

This document contains extracts from the California Code of Regulations, Title 8, Section 3291 (Special Design Considerations - Permanent Roof Top Installations). The applicable section is Subchapter 7 (General Industry Safety Orders) Group 1 (General Physical Conditions and Structures Orders), Article 5 (Window Cleaning).

The extracts pertain to fall protection anchors, including "rope drop" sleeves, roof davit systems, outrigger beams, and roof tie-backs.

The CAL OSHA standard is one of several OSHA standards governing window cleaning and other suspended maintenance operations; the others are OSHA 1910.28, SubPart D (Walking-Working Surfaces), OSHA 1926.500, SubPart M (Fall Protection), and Department of Labor Memorandum to Regional Administrators for Descent Control Devices.

PARAGRAPH REFERENCE	REQUIREMENT
(a) General	A Civil or Mechanical Engineer registered in the State of California shall prepare calculations and/or plans substantiating the structural integrity of all facets of the complete installation, including the eyebrow sleeves, roof davit systems, roof outrigger beams, and roof tie-backs. Such plans shall be available to the Division at the installation site. (Title 24, Part 2, Section 2-8505(a).)
(b) Projecting Ledges or Eyebrows at Roof Level	<p>(1) Those buildings so designed that projecting ledges or "eyebrows" at the roof or intervening levels prohibit the normal suspension of ropes supporting scaffolds, shall be provided with sleeves that extend through the ledge or eyebrow. The minimum inside diameter of the sleeve shall be 6 inches to permit the passage of shackles, sockets, clamps and other rigging devices. The center-on-center spacing of sleeves shall be consistent with the length of the suspended scaffold to be utilized, but in no case shall this spacing exceed 24 feet for transportable scaffolds. Sleeves shall not be used as a rigging point unless securely anchored to the structure and be capable of supporting the rated load with a minimum safety factor of four.</p> <p>In lieu of the use of sleeves, other means of scaffold support, such as soffit monorail systems, etc. that offer equivalent safety and are acceptable to the Division, may be provided.</p> <p>(2) Each sleeve assembly or each scaffold support system shall be provided with a securely affixed durable and readily visible metal plate bearing the rated load and installer's name in letters at least 1/4-inch in height. (Title 24, Part 2, Section 2-8505(b).)</p>
(c) Roof Davit Systems	<p>Roof davit systems specifically shall comply with applicable provisions of Article 6 and the following:</p> <p>(1) Each davit shall be provided with a securely affixed, durable and readily visible metal plate bearing the following information in letters at least 1/4-inch in height:</p> <ul style="list-style-type: none"> (A) The davit's rated load, based upon a safety factor of 4. (B) Manufacturer's name. (C) Precautionary warning message prohibiting use of the davit within 10 feet of high-voltage lines. <p>(2) Provisions shall be made to easily rotate davits while on the scaffold platform or boatswain's chair unless the platform may be safely re-positioned inboard or outboard without the necessity for personnel to stand on unguarded roofs or ledges unless protected by an approved safety belt or the equivalent.</p> <p>(3) Portable davit systems shall comply with the applicable provisions of Article 6. (Title 24, Part 2, Section 2-8505(c).)</p>

**(d) Outrigger
Beams**

(1) Outrigger beams shall not be employed on buildings exceeding 130 feet in height unless acceptable to the Division. All outrigger beams shall be designed to support the rated load imparted by the suspended scaffold or boatswain's chair with a safety factor of at least 4. Outrigger beams shall not extend more than 6 feet beyond the face of the building. Only steel or high strength alloy beams shall be used. The inboard end of outrigger beams, measured from the fulcrum point to the anchorage point, shall be not less than 1 1/2 times the outboard end length. 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. Bearing pads shall be securely affixed to each support and shall be of sufficient area to safely distribute imposed loads to the roof structure. The inboard ends of outrigger beams shall be securely anchored by means of tension members (tie-down) affixed to the structural frame of the roof in such a manner that applied forces are resisted within allowable limits affording a safety factor of at least 4. 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 purposes shall not be used. The use of counterweights at the inboard end of mobile and fixed outrigger beams are prohibited.

(2) The use of counterweights on the inboard end of portable or transportable outrigger beams shall be permitted only when the following conditions have been met:

- (A) The building on which the counterweight beam is to be used, was constructed prior to July 23, 1990.
- (B) The building was not designed for other suspension systems.
- (C) An Operating Procedures Outline Sheet (OPOS) shall be developed in accordance with Section 3282 (p) of these orders.
- (D) The counterweights shall be secured to the inboard ends of beams and shall consist of non-flowable/solid materials (e.g. concrete, steel, etc.).
- (E) The outrigger shall be secured with a tie-back to a verified anchorage on the building during the entire time of use. The anchorage shall be designed to have a safety factor of not less than four based on the rated capacity of the outrigger.
- (F) The counterweight shall provide a stability factor of at least 4 against overturning or upsetting of the outrigger.
- (G) Each outrigger shall be designed by a registered engineer to support a load of 4 times the rated hoist capacity or the total load whichever is greater. Outrigger beams shall have a minimum rated capacity of 1000 pounds.
- (H) The outrigger beam shall be secured against horizontal movement when in use.
- (I) Portable outriggers weighing more than 80 pounds shall be provided with a stable means for its transport (wheels or cart).
- (J) Each outrigger shall be so located that the suspension wire ropes, for two point suspended working platforms, are hung parallel.
- (K) The parts of sectional outrigger beam(s) (i.e. an outrigger beam(s) consisting of more than one piece) shall be identified (e.g. numbered, color-coded). Parts shall not be interchanged or substituted except with the approval of the manufacturer.

