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524 CMR 17.00: POWER PASSENGER AND FREIGHT ELEVATORS (FOR INSTALLATIONS
MADE PRIOR TO **JULY** 1, 1989)

Section

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17.01: **Hoistway** Enclosures: General

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- (1) The hoistways of all elevators shall be enclosed throughout their height and constructed in accordance with 780 CMR (Massachusetts State Building Code) in effect at the time of construction.

17.01: continued

(2) When the elevator **hoistway** penetrates any fully enclosed solid floor above the bottom landing, walls of **hoistway** shall be of two hour **fire** rated construction.

NOTE: Elevator hoistways exposed to wheeled traffic shall be so designed as to withstand the impact loads of such traffic.

(a) For elevator installations made prior to March 9, 1950, if the elevator **hoistway** penetrates any fully enclosed solid floor above the lowest landing in a building that is not two hour fire rated, the **hoistway** walls shall be a minimum of one hour fire rated construction.

(b) The hoistways of all elevators and the stairwells surrounding them shall be enclosed through out the complete height of the building and vented to the outer air. The **hoistway** shall be of two hour fire rated construction. For elevator installations made prior to March 9, 1950, a fire rated **hoistway** is not required, provided that the stairwell enclosure, including any openings therein, is of two hour **construction** and there is one other means of egress from the building from each floor, accessible without having to pass through said enclosure.

(3) All windows in exterior and interior walls of an elevator **hoistway** are prohibited except for elevator installations made prior to March 9, 1950 existing windows in the exterior wall of a **hoistway** may remain, provided that said windows were in compliance with the code at the time of installation. All windows in interior walls of a **hoistway** shall be removed and replaced with enclosing materials that have a minimum two hour fire rating, unless the building is not two hour fire rated, in which case the enclosing material shall be a minimum of one hour fire rated **construction**.

(4) Not **more** than four elevators shall be installed in the same hoistway.

(5) Dividing wall partitions which are located within an elevator **hoistway** shall be constructed with solid walls of not less than ~~¾~~ hour fire-resistive construction.

(6) Glass hoistways must conform to 524 CMR 17.14(1)(g).

(7) For elevator hoistways which are not fully enclosed, protection shall be provided adjacent to areas permitting the passage of people (passageways, stairways and elevator landings). This protection shall be fixed solid guards seven feet in height and sufficient distance from the moving portion of the elevator so that individuals cannot come in contact with the elevator.

17.02: Machine Rooms, Sheave Rooms and Secondary Levels

(1) All machine rooms shall be located above or below or contiguous to any side of the hoistway.

EXCEPTIONS: Machine rooms for oil hydraulic elevators in 524 CMR 17.23 shall be located not more than ten feet from 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.

(a) Machinery spaces located above any **hoistway** and containing hoisting or counterweight sheaves **directly** over the car shall be provided with flooring located either below the sheaves or level with the top of the sheave supporting beams. Machinery spaces located above my **hoistway** and containing secondary and deflecting sheaves shall be provided with flooring if the space also contains other elevator equipment in addition to the sheaves. Where no flooring is provided beneath secondary and deflecting sheaves requiring frequent replenishment of the sheave bearing lubricant means **shall be** provided for lubricating the sheave bearing from the machine room.

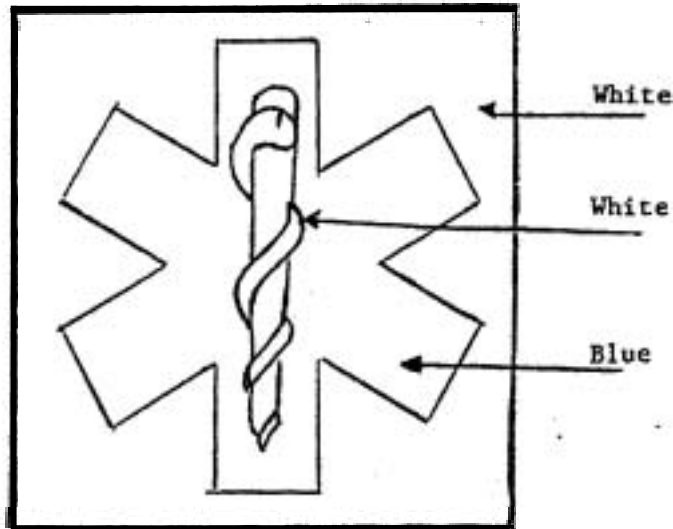
(b) Machine room floors shall be designed to support a uniformly distributed load of not less than 50 lbs. per square foot.

