

524 CMR 32.00: VERTICAL RECIPROCATING CONVEYORS

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32.01: Scope and Application

(1) The standards in 524 CMR 32.00 shall apply to the new installation, alteration, and maintenance of power driven Vertical Reciprocating Conveyors (VRCs) as defined in 524 CMR 35.00: *Safety Code for Elevators and Escalators A17.1-2013 and the Massachusetts Modifications of That Code*. A registered design professional shall indicate conformance to these requirements verifying a safety factor of three for all structural components.

(2) Inspection and Existing Installations.

(a) Vertical Reciprocating Conveyors shall be subject to inspection as provided in 524 CMR 32.00.

(b) Existing vertical reciprocating conveyors installed prior to April 15, 2009, shall be subject to the following requirements:

1. Top and bottom limits;
2. Backstops;
3. Signage;
4. Safeties (instantaneous or valve overspeed);
5. Safety operated switches required on safeties;
6. Suitable enclosure for machinery;
7. Electrical and mechanical interlocks shall be provided;
8. Interlocks cannot be accessible from outside the hoistway;
9. Corridor push button with stop switches;
10. Car light;
11. Unsafe conditions as deemed such by an inspector.
12. Alterations for any component or system not included in 524 CMR 32.01(3)(b)1. through 10. shall comply with 524 CMR 32.00.

(3) Vertical Reciprocating Conveyor wiring and electrical equipment shall be installed in accordance with 527 CMR 12.00: *Massachusetts Electrical Code (Amendments)*.

(4) No riders shall be permitted on Vertical Reciprocating Conveyors while the lift is in operation.

(5) Individuals performing work relative to the construction, maintenance, or repair of Vertical Reciprocating Conveyors within the Commonwealth shall be subject to the licensing requirements of M.G.L. c. 143, § 71B.

32.02: Hoistway Enclosure

(1) The hoistways of all VRCs that penetrate any fully enclosed solid floor above the bottom landing shall be enclosed throughout their height and constructed in accordance with 780 CMR: *State Board of Building Regulations and Standards* in effect at that time of installation.

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- (2) Where 524 CMR 32.03(1) does not apply, hoistway enclosures shall be constructed at each landing according to the following standards:
 - (a) The enclosure height of the hoistway shall be not less than 96 inches (2,440 mm). Where a car gate is not used, the hoistway shall be fully enclosed on the open end(s) of the car.
 - (b) Enclosures shall be constructed with material having the ability to withstand a 100-pound lateral force without deflection and reject a ball two inches (50 mm) in diameter.
 - (c) Where the VRC is adjacent to a stairway, the enclosure shall be of solid or perforated construction and shall not be less than 96 inches (2,440 mm) above any step. Perforated construction shall reject a ball one inch (25 mm) in diameter.

32.03: Backstops

- (1) Where a double ended platform is not accessible from both sides at a landing, the enclosure shall be provided with a backstop located on the hoistway enclosure opposite the landing opening, regardless of whether or not car gates are provided.
- (2) Enclosures shall be constructed with material having the ability to withstand a 100-pound lateral force without deflection and reject a ball two inches (50 mm) in diameter.
- (3) The backstop shall extend to the height of the tallest rated load and not less than two inches (50mm) below the platform or to floor level, as measured with the lift at floor level. The width of the backstop shall be not less than the clear opening.
- (4) The distance measured horizontally from the platform to the backstop shall not exceed 1½ inches (38mm).

32.04: Machine Rooms

Machine rooms or suitable enclosures around machinery and control equipment shall be required and shall meet the requirements of ASME A17.1-2013/CSA B44-13: *Safety Code for Elevators and Escalators*, Section 2.7 as modified by 524 CMR 35.00: *Safety Code for Elevators and Escalators A17.1-2013 and the Massachusetts Modifications of That Code*.

32.05: Hoistway Doors and Gates

- (1) The openings at each landing shall be provided with gates or doors that guard the full width and height of the opening and prevent entry to any hoistway area during VRC operation. Hoistway gates or doors shall extend vertically not more than two inches (50 mm) from the landing threshold.
- (2) The horizontal running clearance between the platform and landing threshold shall not be less than ½ inch (13 mm) nor greater than 1½ inches (40 mm).
- (3) The horizontal clearance between the landing edge and the nearest portion of the hoistway door shall not exceed five inches (130 mm).
- (4) Each hoistway gate or door shall have an electromechanical interlock or combination mechanical door lock and contact to prevent the door from opening while the VRC platform is not within the landing zone and to prevent the VRC from operating if a door or gate is open at any landing. The interlock shall be located so it is not accessible from the landing side when the hoistway doors are closed. Access to the interlock through use of special tool is permitted provided the interlock is located not more than 84 inches (2,130mm) from floor level.
- (5) There shall be a sign on each landing door or gate reading "NO RIDERS." Letters on the sign shall be a minimum of two inches (50 mm) high and be a contrasting color to the surrounding background.

32.05: continued

- (6) Power doors, when provided, shall conform to the following:
 - (a) Swing door closing force shall not exceed ten lbf (45 N).
 - (b) Horizontal sliding or vertical operating doors closing force shall not exceed 30 lbf (133 N).
 - (c) The maximum closing speed for doors shall not exceed one ft./sec (0.305 m/s).
 - (d) The control device to open and close the door shall be within sight of the hoistway door it controls. Door control shall be of the constant pressure type and shall not be controlled automatically.

