THE COMMONWEALTH OF MASSACHUSETTS

BOARD OF

Elevator Regulations

524 CMR

Effective: 10/6/2006

524CMR-ELEVATOR CODE
ELEVATORCODE
100392
$15.75

Published by
William Francis Galvin - Secretary of the Commonwealth

524 CMR BOARD OF ELEVATOR REGULATIONS

Amendment Process

The Board holds public hearings on the first Wednesday in May and October at which time it will hear any petitions for changes in the Elevator Regulations – M.G.L. c. 143 § 69.

Appeals

Whoever is aggrieved by an interpretation, order, requirement or direction of an inspector or other person charged with the enforcement of any provision of law, code, rule or regulation relating to the installation or alteration of elevators may within ten days after the service or notice thereof appeal from such interpretation, order, requirement or direction to the Board of Elevator Regulations – M.G.L. c. 143 § 70.

Petition for Variance

Whoever is or will be aggrieved by the application of any provision of law, code, rule or regulation relating to the installation of elevators may file a petition for a variance there from with the Board – M.G.L. c. 143 § 70.

Members of the Board of Elevator Regulations

James F. Comley, Chairman	Experienced Elevator Constructor
Harold McGonagle, Member	Representing the Building Commissioner, City of Boston
Martin H. McKown, Sr., Member	Representing Building Owners
Patrick C. Coyle, Member	Representing the Department of Public Safety
John J. O'Donoghue, Member	Representing the Department of Fire Services
John M. Otis, Member	Representing Elevator Manufacturers
John J. Caughey, Member	A Consulting Engineer
Michael J. Nocoloro	City of Cambridge

The Commonwealth of Massachusetts

William Francis Galvin, Secretary of the Commonwealth
State Publications and Regulations

REGULATION FILING AND PUBLICATION

1. **Regulation Chapter, Number and Heading:** 524 CMR

2. **Name of Agency:** BOARD OF ELEVATOR REGULATIONS

3. **This document is reprinted from the Code of Massachusetts Regulations and contains the following:**

524 CMR 1.00 - 35.00 CONTAINS THE ENTIRE ELEVATOR CODE

Under the provisions of Massachusetts General Laws, Chapter 30A, Section 6 and Chapter 233, Section 75, this document may be used as evidence of the original documents on file with the Secretary of the Commonwealth.

10/6/2006

Compiled as in full force and effect:

A true copy attest: William Francis Galvin

$15.75

WILLIAM FRANCIS GALVIN
Secretary of the Commonwealth

Table of Contents

		Page
524 CMR 1.00:	ELEVATOR, ESCALATOR, WHEELCHAIR LIFT, DUMBWAITER AND OTHER SPECIAL HOISTING EQUIPMENT: INSTALLATION AND MAINTENANCE	9
Section 1.01:	Scope	9
Section 1.02:	Application	9
Section 1.03:	Permits	10
Section 1.04:	Tests and Inspections	10
Section 1.05:	Certificate of compliance	10
Section 1.06:	Limited certificate of compliance	10
Section 1.07:	Time limitation	10
Section 1.08:	Owner responsibility	10
(524 CMR 2.00: RESERVED)		11
524 CMR 3.00:	ELEVATOR, ESCALATOR, DUMBWAITERS AND MOVING WALKS: DEFINITIONS	15
(524 CMR 4.00 THROUGH 6.00: RESERVED)		25
524 CMR 7.00:	MISCELLANEOUS REGULATIONS	41
Section 7.01:	Miscellaneous Regulations	41
Section 7.02:	Registration Numbers	41
Section 7.03:	Reference to Other Applicable Regulatory Codes	42
Section 7.04:	Inspection Certificates	42
524 CMR 8.00:	PRACTICAL TESTS AND INSPECTIONS	43
Section 8.01:	Practical Tests and Inspections	43
Section 8.02:	Unsafe or Non-Compliant Conditions	44
Section 8.03:	Power to Seal Equipment	44
Section 8.04:	Notice of Sealing Out of Service	44
Section 8.05:	Unlawful to Remove Seal	44
524 CMR 9.00:	OPERATION OF ELEVATORS	45
Section 9.01:	Licensed Operators: General	45
Section 9.02:	Granting of Licenses	45
Section 9.03:	Display of Licenses	46
Section 9.04:	Revocation and Suspension of Licenses	46
Section 9.05:	Instructions to Operators	46
524 CMR 10.00:	ALTERATIONS OF ELEVATORS	49
Section 10.01:	Alterations of Elevators	49
524 CMR 11.00:	ELEVATORS PLACED OUT OF SERVICE	51
Section 11.01:	Elevators Placed Out of Service	51
Section 11.02:	Decommissioned Equipment	51
(524 CMR 12.00 THROUGH 14.00: RESERVED)		53