(c) Sheave room or secondary level floors shall be designed to support a uniformly distributed load of not less than 30 lbs. per square foot.

(d) Floors shall be either of concrete construction or of open metal construction which will reject a ¾" ball.

(e) Where holes in flooring for sheaves or groups of ropes are unprotected, they shall be provided with curbing guards not less than four inches high.

17.40: continued



EXCEPTIONS: The following elevator installations need not comply with 524 CMR 17.40:

- (a) Elevators in structures such as rock quarries, steel towers, dams, storage bins, smoke stacks, tanks (and other special industrial installations) where the elevators are used only by maintenance and operating personnel or in hospitals where the normal services of an EMT are available.
- (b) Elevators in buildings or structures where each landing is at ground level or is accessible to ground by a ramp.
- (c) Elevators in buildings or structures equipped with stairs that extend no more than one floor above or below the building entrance grade and with a configuration that shall accommodate the carrying of a gurney or stretcher on said stair and when said stair conforms to 780 CMR et seq. (the Massachusetts State Building Code) and is permitted by the authority having jurisdiction.

17.41: Registration of Freight Elevators Exempt under St. 1962, c. 288

- (1) All freight elevators installed prior to July 1, 1989 are governed by 524 CMR 17.01 through 17.40 unless granted exempt status by the Board pursuant to St. 1962, c. 288. If granted exempt status, the freight elevator will be governed by 524 CMR 17.41 through 17.50. In order to be granted exempt status, a freight elevator owner must submit an application for exempt status to the Board, on a form provided by the Board. The Board may either act upon the application on its face, or convene a hearing.
- (2) If granted exempt status, the Board shall issue a **certificate** of registration for the elevator to the owner or to the person in charge of the freight elevator. The owner or person in charge shall post the certificate in a conspicuous place in the elevator's machine room.
- (3) An owner or the person in charge on an elevator denied exempt status by the Board, may appeal the decision to the Board of Elevator Appeals, pursuant to M.G.L. c. 143, § 70, within 30 days of receipt of the Board of Elevator Regulations' decision.

17.42: Hydraulic Cylinders for Freight Elevators Exempt under St. 1962, c. 288

All hydraulic cylinders buried in the ground that were installed without a safety bulkhead shall have a governor-operated safety or a plunger gripper installed by July-1, 2011.

17.43: Car Frames for Freight Elevators Exempt under St. 1962, c. 288

(1) Car suspension frames, platform frames, and platform stringers of freight elevators granted exempt status pursuant to Chapter 288 of the Acts of 1962 shall be constructed of steel meeting not less than the requirements of the American Society for Testing Materials (ASTM) specification A7.

(2) The stresses of rolled steel sections or annealed cast steel used in the construction of car frames and platforms based on the static load imposed on them, including the weight of the unloaded car and the maximum rated carrying capacity, shall not exceed the values given in **524 CMR 17.13: Table 2** for freight cars.

The stresses tabulated in **524 CMR 17.13** are based on steels having an ultimate strength from **55,000** to **65,000** pounds per square inch for rolled sections or cast steel and **46,000** to **56,000** pounds per square inch for rivets. For steels of greater ultimate strength, the allowable stresses may be increased proportionately. However, any such deviating proportionality calculations must be performed and stamped by a registered Professional Engineer (P.E.) and submitted to the Board for approval.

(3) No cast iron shall be used in the construction of any member of the car frame or platform subject to tension or bending. Cast iron may be used for compensating cable anchorages, releasing carriers, and guideshoe stands.

(4) The deflection of crosshead and safety plank shall not exceed $\frac{1}{8}$ inch in each ten feet of span under static conditions with contract load substantially uniformly distributed over the car platform.

(5) The slenderness ratio L/R for members not normally subject to compression shall not exceed **250**; for members normally subject to compression this ratio shall not exceed **120**. Loading resulting from buffer and safety operation shall not be considered normal loading.

(6) No glass shall be used in freight elevators except to cover certificates, lighting fixtures, vision panels and appliances necessary for the operation of the car.

(7) There shall be no obstructions or projections in the car floor.

(8) Where platform floors are constructed of wood or other combustible materials they shall be covered on the underside with sheet metal of not less than No. 27 U. S. Gauge thickness.

