

California Static/Non-Static Control Requirements
Electric Elevators
Title 8, Group IV Section 3141.3 and ASME A17.1-2004
Effective May 1, 2008

§3141.3. Static Controls.

- (a) The installation of static controls shall comply with the requirements of ASME A17.1-2004 applicable to the conveyance involved.
- (b) The Certified Qualified Conveyance Company (CQCC) installing static controls shall provide the Division with verification that the control complies with the requirements of ASME A17.1-2004. This information shall be in the form of:
 - (1) Electrical schematic diagrams or block diagrams of the control and safety circuits; and
 - (2) A written check-off procedure and demonstration of safety and speed control circuits at the time of initial inspection.
- (c) The results of the Electromagnetic Interference (EMI) testing required by ASME A17.1-2004 shall be submitted to the Division for review. The test shall include any wireless communication system used.

2.26.4.4 Control equipment shall be tested in accordance with the testing requirements of **EN 12016** by exposing it to interference levels at the test values specified for "safety circuits." The interference shall not cause any of the conditions described in 2.26.9.3(a) through (e) and shall not cause the car to move while on inspection operation.

Submit test results in accordance with EN 12016:2004 which includes EN 61000-4-2 (Electromagnetic Discharge Immunity Test), EN 61000-4-3 (Radiated RF Electromagnetic Field Immunity Test), EN 61000-4-4 (Electrical Fast Transient/Burst Immunity Test), EN 61000-4-5 (Surge Immunity Test), EN 61000-4-6 (Conducted RF Immunity Test) and EN 61000-4-11 (Voltage Dips and Short Interruptions and Voltage Variations Immunity Test).

2.26.4.2 Drive-machine controllers, logic controllers, and operating devices accessory thereto for starting, stopping, regulating, controlling, or protecting electric motors, generators, or other equipment shall be listed/certified and labeled/marked to the requirements of **CAN/CSA-B44.1/ASME A17.5.**

Code Compliance:

Submit a certificate from Organizations Currently Recognized by OSHA as Nationally Recognized Testing Laboratories (NRTLs) indicating compliance to CAN/CSA-B44.1/ASME A17.5

2.26.3 Contactors and Relays for Use in Critical Operating Circuits

Where electromechanical contactors or relays are provided to fulfill the requirements of 2.26.8.2, and 2.26.9.3 through 2.26.9.7, they shall be considered to be used in critical operating circuits. If contact(s) on these electromechanical contactors or relays are used for monitoring purposes, they shall be prevented from changing state if the contact(s) utilized in a critical operating circuit fail to open in the intended manner. The ability of the monitoring contact(s) to perform this function shall not be solely dependent upon springs.

Code Compliance Explanation:

To submit the manufacturer's specification that the contactors and relays used are for critical operating circuits.

2.26.9.3 The occurrence of a single ground or the failure of any single magnetically operated switch, contactor, or relay, or any single device that limits the leveling or truck zone, or any single solid state device; or software system failure, shall not

- a)* render any electrical protective device ineffective (see 2.26.2);
- b)* permit the car to move beyond the leveling or truck zone if any hoistway-door interlock is unlocked or if any hoistway door or car door or gate electric contact is not in the closed position (see 2.26.1.6);
- c)* permit speeds in excess of those specified in 2.12.7.3.2, 2.26.1.4.1(d)(1), and 2.26.1.6.6;
- d)* permit the car to revert to normal operation when on hoistway access switch operation (see 2.12.7.3) or on inspection operation (see 2.26.1.4) or on bypass operation (see 2.26.1.5); and
- e)* continue to make ineffective any hoistwaydoor interlock or car-door or gate electric contact when either a hoistway access switch (see 2.12.7.3) or a "BYPASS" switch (see 2.26.1.5) is turned to the OFF" position.

Code Compliance Explanation:

2.26.9.4 Redundant devices used to satisfy 2.26.9.3 in the determination of the occurrence of a single ground or the failure of any single magnetically operated switch, contactor or relay, or of any single solid state device, or any single device that limits the leveling or truck zone, or a software system failure, shall be checked prior to each start of the elevator from a landing, when on automatic operation. When a single ground or failure, as specified in 2.26.9.3, occurs, the car shall not be permitted to restart. Implementation of redundancy by a software system is permitted, provided that the removal of power from the driving-machine motor and brake shall not be solely dependent on software-controlled means.

Code Compliance Explanation:

2.13.2.1.1 Power opening shall occur only at the landing where the car is stopping, or is leveling, or at rest, and shall start only when the car is within the landing zone

where an automatic car-leveling device is provided, except that on elevators with static control, power shall not be applied to open car doors until the car is within 300 mm (12 in.) of the landing.