(3) Each outrigger beam shall be provided with a securely affixed, durable and readily visible metal plate bearing the following information in letters at least 1/4-inch in height:

- (A) The beam's rated load.
- (B) Manufacturer's name.

	(C) Precautionary warning message prohibiting use of the beam within 10 feet of high-voltage lines. (Title 24, Part 2, Section 3105A.4.2)
(e) Portable Outrigger Beams	The use of portable outrigger beams shall comply with the applicable provisions of Article 6. (Title 24, Part 2, Section 2-8505(d).)
(f) Roof Tie-Backs	<p>(1) Every building constructed 3 stories or 36 feet or more in height, shall have eyebolts or other permanent devices installed at the roof level for the purpose of securing or tying back suspended scaffold hooks or clamps and safety lines.</p> <p>EXCEPTIONS:</p> <p>1. Roof tie-backs are not required on buildings employing other acceptable means of permanently installed roof top maintenance systems specified in this Article or Article 6.</p> <p>2. Eyebolts for roof tie-backs are not required on buildings constructed up to 4 stories or 48 feet in height when building maintenance can be accomplished using extension tools, ladders, approved ground equipment such as scaffolds, or aerial devices designed and used for positioning personnel.</p> <p>(2) Such devices should be spaced at approximately 12-foot intervals; however, the spacing shall depend primarily on the availability of roof structural framing members of sufficient strength to safely carry applied loads. Tie-backs may be installed in structural parapets that are of adequate strength to sustain applied loads, but placement shall be as close to the roof level as practicable. Design criteria for tie-backs shall be as follows:</p> <p>(A) Drop-forged eyebolts or other component of equivalent strength having at least a 2-inch inside diameter closed "eye."</p> <p>(B) Tie-back assembly to be hot dip galvanized or afforded equivalent corrosion resistance.</p> <p>(C) Assembly and anchorage provisions adequate to sustain a 5400 pound (tensile) load applied in any direction.</p> <p>(3) Roof tie-backs or other devices shall not be installed in a wood framing system.</p> <p>A) Suspended scaffolds shall not be permitted unless roof tie-backs or equivalent anchorages are provided. (Title 24, Part 2, Section 2-8505(e).3). Parapets of Excessive Height. Where building parapet heights exceed 42 inches, special provisions shall be employed to provide a safe means of access to the top of the parapet for rigging purposes if such access is necessary to the safe performance of the work. If such support system as davit/sockets, parapet hooks or clamps, etc., are utilized at the top of parapets, a catwalk platform meeting the applicable sections of these orders, or other equivalent means of affording access for the safe performance of the work shall be provided. (Title 24, Part 2, Section 2-8505(f).)</p> <p>NOTE: Authority cited: Section 142.3, Labor Code. Reference: Section 142.3, Labor Code; and Section 18943(b), Health and Safety Code.</p>
Appendix A. Operating Procedures Outline Sheet (OPOS)	<p>An OPOS establishes safe window cleaning and exterior maintenance procedures for buildings and structures. An OPOS shall include all of the necessary elements in pictorial and written form, to instruct employees in the safe use of roof supported building maintenance equipment or window cleaning procedures not covered by these Orders. An OPOS shall contain at least the following elements:</p> <p>1. Isometric or plan view drawing (pictorial drawing) of the building's roof, including the building's name, address, and the date the OPOS was prepared; and</p> <p>a. The drawing shall be legible and kept with the building's written assurance; and</p>

2. Identification of drop zones, recommended drop sequences, scaffold configurations, and specific building maintenance procedures including the equipment to be used, e.g. permanent roof rigging platform, ground rigged scaffolding, davits, outrigger beams, boatswain's chair or seatboard, etc.; and
3. Identification of all anchorage points for personal fall arrest systems and building maintenance equipment; and
4. Identification of personal fall protection requirements and, if applicable, procedures for securing equipment; and
5. If applicable, identification of all dangerous areas on the roof by highlighting all of the "Danger Zone (s)" on the pictorial drawings(s); and
6. If applicable, description of the means and methods to be used to transfer equipment from drop location to drop location or between building levels; and
7. Identification of equipment limitations, load ratings, and special use conditions; and
8. Provisions for pre-operational, operation and maintenance inspections; and
9. Identification of the access and egress to the work locations and the storage area(s) for the permanent or transportable building maintenance equipment; and
10. If applicable, indication of the location and method of stabilization provided for the suspended equipment; and
11. Emergency and rescue procedures, and means of communications to be used during such procedures; and
12. Method(s) to be used to control employee exposure to falls while they are in the "Danger Zone".