(9) Elevators provided with car leveling or inching devices shall have their platforms provided with a metal guard not less than No. 16 U. S. Gauge in thickness. This guard shall extend horizontally the full width of the car entrance and vertically below the car floor for not less than the depth of the leveling or inching zone plus three inches. The lower edge of the guard shall be beveled at an angle of not less than 70 degrees with the horizontal.

(10) The requirements for loading classifications can be found in **524 CMR 33.00**. Satisfaction as to compliance will be evidenced by the manufacturer's certificate.

(11) Welding of parts upon which safe operation of all equipment contained in **524 CMR** depends shall be done by American Welding Society (AWS) certified welders; and all work upon completion shall be approved by the state elevator inspector before the unit is placed in service.

EXCEPTION: Tack welds not later incorporated into finished welds carrying calculated loads.

(12) Full compliance with all provisions of **524 CMR 17.43** is required by July 1, 2011.

17.44: Machines and Machinery for Freight Elevators Exempt under St. 1962, c. 288

Beginning on July 1, 2011, freight elevators granted exempt status pursuant to St. 1962, c. 288 shall be direct drive as defined in **524 CMR 3.00** and shall meet the following requirements:

17.44: continued

- (1) Drums and leading sheaves shall be of cast iron or steel, and shall have finished grooves. U-grooves shall be not more than 1/16 inch larger than the ropes. The pitch diameter of sheaves or drums for hoisting or counterweight ropes shall be not less than 40 times the nominal diameter of the rope. **Opening in drums** shall be drilled at an angle of not over 45 degrees with the run of the rope and shall be provided with a rounded corner with a radius at least equal to that of the rope.
- (2) The factor of safety based on the static load to be used in the design of elevator hoisting machines shall be not less than ten for cast iron, cast steel, or materials other than wrought iron or wrought steel. For wrought iron or wrought steel, the factor of safety shall be eight.
- (3) No set-screw fastenings shall be used in *lieu* of keys or pins if the connection is subject to torque or tension. Shafts which support drums, gears, couplings and other members and which transmit torque shall be provided with tight fitting keys. A fillet shall be provided at any point of **change in the diameter of driving-machine sheave shafts**, or drums to prevent excessive stress concentrations in the shafts.
- (4) No friction gearing or clutch mechanisms shall be used for connecting the drums or sheaves to the main driving gear of power elevators.
- (5) No belt or chain-driven machine shall be used to drive any power elevator.
- (6) No worm gearing having cast iron teeth shall be used for any power elevator machine.
- (7) **Electric** elevator machines shall be equipped with electrically released brakes which are applied by compression springs. No brakes shall be released until power has been applied to the motor.
- (8) No single-ground, short-circuit, or counter-voltage shall prevent the action of the brake magnet from allowing the brake to set in the intended manner during normal operation. No motor field discharge, counter-voltage, single ground, or accidental short-circuit shall retard the action of the brake magnet in allowing the brake to set during emergency stops.
- (9) Welding of parts on which safe operation depends shall be done in accordance with the appropriate standards established by the American Welding Society. All welding of such parts shall be done by welders certified by the American Welding Society.
- (10) When machinery of more than one elevator is in a **machine** room, each elevator machine shall be assigned a different elevator number which shall be painted on or securely attached to the driving machine and visible from the **disconnect** switch. The corresponding disconnect switch shall **carry** the same elevator number.

17.45: Guide Rails for **Freight Elevators Exempt** under St. 1962, c. 288

- (1) Guide rails for cars and counterweights on freight elevators granted exempt status pursuant to St. 1962, c. 288 shall be made of steel. Where steel rails present an accident hazard, as in chemical or explosive industries, wood guide rails may be used. Guide rails for cars and counterweights on exempt freight elevators shall follow the guide rail dimensions provided in 524 CMR 17.30(1) TABLE 1. **Guide Rail Dimensions**. However, counterweight rails made of wood which were installed prior to March 9, 1950, may remain provided that no other wood is present in the hoistway.
- (2) **Length of Guide Rails**
 - (a) For hydraulic elevators where the car is secured directly to the top of a hydraulic plunger, **the guide rails shall be** extended at the top **and bottom to prevent the guide shoes** from running off when the plunger is fully extended or fully compressed.
 - (b) For all other power elevators, the guide rails shall be continuous from the bottom to the top of the hoistway.

