its counter weights weighing more than 80 pounds (36 kg) shall be equipped with a stable means for its transport
<p>Parapet Clamps and Cornice Hooks 17.6.1(f)</p>	<p>Each clamp/hook shall be tied back to a certified anchorage on the building with rope equivalent in strength to the suspension rope but in no case less than 5/16 inch (8 mm) in diameter. The tie-back rope shall be installed parallel to the center line (longitudinal axis) of the clamp/hook</p>
<p>Overhead Monorail Tracks and Trolleys 17.7.1</p>	<p>Transportable trolleys may be used on overhead tracks permanently affixed to the building to support window cleaning activities providing:</p> <ol style="list-style-type: none"> a) the monorail tracks have end stops and the system is equipped with independent trolleys from which the operator's vertical lifeline is suspended; b) the primary support trolley(s) and the safety line trolley(s) are designed by a registered professional engineer and has a stability factor of at least 4 to 1 against the causation of structural damage to its supporting track. Each trolley and its supporting track structure shall be designed to support an ultimate load of not less than 4 times the rated load (based upon the rated load of the hoist when supporting a powered access platform) plus the safety line load for each operator suspended from the track; c) the trolley's wheel diameter and wheel gauge have been verified by a registered professional engineer for specific use on the monorail beam and the beam will safely support the loads applied; d) the trolley system is designed in accordance with ASME A120.1; e) the trolley and track are inspected and tested in strict accordance with Section 8 of this Standard.

17.7.2

Transportable monorail tracks suspended from davit arms, outriggers or portable support fixtures are prohibited.

Appendix C - Anchor Placement for Working Lines, Lifelines And Tie-back Lines

NOTE: These appendices are intended to be used only as a reference or guideline and are not to be considered a part of the ANSI/IWCA I-14.1 Window Cleaning Safety Standard. The following recommendations are a guideline for the placement and installation of permanent anchorages on buildings where workers will be using suspended access equipment to perform window cleaning. The ANSI/IWCA I-14.1 Standard presently requires that working lines, lifelines and tie back lines be anchored either in line with the suspended worker or within 15 degrees of perpendicular.

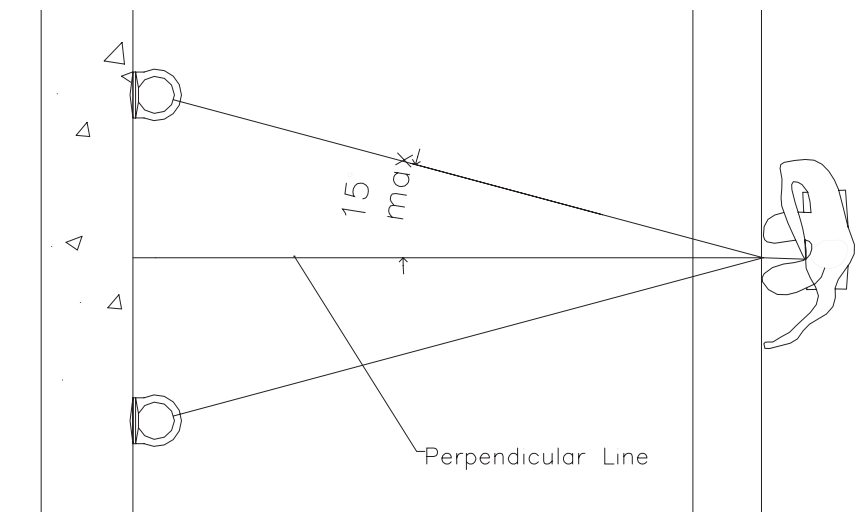
New Constructuin

Newly constructed buildings compliance with the requirement of "in line" is easily done during the design phase of the building. Anchors should be placed in line to the work area so as to prevent displacement of lines under load and/or a fall greater than 6 feet (1800 mm). Placement of anchors shall not be within 6 feet (1800 mm) of the roof edge unless fall protection is provided to access those anchors safely. In no case should anchor spacing exceed 12 feet (3.6 m). In essence, the risk to the worker is greatly reduced by placing the anchors further back from the roof edge. (12 feet [3.6 m] to 50 feet [15.2 m]).

Existing buildings

The installation or identification of anchorages on existing buildings will vary from that of new buildings. Existing buildings can present obstacles that will prevent ideal anchor placement. However, the safety of the worker(s) shall be of utmost importance when designing an anchor system to be installed on an existing building in compliance with Section 14.6. Ideally, anchors are to be placed in line with the suspended worker(s). Where this is impracticable, anchors may be offset no more than 15 degrees from in line (perpendicular) provided displacement of the rope under load can be prevented. (see Fig. AP-1)

Fig. AP-1 Suggested Anchor Placement



As with new construction, placement of anchors shall not be within 6 feet (1800 mm) of the roof edges unless fall protection is provided to access those anchors safely. In no case should anchor spacing exceed 12 feet (3.6 m). As stated for new buildings, the risk to the worker(s) is greatly reduced by placing the anchors further back from the roof edge. (12 feet [3.6 m] to 50 feet [15.2 m]).