

524 CMR: BOARD OF ELEVATOR REGULATIONS

524 CMR 18.00: HAND ELEVATORS (FOR INSTALLATIONS MADE PRIOR TO JUNE 7, 1991)

Section

- 18.01: Hoistway Enclosures: General
- 18.02: Machine Rooms
- 18.03: Venting of Hoistways
- 18.04: Hoistway Guards
- 18.05: Thoroughfares
- 18.06: Pipes and Wiring
- 18.07: Shaftway Doors: General
- 18.08: Car Construction
- 18.09: Capacity and Loading
- 18.10: Car Safeties
- 18.11: Contract-Load Test of Car Safety Devices
- 18.12: Machines and Machine Safeties
- 18.13: Suspension Means
- 18.14: Guide Rails
- 18.15: Counterweights

18.01: Hoistway Enclosures: General

- (1) The hoistways of all elevators shall be enclosed throughout their height.
- (2) Where the elevator shaftway penetrates any fully enclosed solid floor above the bottom landing, the walls shall be of not less than two hour fire resistive rating, and in addition any portion of the walls exposed to automotive traffic shall be of solid masonry not less than eight inches in thickness to a height of not less than four feet six inches above finished floor.
- (3) Where the elevator either serves only open construction floors or serves only open balcony floors within one story, the wall shall be of non-combustible materials of either solid construction or open metal construction which will reject a two-inch ball, provided such open construction fronts or panels are not less than two inches from any moving equipment within the enclosure. Where less than two inches from moving equipment, open construction shall reject a ½ inch ball.
- (4) Hoistway windows shall be located only in exterior walls of the building, or in hoistway walls above the roof.
- (5) Not more than two elevators shall be installed in the same hoistway.
- (6) The dividing wall partition which is located within an elevator hoistway shall be constructed with a solid wall of not less than three quarters of an hour fire resistive construction.
- (7) Where a hoistway extends into the top story of a building, fire-resistive hoistway or machinery enclosures, where required, shall be carried to the underside of the roof if the roof is of fire-resistive construction, and at least three feet above the top surface of the roof if the roof is of non-fire-resistive construction.
- (8) Where hoistway enclosures are not required to continue through the roof, the top of the hoistway shall be of fire-resistive construction equivalent to that required for the walls.

18.02: Machine Rooms

- (1) Machine rooms shall be located above or adjacent to any side of the hoistway.
- (2) Machine rooms located above any hoistway shall be provided with a flooring which is either above or level with the top of the machine supporting beams. Machine room floors shall be designed to support a uniformly distributed load of not less than 50 lbs. per square foot.

524 CMR: BOARD OF ELEVATOR REGULATIONS

18.02: continued

- (3) Machine room enclosures shall be constructed as follows:
 - (a) Where solid construction hoistways are required by 524 CMR 18.00, the walls shall be of not less than two hour fire-resistive construction, other than for doors, windows, louvers, or ventilators.
 - (b) Where open construction hoistways are permitted by 524 CMR 18.00, the walls shall be of non-combustible materials which shall be either solid construction walls, or open metal construction which will reject a two-inch ball, and shall be not less than six feet high.
 - (c) Where the machine room is located within the building and where solid construction hoistways are required by these regulations, the ceiling of each machine room shall be of not less than two hour fire-resistive construction.
 - (d) Where an open construction hoistway is permitted, the machine room ceiling may be omitted.
- (4) Elevator machine rooms shall not be used as public thoroughfares.
- (5) Loads on overhead beams and their supports shall be computed as follows:
 - (a) The total load on overhead beams shall be assumed as equal to the weight of all apparatus resting on the beams plus twice the maximum load suspended from the beams.
 - (b) The load resting on the beams shall include the complete weights of machine, sheaves, *etc.* The load suspended from the beams shall include the sum of the tensions of all ropes suspended from the beams.
- (6) The required factor of safety for all overhead beams and their supports, based upon both the average ultimate strength of the material and the loads shall not be less than five.