Code Compliance Explanation:

2.18.4.2.3 For elevators with static control, the car speed-governor overspeed switch shall open in the down direction of the elevator at not more than 90% of the speed at which the governor is set to trip in the down direction.

Code Compliance Explanation:

2.18.4.2.4 The switch, when set as specified in either 2.18.4.2.1, 2.18.4.2.2, or 2.18.4.2.3, shall open in the up direction at not more than 100% of the speed at which the governor is set to trip in the down direction.

Code Compliance Explanation:

2.25.4.2 Emergency Terminal Stopping Device. Elevators with static control and rated speeds over 1 m/s (200 ft/min) shall be provided with an emergency terminal stopping device that will cause power to be removed from the driving-machine motor and brake should the normal stopping means and the normal terminal stopping device fail to cause the car to slow down at the terminal as intended.

The emergency terminal stopping device shall function independently of the normal terminal stopping device and the normal speed control system.

Elevators with static generator-field control that use the normal terminal stopping device to limit the generator- field current directly, or elevators that have an emergency terminal speed-limiting device that complies with 2.25.4.1, are not required to have an emergency terminal stopping device.

Code Compliance Explanation:

2.26.1.6.6 A leveling or truck-zoning device shall not move the car at a speed exceeding 0.75 m/s (150 ft/min). For elevators with static control, an independent means shall be provided to limit the leveling speed to a maximum of 0.75 m/s (150 ft/min) with the doors open, should the normal means to control this speed (mechanical, electrical, or solid state devices) fail to do so.

Code Compliance Explanation:

2.26.1.6.7 For elevators with static control, an inner landing zone extending not more than 75 mm (3 in.) above and 75 mm (3 in.) below the landing shall be provided. A car shall not move if it stops outside of the inner landing zone unless the doors are fully closed.

Code Compliance Explanation:

2.26.2.4 Motor Field Sensing Means. Where direct current is supplied to an armature and shunt field of an elevator driving-machine motor, a motor field current sensing means shall be provided, which shall cause the electric power to be removed from the driving-machine motor armature, and brake unless current is flowing in the shunt field of the motor, except for static control elevators provided with a device to detect an overspeed condition prior to, and independent of, the operation of the governor overspeed switch. This device shall cause power to be removed from the elevator driving-machine motor armature and machine brake.
Code Compliance Explanation:

2.26.2.29 Ascending Car Overspeed Protection Device. An over speed device shall be provided when required by 2.19.1 and shall meet the requirements of 2.19.1.2(a).
Code Compliance Explanation:

2.26.2.30 Unintended Car Movement Device. An unintended car movement device shall be provided when required by 2.19.2 and shall meet the requirements of 2.19.2.2(a). Where generator-field control is used, this electrical protective device shall also cause the power to be removed from the drive motor of the motor-generator set.
Code Compliance Explanation:

2.26.8.2 Two devices shall be provided to independently remove power from the brake. If the brake circuit is ungrounded, all power feed lines to the brake shall be opened.
Code Compliance Explanation:

2.26.9.5 Except for elevators employing alternating current hoist motors driven from a direct-current source through a static inverter (see 2.26.9.6), elevators with driving motors employing static control without motor generator sets shall conform to 2.26.9.5.1 through 2.26.9.5.6.
Code Compliance Explanation:

2.26.9.6 Elevators employing alternating-current driving motors driven from a direct-current power source through a static inverter shall conform to 2.26.9.6.1 through 2.26.9.6.6.
Code Compliance Explanation:

8.4.10.1.3 Elevator Operation (E. Q.)
(a) Upon activation of a seismic switch, all elevators with traction machines, counterweights, and selective, collective, or group automatic operation that are in motion shall proceed to the nearest available floor, open their doors, and shut

down; except that where Phase II Emergency In-Car Operation is in effect, door operation shall conform to 2.27.3.3.

(b) When the counterweight displacement switch is activated, the elevator, if in motion, shall initiate an emergency stop and then proceed away from the counterweight at a speed of not more than 0.75 m/s (150 ft/min) to the nearest available floor, open the doors, and shut down; except that where Phase II Emergency In-Car Operation is in effect, door operation shall conform to 2.27.3.3.

(c) Elevators with power-operated doors, upon reaching a landing shall cause their doors to open and remain open; except that where Phase II Emergency In-Car Operation is in effect, door operation shall conform to 2.27.3.3.

(d) Upon activation of an earthquake protective device, an elevator standing at a floor with its doors open shall remain at the floor. If its doors are closed, it shall open its doors. Where Phase II Emergency In-Car Operation is in effect, door operation shall conform to 2.27.3.3.

(e) An elevator not in operation when an earthquake protective device is activated shall remain at the landing.

(f) An elevator shall be permitted to be operated at a speed of not more than 0.75 m/s (150 ft/min), provided the counterweight displacement switch is of the continuously monitoring type and is not activated.