Table of Contents

		Page
524 CMR 15.00:	ELEVATOR, DUMBWAITER, ESCALATOR AND MOVING WALK: GENERAL	71
Section 15.01:	Elevator, Dumbwaiter, Escalator and Moving Walls Regulations: General	71
Section 15.02:	Age Requirement	71
Section 15.03:	Increase in Dead Weight	71
(524 CMR 16.00:	RESERVED)	73
524 CMR 17.00:	POWER PASSENGER AND FREIGHT ELEVATORS (FOR INSTALLATIONS MADE PRIOR TO JULY 1, 1989)	75
Section 17.01:	Hoistway Enclosures: General	75
Section 17.02:	Machine Rooms, Sheave Rooms and Secondary Levels	76
Section 17.03:	Venting of Hoistways	80
Section 17.04:	Clearance and Pits	81
Section 17.05:	Hoistway Guards	83
Section 17.06:	Pipes and Wiring	84
Section 17.07:	Hoistway Doors: General	84.1
Section 17.08:	Landing Doors for Power Passenger Elevators	86
Section 17.09:	Landing Doors for Power Freight Elevators	87
Section 17.10:	Hoistway Door Interlocks	87
Section 17.11:	Landings for Power Passenger and Freight Elevators	89
Section 17.12:	Power Operation, Power Opening and Power Closing of Hoistway Doors and Car Doors	89
Section 17.13:	Car Construction	91
Section 17.14:	Car Enclosures	92
Section 17.15:	Capacity and Loading	97
Section 17.16:	Car and Counterweight Safeties and Speed Governors	99
Section 17.17:	Car Speeds	104
Section 17.18:	Illumination of Cars and Lighting Fixtures	105
Section 17.19:	Contract-Load Test	106
Section 17.20:	Equipment Prohibited Inside Car	106
Section 17.22:	Machines and Machinery	106
Section 17.23:	Hydraulic Elevator Machines, Tanks, Pumps, Valves and Gauges	107
Section 17.24:	Venting of Machinery Spaces	110
Section 17.25:	Venting of Elevator Hoistways	110
Section 17.26:	Hoisting Ropes	110
Section 17.27:	Governor Ropes	114
Section 17.28:	Governor Tail-Ropes	115
Section 17.29:	Compensating Ropes or Chains	115
Section 17.30:	Guide Rails	115
Section 17.31:	Car and Counterweight Buffers	119
Section 17.32:	Counterweights	120
Section 17.33:	Control and Operating Devices and Systems: General	120
Section 17.34:	Control Devices	121
Section 17.35:	Operating Devices	122
Section 17.36:	Terminal Stopping	124
Section 17.37:	Signals	125
Section 17.38:	General	125
Section 17.39:	Fire Emergency Service - Automatic Passenger Elevators	126
Section 17.40:	Medical Emergency Elevators	127

Table of Contents

		Page
524 CMR 18.00:	HAND ELEVATORS (FOR INSTALLATIONS MADE PRIOR TO JUNE 7, 1991)	131
Section 18.01:	Hoistway Enclosures: General	131
Section 18.02:	Machine Rooms	131
Section 18.03:	Venting of Hoistways	132
Section 18.04:	Hoistway Guards	133
Section 18.05:	Thoroughfares	133
Section 18.06:	Pipes and Wiring	133
Section 18.07:	Shaftway Doors: General	134
Section 18.08:	Car Construction	134
Section 18.09:	Capacity and Loading	134
Section 18.10:	Car Safeties	135
Section 18.11:	Contract-Load Test of Car Safety Devices	135
Section 18.12:	Machines and Machine Safeties	135
Section 18.13:	Suspension Means	135
Section 18.14:	Guide Rails	136
Section 18.15:	Counterweights	136
524 CMR 19.00:	DUMB-WAITERS (FOR INSTALLATIONS MADE PRIOR TO JUNE 7, 1991)	137
Section 19.01:	Hoistway Enclosures	137
Section 19.02:	Machine Sheave Enclosures	137
Section 19.03:	Venting of Hoistways	138
Section 19.04:	Thoroughfares	139
Section 19.05:	Pipes and Wiring	139
Section 19.06:	Dumb-waiter Hoistway Doors	140
Section 19.07:	Car Construction	140
Section 19.08:	Hydraulic Driving Machines	140
Section 19.09:	Power Dumb-waiter Machines	141
Section 19.10:	Terminal Stopping and Machine and Safety Devices	141
Section 19.11:	Suspension Means	141
524 CMR 20.00:	SIDEWALK ELEVATORS AND MANLIFTS	143
Section 20.00:	Sidewalk Elevators and Manlifts	143
(524 CMR 21.00:	RESERVED)	145
524 CMR 22.00:	MOVING STAIRWAYS (FOR INSTALLATIONS MADE PRIOR TO JULY 1,1989)	155
Section 22.01:	Construction: Protection of Floor Openings	155
Section 22.02:	Angle of Inclination	157
Section 22.03:	Width	157
Section 22.04:	Balustrading and Hand Rails	157
Section 22.05:	Step Frames and Treads	157
Section 22.06:	Design of Trusses or Girders	158
Section 22.07:	Track Arrangement	158
Section 22.08:	Capacity and Loading	158
Section 22.09:	Factors of Safety	158
Section 22.10:	Safety Requirements	158
Section 22.11:	Tests	159