18.03: Venting of Hoistways

- (1) General. Hoistways of elevators serving more than three stories shall be provided with means for venting smoke and hot gases to the outer air in case of fire.
EXCEPTIONS: Hoistways not extending into the top story of a building, other than hotels, apartment houses, hospitals, and similar buildings with overnight sleeping quarters, where the hoistways are equipped with approved automatic sprinklers connected to the building water-supply system or to an approved automatic sprinkler system. (In case any question arises as to what is the best practice, work done in accordance with the requirements of National Fire Protection Association Standards No. 13, entitled *Sprinkler Systems*, dated August 9, 1996 will be considered as compliance.)
- (2) Location of Vents. Vents shall be located:
 - (a) In the side of the hoistway enclosure directly below the floor or floors at the top of the hoistway, and shall open directly to the outer air or through incombustible ducts to the outer air; or,
 - (b) In the wall or roof of the penthouse or overhead machinery space above the roof, provided that openings of at least equivalent area are provided in the floor or floors at the top of the hoistway.
- (3) Area of Vents. The area of the vents shall be not less than 3½% of the area of the hoistway nor less than three square feet for each elevator car, whichever is greater. Of the required vent area, not less than ⅓ shall be of the permanently open type.
EXCEPTIONS: Where mechanical ventilation providing equivalent venting of the hoistway is provided in the overhead elevator machine room (see 524 CMR 17.02(8)), required vent area may be reduced subject to the following:
 - (a) The building is not a hotel, apartment house, hospital, or similar building with overnight sleeping quarters;
 - (b) The machine room is so located that it has no outside exposure;
 - (c) The hoistway does not extend to the top story of the building;
 - (d) The machine room exhaust fan is automatically reactivated by thermostatic means.
- (4) Closed Vents. Closed portions of the required vent area shall consist of windows, skylights, or duct openings glazed with plain glass not more than ⅛ inch thick.

18.03: continued

- (5) Window and Skylight Frames and Sash. Window and skylight frames and sash shall be of metal.
- (6) Skylight Guards. A guard, securely anchored to the supporting structure, consisting of a wire-mesh screen of at least #13 steel wire gauge with openings which will reject a ball one inch in diameter, or an expanded metal screen of equivalent strength and open area, shall be installed above every elevator skylight. A similar screen of at least #18 steel wire gauge, or of expanded metal of equivalent strength and open area, shall be installed below every elevator skylight.
- (7) Windows. All windows and window frames in fire-resistive hoistway enclosures shall be fire windows conforming to local laws and ordinances.
- (8) Window Guards. Exterior windows in the hoistway less than 100' above the ground or less than 30' above an adjacent roof shall be guarded on the outside by one of the following methods:
 - (a) By vertical bars not less than five-eighths inches in diameter, or equivalent, spaced not less than ten inches on centers, and not more than ten inches between the window jamb and the center of the nearest bar.
 - (b) By metal sash having solid-section steel muntins of not less than 1/8" thickness, spaced not more than eight inches apart.

18.04: Hoistway Guards

- (1) Counterweight Runways. Counterweight runways of hand elevators located in the elevator hoistway shall be enclosed from a point 12" above the floor of the pit to a point at least seven feet above the floor of its own pit and any other pit adjacent to such counterweight runway.
- (2) Rope Enclosures. Where ropes pass through floors on the outside of the shaftway, they shall be enclosed completely from floor to ceiling at all floors with solid enclosures of not less than two hour fire-resistive construction.

18.05: Thoroughfares

If a hoistway does not extend to the lowest floor of a building, and the space under the bottom of the hoistway is used for any purpose, the following conditions shall exist:

- (1) The car and counterweight shall be provided with safety devices.
- (2) There shall be a structure under the hoistway sufficiently strong to withstand without failure the impact of the car with contract load or the impact of the counterweight under free fall conditions.