(g) Continuous activation of a displacement switch shall

(1) prevent operation of the car, except from the inspection station located on top of the car

(2) prevent operation of the car by means of the emergency service key described in 2.27.3.1 and 2.27.3.3, hospital emergency service key, and other similar types of operation

(h) Elevators stopped by an earthquake protective device with a volatile-type memory shall remain idle in the event of a power failure. Subsequent restoration of power shall not cancel the status of the earthquake protective devices nor the slow speed status of the elevator system if such existed prior to the loss of power.

(i) An elevator shall be permitted to be returned to normal service by means of the momentary reset button or switch [see 8.4.10.1.1(a)(2)], provided the displacement switch is not activated.

(j) Electrical protective devices required by 2.26.2 shall not be rendered inoperative nor bypassed by earthquake protective devices

Code Compliance Explanation:

Code Compliance Explanation for Section 2.19

ASME A17.1 2004 Section 8.7.2.20:

Ascending Car Overspeed and Unintended Car Movement Protection:

The requirements of 2.19 shall be conformed to where a device for protection against ascending car overspeed and unintended car movement is altered or **installed**.

SECTION 2.19

ASCENDING CAR OVERSPEED AND UNINTENDED CAR MOVEMENT PROTECTION:

A complete set of wiring diagrams indicating the alteration to the elevator controller resulting from the installation of the Ascending Car and Unintended Movement Device and documentation of the sequence of operation shall be provided to the Division for review. See below for Sequence of Operation:

Ascending Car Overspeed Protection

2.19.1.2: All electric traction elevators, except those whose empty car weight exceeds the total weight of the suspension ropes and counterweight, shall be provided with a device to prevent an ascending elevator from striking the hoistway overhead structure. This device (see 2.26.2.29) shall

(a) Detect an ascending car overspeed condition at a speed not greater than 10% higher than the speed at which the car governor is set to trip (see 2.18.2.1).

(1) If the overspeed detection means requires electrical power for its functioning

(a) A loss of electrical power to the ascending car overspeed detection and control means shall cause the immediate activation of the emergency brake as required in 2.19.1.2(b)

(b) The occurrence of a single ground or the failure of any mechanically operated switch that does not meet the requirements of 2.26.4.3, any single magnetically operated switch, contactor, or relay, or any single solid-state device, or a software system failure, shall not render the detection means inoperative

(2) The failure of any single mechanically operated switch that does not meet the requirements of 2.26.4.3 shall not render the detection means inoperative.

(3) When a fault specified in 2.19.1.2(a)(1)(b) or 2.19.1.2(a)(2) is detected, the car shall stop at or before the next landing for which a demand was registered, and shall not be permitted to restart.

(4) Once actuated by overspeed, the overspeed detection means shall remain actuated until manually reset, and the car shall not start or run unless the detection means is reset.

(b) Decelerate the car when loaded with any load up to its rated load [see 2.16.8(h)] by applying an emergency brake conforming to 2.19.3. The car shall not start or run unless the emergency brake is reset.

Code Compliance Explanation: Please refer to schematic wiring diagrams.

Unintended Car Movement Protection

2.19.2.2: All electric traction elevators shall be provided with a device (see 2.26.2.30) that shall

(a) Detect unintended car movement away from the landing with the hoistway door not in the locked position and the car door not in the closed position. NOTE: Freight elevators provided with combination mechanical locks and contacts on the hoistway door shall detect the closed position of the hoistway door and the closed position of the car door.

(1) If the detection means requires electrical power for its functioning

(a) A loss of electrical power to the unintended movement detection and control means shall cause the immediate activation of the emergency brake as required in 2.19.2.2(b)

(b) The occurrence of a single ground or the failure of any mechanically operated switch that does not meet the requirements of 2.26.4.3, any single magnetically operated switch, contactor, or relay, or any single solid-state device, or software system failure, shall not render the detection means inoperative

(2) The failure of any single mechanically operated switch that does not meet the requirements of 2.26.4.3 shall not render the detection means inoperative.

(3) When a fault specified in 2.19.2.2(a)(1)(b) or 2.19.2.2(a)(2) is detected, the car shall stop at or before the next landing for which a demand was registered, and shall not be permitted to restart.

(4) Once actuated by unintended movement, the detection means shall remain actuated until manually reset, and the car shall not start or run unless the detection means is reset.

(b) upon detection of unintended car movement, stop and hold the car, with any load up to rated load [see also 2.16.8(h)], by applying an emergency brake conforming to 2.19.3, with the car movement limited in both directions, to a maximum of 1 220 mm (48 in.). The car shall not start or run unless the emergency brake provided for the unintended movement protection is reset.

Code Compliance Explanation: Please refer to schematic wiring diagrams.