Table of Contents

		Page
524 CMR 23.00:	PRIVATE RESIDENCE ELEVATOR CODE FOR INSTALLATIONS MADE PRIOR TO JUNE 7, 1991)	161
Section 23.01:	Scope	161
Section 23.02:	Hoistways	161
Section 23.03:	Hoistway Guards	162
Section 23.04:	Landings	162
Section 23.05:	Counterweights	163
Section 23.06:	Safeties	164
Section 23.07:	Machines	165
Section 23.08:	Suspension Means	166
Section 23.09:	Emergency Signal	166
(524 CMR 24.00:	RESERVED)	167
524 CMR 25.00:	BUILDERS' ELEVATORS	175
Section 25.01:	Definition	175
Section 25.02:	Supporting Structures	175
Section 25.03:	Protection of Openings	175
Section 25.04:	Car Construction	175
Section 25.05:	Ropes	176
Section 25.06:	Signals	176
Section 25.07:	Inspection	176
Section 25.08:	Riders	177
524 CMR 26.00:	CERTAIN ELEVATOR EQUIPMENT USED AS AUTOMOBILE PARKING DEVICES	179
Section 26.01:	Reasons for Special Regulations for So-Called Automatic Parking Devices	179
Section 26.02:	Reference to Safety Codes	179
Section 26.03:	Scope and Classification	179
Section 26.04:	Definitions	180
Section 26.05:	Construction of Hoistways and Hoistway Enclosures	180
Section 26.06:	Hoistway Gates in Non-Fire-Resistive Hoistways	180
Section 26.07:	Protection at Other Levels	180
Section 26.08:	Guide Rails, Guide Rail Supports and Fastenings	181
Section 26.09:	Car and Counterweight Buffers	181
Section 26.10:	Car Frames and Platforms: Design Requirements	181
Section 26.11:	Car Enclosures and Car Gates	181
Section 26.12:	Car and Counterweight Safeties and Speed Governors	182
Section 26.13:	Driving Machines	182
Section 26.14:	Roped Hydraulic Elevators	183
Section 26.15:	Requirements for Capacity and Loading	183
Section 26.16:	Terminal-Stopping Devices and Operating and Control Devices	183
Section 26.17:	Requirements for Suspension Means	184
Section 26.18:	Inspection, Tests, Maintenance and Alterations	184
Section 26.19:	Members of the Public Not Allowed Above Receiving Level	184
Section 26.20:	Operators to be Licensed	184

Table of Contents

		Page
524 CMR 27.00:	SPECIAL INDUSTRIAL POWER OPERATED SERVICE ELEVATORS	187
Section 27.01:	General	187
Section 27.02:	Hoistway Enclosure	188
Section 27.03:	Car Clearances	188
Section 27.04:	Pits and Overtravel	188
Section 27.05:	Machine and Machinery Supports	188
Section 27.06:	Pipes and Wiring	189
Section 27.07:	Counterweight Runway	189
Section 27.08:	Protection of Hoist Ropes	189
Section 27.09:	Hoistway Doors	189
Section 27.10:	Light in Car	190
Section 27.11:	Guide Rail Construction	190
Section 27.12:	Counterweight	190
Section 27.13:	Car Construction	190
Section 27.14:	Car Enclosure	190
Section 27.15:	Car Gate	191
Section 27.16:	Car Safety Construction and Operation	191
Section 27.17:	Tests	191
Section 27.18:	Capacity Plates	191
Section 27.19:	Limitations of Load, Speed and Platform Area	192
Section 27.20:	Machines and Sheaves	192
Section 27.21:	Limit Switches	192
Section 27.22:	Operation and Operating Devices	192
Section 27.23:	Suspension Means	193
Section 27.24:	Emergency Signal	193
Section 27.25:	Maintenance of Elevators	194
Section 27.26:	Guide Rails	194
Section 27.27:	Car Safety Mechanisms	194
Section 27.28:	Machine and Brake	194
Section 27.29:	Instructions	194
(524 CMR 28.00:	RESERVED)	195
524 CMR 29.00:	STAGE, ORCHESTRA, AND ORGAN CONSOLE ELEVATORS	201
Section 29.01:	Definitions	201
Section 29.02:	Hoistway Construction	201
Section 29.03:	Clearance and Pits	202
Section 29.04:	Machine Rooms, Sheave Rooms and Secondary Levels	202
Section 29.05:	Hoistway Doors	202
Section 29.06:	Railings and Toe Boards	202
Section 29.07:	Guide Rails	202
Section 29.08:	Door Interlocks	202
Section 29.09:	Lifting Capacity	202
Section 29.10:	Stage Elevators	202
Section 29.11:	Control Apparatus for Orchestra and Organ Console Elevators	202
Section 29.12:	Driving Machines	203
Section 29.13:	Control and Operating Devices and Systems	203
Section 29.14:	Factor of Safety	203
(524 CMR 30.00:	RESERVED)	205