18.06: Pipes and Wiring

- (1) No pipes, ducts, vessels, electrical conduits or cables shall be located within an elevator shaftway or hoistway or its pit other than those used to furnish or control light, heat, sprinklers, communications or signals for the elevator or hoistway, or for low voltage fire detection systems for the hoistway.
- (2) The fixed electrical conductors installed in elevator or counterweight hoistway, machine room and pit shall be encased in rigid metal conduits or electrical metallic tubing.
- (3) The traveling electrical conductors connecting the car to the fixed wiring in the hoistway shall have a flame retardant and moisture resistant outer cover.
- (4) Pipes, conduits and armored cables shall be securely fastened to the hoistway construction.
- (5) Pressure in steam pipes shall not exceed 15 lbs. above atmospheric pressure.

524 CMR: BOARD OF ELEVATOR REGULATIONS

18.06: continued

- (6) No pipes, ducts or vessels conveying gases or liquids shall be discharged or vented into the hoistway or shaftway.
- (7) All wiring for electricity shall be done in accordance with the best practice and in accordance with 527 CMR 12.00: *The Massachusetts Electrical Code*.

8.07: Shaftway Doors: General

- (1) All landing openings in hand elevator fire-resistive hoistways shall be provided with doors, panels or fronts of not less than 1½ hour fire-resistive construction. When fire-resistive hoistway enclosures are not required, doors may be of open metal construction which will reject a ball two inches in diameter.
- (2) All hoistway doors shall be normally closed when the elevator is not in use.
- (3) Hoistway doors shall be equipped to close automatically in case of fire.
- (4) Each landing opening shall be provided with a vertical sliding type semi-automatic gate not less than 42" high and meeting the following requirements:
 - (a) Vertical sliding counterbalanced gates shall be of wood or metal of a design which will reject a two inch ball. Such gates shall be so constructed and guided as to withstand a lateral force of 100 lbs. concentrated at the center of the gate without being deflected past the line of the car sill; and a force of 250 lbs. without forcing the gate from its guides, or without causing it to break and permanently deform.
 - (b) The bottom of all landing gates shall be not more than two inches above the landing sill.
 - (c) Gates at landing openings in outside walls shall be not less than six feet high and shall be equipped with a locking device which will prevent the opening of the gate from the outside unless the car is at the landing, and shall be arranged to close and lock automatically when the car leaves the landing.
 - (d) Gate shoes and guides shall be of metal.
 - (e) Gate counterweights shall be enclosed or shall run in metal guides from which they cannot be dislodged.
 - (f) The bottom of all gate weight boxes or of the guides shall be so constructed that the counterweights will be securely held if the counterweight ropes should break.

18.08: Car Construction

- (1) Car platforms shall not exceed 6' x 6' in area or a total capacity of 2,000 lbs.
- (2) Hand elevators shall have cars enclosed on top and sides not used for entrance. The car enclosure shall be secured to the car platform or frame in such a manner that it cannot work loose or become displaced in ordinary service.
- (3) Car frames and platforms shall be of metal or sound seasoned wood designed with a factor of safety of not less than four for metal and six for wood, based on the contract load uniformly distributed. If of wood, the frame members shall be securely bolted and braced.
- (4) No glass shall be used in elevator cars except to cover certificates.
- (5) Elevator cars operating in hoistways outside the building, which are enclosed only at the bottom landing, shall be protected on the exposed side or sides by independently operated gates which shall be provided with a lock or latch.

18.09: Capacity and Loading

- (1) Contract Load. The contract load of hand elevators shall be not less than 50 pounds per square foot of net inside car area.

524 CMR: BOARD OF ELEVATOR REGULATIONS

18.09: continued

(2) Capacity Plate for Hand Power Elevators. In each hand elevator car, a metal plate shall be provided which shall be fastened in a conspicuous place and shall bear the following information in not less than ¼" letters or figures stamped in, etched, or raised on the surface of the plate:

CAPACITY (X) POUNDS

(The contract load of the elevator in pounds shall be inserted in space (x) above).