32.06: Car Enclosures

- (1) The enclosure on the sides not used for loading and unloading shall be constructed to prevent material from falling into or against the hoistway enclosure during operation and will be constructed to reject a two inches (50 mm) ball. The enclosure shall match the height of the tallest rated load.
- (2) Car Gates Not Required. Where provided, however, car gates shall be a minimum of 43 inches (1,100 mm) high and provided with a gate switch contact to prevent operation of the lift unless the car gate is in the closed position.
- (3) A snap chain, drop bar or similar device may be installed across all loading sides of the lift platform.
- (4) A capacity sign shall be installed on conveyor and clearly visible showing the maximum rated capacity. The capacity sign lettering shall not be less than ¾ inch high.
- (5) A "NO RIDERS" sign shall be installed on the conveyor. The lettering shall not be less than ¾ inch high.
- (6) Conveyors shall be equipped with an electric light or lights; not less than two lamps shall be provided. The minimum illumination at the landing edge of the conveyor platform when the landing doors are open shall not be less than five foot candles.
- (7) A car light switch is not required on the conveyor, but it shall be required in the machine room.

32.07: Driving Machines and Control Equipment

- (1) Driving machines, pump units, and other equipment shall be permanently secured in place and shall not be supported by hooks, cables, chains, similar devices or configurations. Chain hoists, rope falls or similar hoisting devices are prohibited from use as the main driving machine. Portable hoists are prohibited.
- (2) The diameter of drive sheaves for traction machines and drums shall not be less than 30 times the diameter of the hoisting cables. The diameter of all other sheaves shall not be less than 21 times the diameter of the hoisting cables.
- (3) The controller, driving machine and other equipment requiring periodic service and repair shall be readily accessible. Where machines are located in the hoistway, a safe means of access shall be provided from outside or from the car when secured in position at the top landing to facilitate maintenance and repairs. Access panels shall be not less than 30" x 30". Where equipment access panels are located more than 72 inches (1,830 mm) above floor level, stairs or fixed ladders shall be provided. Stairs and fixed ladders shall comply with of ASME A17.1-2013/CSA B44-13: *Safety Code for Elevators and Escalators*, Section 2.7.3.3.1.

32.07: continued

- (4) Illumination of work areas containing machines and controls shall be provided with an electric light or lights; not less than two lamps shall be provided. The minimum illumination of not less than ten foot candles as measured at a point in front of the equipment. An electrical outlet conforming to 527 CMR: *Board of Fire Prevention Regulations* shall be provided within 72 inches of the control equipment.
- (5) Controllers shall not be accessible from the hoistway and shall be located in a locked enclosure.
- (6) Machine rooms and/or control rooms shall meet the requirements of ASME A17.1-2013/CSA B44-13: *Safety Code for Elevators and Escalators*, Section 2.26 as modified by 524 CMR 35.00: *Safety Code for Elevators and Escalators A17.1-2013 and the Massachusetts Modifications of That Code*.
- (7) Machines located in a hoistway shall not be hydraulic and shall have:
 - (a) a disconnect that will remove power from the motor and brake within sight of the machine;
 - (b) a red stop switch that interrupts the safety circuit; and
 - (c) a 110-volt light and GFI (ground fault interrupter) receptacle.
- (8) By pass pressure on hydraulic units shall be set not to exceed 150% of working pressure and shall be sealed.
- (9) An overspeed valve (rupture valve) shall be installed in the oil line of hydraulic units between the control valve and the jack. Only threaded or welded pipe may be used between the control valve and the jack.

32.08: Operating Protective Devices

- (1) Each conveyor suspended by wire ropes, chains or similar means shall be equipped with car safeties. The car safety shall be capable of stopping the car and sustaining the car with 125% of its rated load. Upon activation of the car safeties, an electric manual reset safety switch shall be provided that will cause the power to be disconnected from the main driving means.
- (2) Each lift shall be provided with top final limit switches or physical stops, including the floor at the bottom landing.
- (3) Control stations shall be permanently installed on the outside of each landing. The control stations shall be in view of the hoistway and shall have an emergency mechanical set reset type stop switch. The control stations shall be located at a point outside the hoistway so it is not possible for the same person to operate the control and ride the lift.
- (4) A lift with a winding drum machine shall be provided with a slack rope switch or slack chain that will cause the main power to be removed from the driving machine. The device shall be of the manually reset type.

32.09: Practical Tests and Inspections

Before a conveyor is allowed to operate, the requirements of 524 CMR 8.00: *Practical Tests and Inspections* shall be met, where applicable.

32.10: Controlled Access Facility

All employees who intend to use a VRC in a controlled access facility shall be trained as to its safe operation. A record shall be kept on file by the facility documenting the individuals who have received such training. No employee of said facility may operate a VRC unless he or she has been trained on its safe operation.

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32.11: Non-controlled Access Facility

VRCs shall not be operated by the general public. If a VRC is located in a non controlled access facility, the area surrounding the VRC shall be secured so that members of the public do not have access to the unit. There shall be a sign on or adjacent to the unit reading "NO RIDERS." Letters on the sign shall be a minimum of two inches (50 mm) high and be a contrasting color to the surrounding background.

REGULATORY AUTHORITY

524 CMR 32.00: M.G.L. c. 143, §§ 62 through 71G.