Table of Contents

		Page
524 CMR 31.00:	CASKET LIFTS INSTALLED IN LICENSED FUNERAL HOMES, MEMORIAL CHAPELS, OR PREPARATION ROOMS	211
Section 31.01:	Definitions	211
Section 31.02:	Requirements	211
(524 CMR 32.00:	RESERVED)	215
524 CMR 33.00:	LOADING CLASSIFICATIONS	221
Section 33.01:	Car Frame Uprights (Stiles)	221
Section 33.02:	Freight Elevator Platform Frames	221
Section 33.03:	Formula Symbols	222
524 CMR 34.00:	VERTICAL WHEELCHAIR LIFTS (FOR INSTALLATIONS MADE PRIOR TO JUNE 7, 1991)	223
Section 34.01:	Definition of Vertical Wheelchair Lift	223
Section 34.02:	Limitations	223
Section 34.03:	Capacity and Rated Load of Vertical Wheelchair Lift	223
Section 34.04:	Rated Speed of Vertical Wheelchair Lift	223
Section 34.05:	Platform and Ramps	223
Section 34.06:	Supports and Mechanism Housing	223
Section 34.07:	Safety Factor	224
Section 34.08:	Guarding	224
Section 34.09:	Controls and Electrical Equipment	224
Section 34.10:	Standards	224
Section 34.11:	Inspection and Tests	225
524 CMR 35.00:	SAFETY CODE FOR ELEVATORS AND ESCALATORS A17.1-2004 and THE MASSACHUSETTS MODIFICATIONS OF THAT CODE	227

(PAGES 7 AND 8 ARE RESERVED FOR FUTURE USE.)

524 CMR 1.00: ELEVATOR, ESCALATOR, WHEELCHAIR LIFT, DUMBWAITER AND OTHER SPECIAL HOISTING EQUIPMENT: INSTALLATION AND MAINTENANCE

Section

1.01: Scope
1.02: Application
1.03: Permits
1.04: Tests and Inspections
1.05: Fees
1.06: Certificate of Compliance
1.07: Limited Certificate of Compliance
1.08: Time Limitation
1.09: Owner Responsibility

1.01: Scope

(1) Except as otherwise provided by statute, the provisions of 524 CMR shall control the design, construction, installation, relocation, alteration or material change, maintenance and operation of all elevators, escalators, lifts, dumbwaiters, moving walks, and special hoisting equipment, covered herein in all buildings and structures. The design, construction, installation, maintenance and operation of all miscellaneous hoisting and elevating equipment shall be subject to such special requirements as are deemed necessary by the authority having jurisdiction to secure their safe operation. The provisions of 524 CMR shall not apply to portable elevating devices used to handle materials only, and located and operated entirely within one story.

(2) The construction, alteration, maintenance, operation and inspection of manlifts is not within the scope of 524 CMR.

(3) The provisions of 524 CMR are not retroactive except as specifically provided hereunder; and except further that if, upon inspection of any device covered by this code, the equipment is found in dangerous or unsafe condition, or there is an immediate hazard to those riding on or using such equipment, or the method of operation in combination with devices used is considered inherently dangerous in the opinion of the state elevator inspector, the state elevator inspector shall notify the owner in writing of the condition as required by 524 CMR 8.02.

(4) All equipment and devices covered by 524 CMR shall meet the requirements of the applicable codes in effect at the time of installation, relocation, major alteration or material change.

EXCEPTIONS: All equipment and devices specifically exempted under the provisions of M.G.L. chs. 288 and 324.

(5) 524 CMR shall become applicable to new and existing installation, a relocation, or material change for which plans and specifications are submitted for approval on or after November 1, 2006.