18.10: Car Safeties

- (1) All hand elevators shall be provided with a safety attached to the underside of the car frame capable of stopping and sustaining the car and contract load.
- (2) The application of the safety shall not cause the car platform to become out of level.
- (3) Car safeties shall be of the instantaneous type.
- (4) Safeties shall be marked by the manufacturer with the range of weight for which they are designed.
- (5) A pawl and ratchet or chisel point safety shall not be used.
- (6) When the travel exceeds 30', hand power elevator machines having hand operated brakes shall also be equipped with an automatic speed retarder.

18.11: Contract-Load Test of Car Safety Devices

A contract-load test of the car safety devices under the supervision of the authorized inspector shall be made of every new hand elevator before the elevator is placed in regular service. This test shall be made with contract load in car.

18.12: Machines and Machine Safeties

- (1) Hand elevators shall be equipped with brakes that operate in either direction of motion of the elevators. When the brake has been applied, it shall remain locked in the "on" position until released by the operator.
- (2) Brakes shall be capable of stopping and holding the elevator with contract load.
- (3) The factors of safety based on the static loads to be used in the design of all parts of hoisting machines shall be not less than eight for wrought iron or wrought steel and ten for cast iron or other materials.
- (4) If suspension stirrups are used for the sheaves or idlers of hand elevators, they shall be of steel.
- (5) Adequate means of access shall be provided to sheaves and machines for maintenance and inspection.
- (6) No hand elevator machine shall be equipped with any means or attachment for applying any other power unless such elevator is permanently and completely converted into a power elevator complying with the requirements of the code for power elevators.

18.13: Suspension Means

- (1) Suspension members shall be wire ropes or chains.
- (2) A durable plate shall be placed upon the crosshead, bearing the following information in not less than ¼" letters or figures stamped, etched, or raised on the surface of the plate:

524 CMR: BOARD OF ELEVATOR REGULATIONS

18.13: continued

- (a) The rope suspension date.
- (b) Number, diameter, material, and rated ultimate strength of the suspension means used, as follows:

524 CMR 18.13 (2) FIGURE 1
SUSPENSION SPECIFICATIONS

| Suspension Material | Material | Nominal-size | Rated Ultimate Strength in Lbs |
|---------------------|----------|--------------|--------------------------------|
| Hoisting | | | |
| Counterweight | | | |

- (3) In addition, a durable tag shall be attached to the suspension fastenings, stating the size, rated ultimate strength and material of the suspension, and the date of its installation.
- (4) The factor of safety used in determining the size of the suspension member shall be five, based on the weight of the car and its contract load.
- (5) Suspension members shall be so adjusted that, when the car or counterweight of a hand elevator rests on its buffers or supports, there shall be a minimum clearance of 12" above the counterweight or car, respectively.
- (6) No bottom runby is required for hand elevators.
- (7) Suspension members secured to a winding drum shall have not less than one complete turn of the suspension member around the winding drum when the car or counterweight has reached the extreme limit of its overtravel.
- (8) The drum end of suspension members shall be secured by clamps or sockets inside the drum.
- (9) Not less than two suspension members shall be provided for each car and each counterweight.

18.14: Guide Rails

Car and counterweight guide rails shall be of steel or straight-grained, seasoned wood free from knots, shakes, dry rot or other imperfections. Guide rails shall be securely fastened with through bolts, screws or clips of such strength, design and spacing that the guide rails and their fastenings shall not deflect more than ¼" under normal operation, particularly where in contact with the guide shoe when the car is at the landing. Guide rails shall withstand the application of the safety when stopping a fully loaded car or the counterweight. The guiding surfaces of the guide rails for elevators requiring safeties shall be finished smooth. The guide rails shall be "bottomed" on suitable supports and extended at the top to prevent guide shoes running off in case the overtravel is extended.

18.15: Counterweights

- (1) Counterweights shall run in guides, or be fully enclosed in a counterweight box.
- (2) Sections of counterweights, whether carried in frames or not, shall be secured by at least two tie rods passing through holes in the sections. The tie rods shall have lock nuts secured by cotter pins at each end.

REGULATORY AUTHORITY

524 CMR 18.00: M.G.L. c. 143, § 69.