17.45: continued

(3) Weight of Guide Rails. The weight of steel guide rails shall not be less than given in **524 CMR 17.30(3) TABLE 2.**

(4) Joints of Steel Guide Rails. Joints of steel guide rails shall ~~be:~~

(a) Accurately machined with tongue and groove through the webs at right angles to the base and through the flanges parallel to the base, and fitted with fishplates each secured with not less than four substantial bolts through each rail; or,

(b) Accurately machined with tongue and groove through the webs and with backs of the flanges where the ~~fishplates bear~~ accurately machined at right angles to the tongue and groove and fitted with finished fishplates each secured with not less than four substantial bolts through each rail.

(5) Guide Rail Bolts. Guide rail bolts for ~~fishplates~~, ties, brackets, backing, clips through bolts, and supports shall be not less than the sizes given in **524 CMR 17.30(3) TABLE 5.**

(6) Guide Rail Brackets.

(a) Guide rails shall be securely fastened in position with brackets, through bolts, ties, clips, or backing of steel of such strength, design, and spacing that the guide rails and their fastenings shall not deflect between supports more than 1/4 inch under normal operation. Welding may be used to fasten rail supports to building steel provided the welding is done by an American Welding Society certified welder.

(b) Where the supports are more ~~than~~ 14 feet on centers, rail backing shall be used regardless of the deflection under normal operation.

(c) ~~Where~~ an elevator is intended to handle heavy loads, the guide rails, fastenings, backing, brackets, and supports shall be designed to sustain the thrusts imposed upon them when a concentrated load is on the car sill in addition to when the concentrated load is in place on the car platform.

(d) Guide Rail Brackets and Building Supports. Design and strength of Brackets and Supports. The building construction forming the supports for the guide rails, and the guide rail brackets, shall be of such design as to:

1. safely withstand the application of the car or counterweight safety when stopping the car and its rated load or the counterweight; and
2. withstand the forces specified in **524 CMR 17.16** within the deflection limits specified.

Where necessary, the building construction shall be reinforced to provide adequate supports for the guide rails. All calculations necessary to achieve compliance with **524 CMR 17.45(6)(d)** must be performed and stamped by a registered Professional Engineer (P.E.).

(7) Bolt Holes. Bolt holes in steel beams for bracket bolts shall not exceed the diameter of the bolt by more than 1/16 inch. Such ~~bolt~~ holes shall be drilled or punched. They ~~shall~~ not be cut with a torch.

(8) Wood Guide Rails. Where the use of steel guide rails creates an explosion hazard, the use of wood guide rails is permitted, provided that:

- (a) the contract speed is not in excess of 100 feet per minute; and,
- (b) the guide rails are of straight grained maple without knots; and,
- (c) the size of the rails is either not less than 2 inches x 2 1/2 inches where the car and load is not in excess of 5,000 pounds or not less than 2 inches x 3 inches where the car and load is not in excess of 8,000 pounds; and,
- (d) all elevator related electrical equipment shall be National Electrical Manufacturers Association (NEMA) class 1, division 1 rated.

(9) Use of Car or Counterweight Safeties. Where car or counterweight safeties are used, the guide rails and their supports shall be capable of withstanding the application of the safety when ~~stopping~~ the car with ~~contract~~ load or the counterweight when descending at governor tripping speed.

(10) Full compliance with ~~all~~ provisions of **524 CMR 17.45** is required by July 1, 2011.

17.46: Car and Counterweight Safeties for Freight Elevators Exempt under Sr. 1962, c. 288

(1) Freight elevators granted exempt status pursuant to St. 1962, c. 288 which are suspended by ropes shall be equipped with car safeties installed in or on a safety plank located beneath the car platform. Where multiple-type safeties are installed, one such safety shall be located in or on the safety plank located beneath the car platform. The safety or safeties shall be capable of stopping and sustaining the car with contract load

(a) The application of the safety shall not cause the car platform to become out of level in excess of ½ inch per foot, measured in any direction.

(b) When the car safety is applied, no decrease in the tension of the governor rope or motion of the car in the descending direction shall release the car safety.

(c) It is permissible to release the safety by reversing the direction of the motion of the machine.

(d) Car safeties shall be operated by speed governors.

(e) Jaws and other parts of safeties of the sliding type, if made of forged steel of an ultimate strength of not less than 55,000 pounds per square inch and cast steel of an ultimate strength of not less than 65,000 pounds per square inch, may, in action, be stressed to 17,000 pounds per square inch. For steels of greater strength the allowable stresses may be increased proportionately based on ultimate strength.

Cast iron shall not be used in any part of a car safety, the breakage or failure of which would result in failure of the safety device to function, to stop the car and sustain the load.