1.02: Application

The person responsible for the installation, relocation, alteration or material change of any equipment covered by 524 CMR, prior to commencement of such work, shall file an application for permit with the Commonwealth of Massachusetts Department of Public Safety, Elevator Division, accompanied by plans and specifications with sufficient clarity and detail showing: the location of the installation in relation to the building; the location of the machine room and equipment to be installed, relocated or altered; and all structural supporting members thereof, including foundations. Such plans and specifications shall indicate all materials to be employed and all loads to be supported or conveyed and shall be sufficiently complete to illustrate all details of construction and design. The state elevator inspector may waive the requirement for plans for ordinary maintenance or minor repairs.

1.03: Permits

Equipment or devices subject to the provisions of 524 CMR shall not be constructed, installed, relocated or altered unless a permit has been obtained from the Commonwealth of Massachusetts Department of Public Safety, Elevator Division, before the work is commenced. A copy of such permit shall be kept at the site at all times while the work is in progress.

1.04: Tests and Inspections

(1) Acceptance tests and inspections shall be required on all new, relocated, or altered equipment subject to the provisions of 524 CMR. All such tests shall be made in accordance with 524 CMR 8.01.

(2) Annual tests and periodic inspections shall be required on all new and existing equipment covered by 524 CMR, except as otherwise modified by other provisions of 524 CMR or M.G.L. c. 143, § 64.

1.05 Fees

(1) The owner or person in control of a building in which an elevator is operated shall pay fees, as determined by the Commissioner of Administration and Finance pursuant to 801 CMR 4.04, prior to obtaining any inspection, test or permit in accordance with 524 CMR 1.00 *et seq.*

(2) The Department of Public Safety Board of Elevator Regulators (the Board) may reduce fees required under 524 CMR 1.05 upon a showing of medical necessity for residential elevators and lifts which are approved by the Board, and may waive fees required under 524 CMR 1.05 upon a showing of hardship.

(3) An individual or entity may apply to the Board for a reduction or waiver of any fees required under 524 CMR 1.05 on a form provided by the Board. The Board may request any documentation which the Board, at its discretion deems relevant to a showing of medical necessity or hardship. Upon receipt of an application for a reduction or waiver of fees, the Board shall investigate the matter and may:

(a) Schedule a conference with the Applicant to clarify or dispose of any issue the Board, in its discretion, deems necessary;

(b) Grant or deny the application without a hearing and send written notice to the applicant. Any applicant aggrieved by the Board's decision may request an adjudicatory hearing before the Board in accordance with M.G.L. c.30A within 30 days of receipt of the decision;

(c) Commence an adjudicatory hearing in accordance with the provisions of M.G.L. c. 30A and 801 CMR 1.02.

1.06: Certificate of Compliance

The operation of all equipment governed by 524 CMR, and hereafter installed, relocated or altered shall be prohibited by persons other than a licensed installer thereof until such equipment has been inspected and tested as herein required and a final or limited certificate of compliance has been issued by the state elevator inspector.

1.07: Limited Certificate of Compliance

The state elevator inspector is authorized to issue a limited certificate of compliance for any equipment covered by 524 CMR which is hereafter being installed, relocated or altered, to permit its limited use by the person designated therein during the period of such installation, relocation or alteration. Such certificate shall be signed by the state elevator inspector, shall bear the dates of issuance, renewal and/or expiration, and shall designate the class of service allowed.

1.08: Time Limitation

Limited certificates of operation shall be issued for periods of not more than 30 days. The state elevator inspector is authorized to renew the limited certificates of operation for additional periods of not more than 30 days each.

1.09: Owner Responsibility

The owner or the owner's legal agent for the building in which the equipment is located shall be responsible for the care, maintenance and safe operation of all equipment covered by 524 CMR after the installation thereof and its acceptance by such owner or agent. The owner or legal agent shall make or cause to be made all periodic tests and inspections, and shall maintain all equipment in a safe operating condition, as required by 524 CMR and M.G.L. c. 143, § 62A.

REGULATORY AUTHORITY

524 CMR 1.00: M.G.L. c. 143, § 69.

NON-TEXT PAGE

(524 CMR 2.00: RESERVED)

(PAGES 13 AND 14 ARE RESERVED FOR FUTURE USE.)

524 CMR 3.00: ELEVATOR, ESCALATOR, DUMBWAITERS AND MOVING WALKS: DEFINITIONS

In 524 CMR 3.00 the following terms shall have the meanings respectively assigned to them. They are not intended, however, as a complete glossary of terms used in connection with elevator installations.

Alteration. Any change to equipment, including its parts, components, and/or subsystems, other than maintenance, repair, or replacement.

Annunciator: Elevator Car. An elevator car annunciator is an electrical device in the car which indicates the landings at which hall buttons have been pressed.

Bank. A group of elevators sharing the same hoistway or machine room and grouped in series and/or operated by the same dispatching system.

Buffer. A buffer is a device to absorb the impact of the car or counterweight at the extreme limits of travel.