(f) Bearings for safety drums and screw-shafts shall be of non-ferrous material.

(g) Where two (duplex) safeties are provided, the lower safety device shall be capable of developing not less than one half of the force required to stop the entire car with rated load. Duplexed safety devices shall be arranged so as to function approximately simultaneously.

Types A or Type C safety devices (*see* 524 CMR 17.16(20)) shall not be used in multiple.

(h) Type B safeties shall stop the car with its rated load from governor tripping speed within the range of the stopping distances shown in 524 CMR 17.16: TABLE 2. *Maximum Speeds at Which Speed Governor Trips and Governor Overspeed Switch Operates.*

(2) Exempt freight elevators shall comply with the maximum and minimum stopping distances for Type B car safeties with rated load as provided in 524 CMR 17.16: TABLE 1. *Maximum and Minimum Stopping Distances Type B Car Safeties with Rated Load, and of Type B Counterweight Safeties.*

(3) Full compliance with all provisions of 524 CMR 17.46 is required by July 1, 2011.

17.47: Operating Devices for Freight Elevators Exempt under St. 1962, c. 288

Beginning on July 1, 2011, no power freight elevator granted exempt status pursuant to St. 1962, c. 288 shall be operated by a direct hand-operated rope, cable, or rod, or by a wheel or lever mechanism which motivates an operating rope or cable.

17.48: Variances

(1) **Application.** If the owner of a freight elevator granted exempt status pursuant to St. 1962, c. 288 believes that full compliance with 524 CMR 17.00 would be overly burdensome, the owner or owner's designee may apply to the Board for a variance from any provision of 524 CMR 17.00. The burden shall be on the applicant to demonstrate that compliance with a specific provision of 524 CMR 17.00 is overly burdensome and that the granting of the variance would not compromise public safety or otherwise undermine the purpose of 524 CMR 17.00. Application for a variance shall be made on a form provided by the Board for this purpose, shall be accompanied by any supporting documentation on which the applicant seeks to rely, and shall be signed by the applicant.

In determining whether to grant a variance, the Board's consideration may include, but will not be limited to, the following elements:

(a) the use of the elevator/whether it carries exclusively freight;

(b) the age of the elevator;

(c) the maintenance/safety history of the elevator;

(d) the distance the elevator is capable of traveling;

17.48: continued

- (2) Board Action. Upon receipt of an application for a variance, the Board or its designee may:
- (a) Grant the application with whatever conditions are deemed appropriate;
 - (b) Deny the application without a hearing;
 - (c) Schedule a hearing before the Board.

(3) Appeal. Any person aggrieved by the Board of Elevator Regulations' action on a variance request application may file a request for an adjudicatory hearing before the Board of Elevator Appeals within 30 days of receipt of the decision pursuant to M.G.L. c. 143, § 70. All **adjudicatory** hearings **shall** be held in **accordance** with the provisions of M.G.L. c. 30A and 801 CMR 1.02. **Any** person aggrieved by a decision of the Board of Elevator Appeals after a hearing may appeal to the Superior Court in accordance with M.G.L. c. 30A, § 14.

17.49: Training in the Use and Operation of Elevators Exempt under St. 1962, c. 288

In addition to 524 CMR 1.09, **owners** of elevators granted exempt status pursuant to St. 1962, c. 288 shall be responsible for training all individuals who use said elevators in their safe and proper use and operation. Owners must document the training and keep it on file. Documentation of the training must include the name of the individual trained, the date of the training, the content of the training, and a notation of any materials provided to the trainee. A copy of the training documentation shall be immediately provided to the Board upon request.

17.50: Non-compliance with 524 CMR 17.41 through 17.49 and Shut Down Orders

Non-compliance with any provision of 524 CMR 17.41 through 17.49 shall be grounds for immediate shut down of the affected **elevator(s)**. An inspector of the Department of Public Safety may shut down any elevator granted exempt status pursuant to St. 1962, c. 288 for non-compliance with any provision of 524 CMR 17.41 through 17.49 or if a determination is made that the elevator is unsafe to operate. The elevator **shall** remain shut down until the issues leading to the shut down are remedied and the elevator is cleared to operate by an inspector. Shut down orders as given by the Board or an inspector may be appealed pursuant to M.G.L. c. 143, § 70.

REGULATORY AUTHORITY

524 CMR 17.00: St. 2006, c. 45; M.G.L. c. 143, §§ 68 and 69.