Capacity. The capacity of an elevator is the load which the elevator is designed and equipped to adequately handle as determined by 524 CMR 17.15.

Car Door or Gate. A car door or gate is the door or gate attached to the elevator car which closes the opening regularly used for entrance and exit.

Car Door or Gate Electric Contact. A car door or gate electric contact is a device which opens the operating circuit, or an auxiliary circuit, when the car door or gate is open beyond the closed position and thus prevents operation of the elevator car by the operating devices.

Car, Elevator. An elevator car is the load-carrying unit, including its platform, car frame and enclosure.

Car Enclosure. The car enclosure or cab of an elevator is the enclosure consisting of walls and the top or cover built upon the platform.

Car Frame or Car Sling. A car frame or car sling is the supporting frame to which the car platform upper and lower sets of guide shoes and the hoisting ropes are attached.

Car Platform. The car platform is the structure which forms the floor of the car and which directly supports the load.

Clearance, Bottom Car. Bottom clearance of the elevator car is the clear vertical distance between the underside of the car platform or between the underside of any equipment attached thereto, exclusive of the car frame channels, car safety blocks, guide shoes and any aprons or guards attached to the car sill, and the pit floor when the car rests on the fully compressed buffer.

Clearance, Bottom Counterweight. The bottom clearance of the counter-weight is the vertical distance between the counterweight buffer and its striker plate when the car is level with the top terminal landing.

Clearance, Top Car. Top clearance of the elevator car is the distance the car floor can travel above the level of the upper terminal landing without any part of the car or devices attached thereto coming in contact with the overhead structure.

Clearance, Top Counterweight. Top clearance of the elevator counterweight is the shortest vertical distance between any part of the counterweight structure and the nearest part of the overhead structure or any other obstruction when the car floor is level with the lower terminal landing.

Contract Load. Contract load is the rated capacity in pounds specified in the contract for the purchase of the elevator and in the application for the permit.

3.00: continued

Contract Speed. Contract speed is the speed in feet per minute, specified in the purchase contract or the application for the permit, to be attained by the elevator in the up direction with contract load in the car.

Control. The control of an elevator is a system of regulation by which the starting, stopping, direction of motion, acceleration, speed, and retardation of an elevator are governed.

Generator-field. Generator-field control is a system in which control is primarily accomplished by the use of an individual generator for each elevator, in which the voltage applied to the hoisting motor is adjusted by varying the strength and direction of the generator-field.

Multi-voltage. Multi-voltage control is a system in which control is accomplished primarily by impressing successively on the armature of the hoisting motor a number of substantially fixed voltages such as may be obtained from multi-commutator generators common to a group of elevators.

Rheostatic. Rheostatic control is a system in which control is accomplished primarily by varying resistance or reactance in the armature or field circuit of the hoisting motor.

Two-speed Alternating Current. Two-speed, alternating current elevator control is a control for a two-speed induction elevator motor which is arranged to run at two different, practically constant speeds, by connecting the motor winding so as to obtain different numbers of poles.

Variable Voltage. (Same as Generator-field control.)

Controller, Electric Elevator. An electric elevator controller is a device, or a group of devices, which serves to govern, in some predetermined manner, the electric power delivered to the apparatus to which it is connected.

Decommissioned Equipment. An installation whose power feeds have been disconnected from the mainline disconnect switch and with the provisions of 524 CMR 11.00.

Discharge Tank. A discharge tank used to emit fluid at an adequate flow exclusive of external pressure

Dispatching Device, Automatic. An automatic dispatching device is a device whose principal function is to automatically operate a signal in the car to indicate when the car should leave the terminal.

Door Closer. A door closer is a device, operated by gravity or other means, which will automatically close a door when released by the operator or by suitable automatic means.

Door or Gate Device, Power-operated. A power-operated door or gate device is a device or assemblage of devices, the purpose of which is to open or close the hoistway door or car door or gate by power other than by hand, gravity, springs or the movement or the car.

Door Operator, Elevator Electric. An elevator electric door operator is an electric device for operating the hoistway or car doors, or both.

Dumb-waiter. A dumb-waiter is a hoisting and lowering mechanism equipped with a car which moves in guides in a substantially vertical direction; the floor area of which does not exceed nine square feet, whose total internal car height whether or not provided with fixed or removable shelves does not exceed four feet; the capacity of which does not exceed 500 lbs. and which is used exclusively to transport material in a substantially vertical direction.

Dumb-waiter, Electric. An electric dumb-waiter is one in which the motion of the car is obtained through an electric motor directly applied to the dumb-waiter machinery.

3.00: continued

Elevator. An elevator is a hoisting and lowering mechanism for the transportation of persons or materials, which is equipped with a car or solid level platform moving in guides at an angle of 30° or less from the vertical, which serves two or more fixed landings (including balconies and mezzanines) on the inside or outside of a building or structure, and which shall be enclosed and equipped as required.

Automatic Push Button Electric. An electric automatic push button elevator is one that is started by means of momentary pressure of push buttons at the landings with or without push buttons in the car, and whose landing stops are automatic.

Construction Temporary. An elevator erected for temporary use, built-in or adjoining a building under construction or alteration.

Continuous Pressure. A continuous-pressure electric elevator is one operated by means of push buttons or switches at the landings with or without push buttons in the car which requires a button or switch to be held manually in contact to keep the car in motion.

Electric. An electric elevator is one in which the motion of the car is obtained through an electric motor directly applied to the elevator machinery.

Alternating Current. An alternating current elevator is an electric elevator equipped with an alternating current motor directly applied to the elevator machinery.

Electro-hydraulic. An electro-hydraulic elevator is one in which the lifting of the car is obtained by means of an electric motor driving a pump which pumps liquid directly into the cylinder.

Freight. A freight elevator is an elevator used primarily for carrying freight.

Gravity. A gravity elevator is an elevator in which gravity is the source of power.

Hand. A hand elevator is an elevator driven by manual power.

Hydraulic. A hydraulic elevator is an elevator in which the motion of the car is obtained from liquid under pressure.

Passenger. A passenger elevator is an elevator that is used to carry persons other than the operator and persons necessary for loading and unloading.

Plunger. A plunger elevator is a hydraulic elevator having a ram or plunger directly attached to the under side of the car platform.

Power. A power elevator is an elevator in which the motion of the car is obtained through the application of energy other than by hand or gravity.

Private Residence. A private residence elevator is a passenger elevator serving only a single family, installed in a residential building, and having a contract load not in excess of 700 lbs., and a contract speed not in excess of 50 feet per minute.

Rope Geared Hydraulic. A rope geared hydraulic elevator is one in which the motion of the car is obtained by multiplying the travel of a piston or ram by a system of sheaves over which the hoisting ropes operate.

Self-service. A self-service elevator is one that is started by means of momentary pressure of push buttons at the landings, with or without push buttons in the car, and whose landing stops are automatic. An elevator shall not be deemed to be self-service if an operator has been permanently or regularly assigned to its operation.

Sidewalk. A sidewalk elevator is an elevator the upper hatch opening of which is located either partially or wholly outside the building and which has no opening into the building at its upper terminal landing.

Signal Operation. *See* Operation. Signal

Emergency or Standby Power. A power supply provided from any source other than the normal power supply to operate an elevator in the event of the failure of the normal power supply.

Emergency Release. An emergency release is a device the purpose of which is to make inoperative door or gate electric contacts or door interlocks in case of emergency.

Emergency Stop Switch. A device located as required and readily accessible for operation, which when manually operated, causes the electric power to be removed from the driving-machine motor and brake of an electric elevator; or from the electrically operated valves and pump motor of hydraulic elevator; or of a dumbwaiter; or a material lift.

Escalator. A moving stairway.

3.00: continued

Existing Installation. An existing installation is an elevator or moving stairway, for which a permit was issued for its erection or material change before the issuance of current regulation.

F.P.M. Abbreviation for Feet Per Minute.

Fire Resistive Construction. A method of construction which prevents or retards the passage of hot gases or flames, as defined by fire-resistive rating.

Fire Resistive Rating. The measured time in hours or fractions thereof that the material or construction will withstand fire exposure as determined by the fire tests conducted in conformity to recognized standards.

Fireman Service.

(a) Phase 1, Recall of elevator(s) to an exit floor when smoke is detected in a building or when activated by fire department personnel.

(b) Phase 2, Operation of elevator(s) by fire department personnel during a fire emergency.

Governor. A device that together with the governor rope is designed to set the car safety or counterweight safety at a pre-determined rate of overspeed.

Hoistway. A hoistway is any opening or series of vertical openings in one or more floors of a building through which one elevator or dumb-waiter operates.

Door or Gate. A hoistway door or gate is the hinged or sliding portion of the hoistway enclosure which closes the opening giving access to the elevator or dumb-waiter car at any landing.

Door or Gate, Bi-parting. A bi-parting door or gate is a vertical slide, horizontal slide, or swing door or gate consisting of two or more sections so arranged that the sections, or pairs of sections, open away from each other, and so interconnected that both sections operate simultaneously.

Door or Gate Electric Contact. A device the purpose of which is to open the operating circuit, or an auxiliary circuit, unless the hoistway door or gate at which the car is standing is in the closed position, and thus prevent the operation of the elevator by the operating devices in a direction to move the car away from the landing.

Door or Gate, Full Automatic. A full automatic door or gate is a vertically-moving door or gate which is opened directly by the motion of the elevator car approaching any landing and closed by gravity as the car leaves any landing.

Door or Gate, Manually Operated. A manually operated door or gate is a door or gate which is opened and closed by hand.

Door or Gate, Power-operated. A power-operated door or gate is a door or gate which is opened or closed by power other than by hand, gravity, springs, or the movement of the car, and is further defined as follows:

Power-closed Door or Gate. A power-closed door or gate is a door or gate which is manually opened and is closed by power other than by hand, gravity, springs, or the movement of the car.

Power-opened, Self-closing Door or Gate A power-opened self-closing door or gate is a door or gate which is opened by power other than by hand, gravity, springs, or the movement of the car, and is closed by energy stored during the opening operation.

Power-operated Door or Gate, Automatically Opened. A power-operated door or gate, automatically opened, is a door or gate which is opened other than by hand, gravity, springs, or the movement of the car, the opening of the door being initiated by the arrival of the car at or near the landing. The closing of such door or gate may be under the control of the elevator operator or may be automatic.

Power-operated Door or Gate Manually Controlled. A power-operated door or gate, manually controlled, is a door or gate which is opened by power other than by hand, gravity, springs, or the movement of the car, the door movement in each direction being controlled by the operator.

Self-closing Door or Gate. A self-closing door or gate is a door or gate which is opened manually and closes when released.

3.00: continued

Door Interlock. A hoistway door interlock is a device, the purpose of which is:

(a) To prevent the operation of the elevator machine by the operating devices in a direction to move the car away from a landing unless the hoistway door at that landing at which the which the car is stopping or is at rest is locked in the closed position.

(b) To prevent the opening of the hoistway door from the landing side; unless the car is at rest within the landing zone, or is coasting through the landing zone with its operating device in the stop position.

Elevator or Dumb-waiter. A shaftway for the travel of one or more elevators or dumb-waiters. It includes the pit and terminates at the underside of the overhead machinery space floor or grating, or at the underside of the roof where the hoistway does not penetrate the roof.

Enclosures. The fixed structure consisting of vertical walls or partitions which isolates the hoistway from all other parts of the building or from an adjacent hoistway and in which the hoistway doors and door assemblies are installed.

Inching Device. An inching device is a set of "up" and "down" continuous-pressure buttons located on the car arranged to permit the manual operation of the car when within the inching zone toward the landing level where the landing doors, or gates, or the car doors or gates, are not in the locked or closed position.

Inching Zone. A car is considered as being within the inching zone when the car is eight inches below any landing, or eight inches above any landing.

NOTE: Where controlled by the operator by means of up-down continuous pressure switches in the car, this device is known as an "inching" device. Where used with a hydraulic elevator to correct automatically a change in the car level by leakage in the hydraulic system, this device is known as an "anti-creep" device.

Multiple. A hoistway for more than one elevator or dumbwaiter.

Single. A hoistway for a single elevator or dumb-waiter

Unit System is an interlock system which, in addition to fulfilling the requirements given under the definition of interlock, will also prevent the operation of the car by the operating devices unless all hoistway doors are locked in the closed position.

In Car Stop Switch. A device located in the car and accessible for operation by elevator personnel only, which when manually operated causes the electric power to be removed from the driving-machine and brake of an electric elevator or from the electrically operated valves and pump motor of a hydraulic elevator.

Landing, Elevator. An elevator landing is that portion of a floor, balcony, or platform used to receive and discharge passengers or freight.

Landing Zone. A zone extending from a point 18 inches below an elevator or material lift landing to a point 18 inches above the landing.

Leveling Device. A car-leveling device is any mechanism or control which will automatically move the car within a limited zone toward, and stop the car, at the landing.

Machine, Elevator. An elevator machine is the machinery and its equipment used in raising and lowering the elevator car or platform, and is further defined as follows:

Chain-driven. A chain-driven elevator machine is an elevator machine connected to a reversible motor, engine, or turbine by a chain.

Direct-drive. A direct-drive machine is one in which the driving motor is connected directly to the driving sheave or drum with or without intermediate mechanism or gears.

Single-belted. A single-belted elevator machine is an elevator machine connected to a reversible motor, engine or turbine by a belt.

Double Belted. A double-belted elevator machine is an elevator connected to a non-reversible prime mover by two belts through which the direction of motion is changed.

Spur-geared. A spur-geared machine is one in which power is transmitted to the driving sheaves or drum through spur gearing.

Traction. A traction machine is an elevator machine in which the motion of the car is obtained through friction between the hoisting ropes and the traction sheave.

Geared-traction. A geared-traction machine is a traction machine which employs gearing between the electric motor and the traction sheave.

3.00: continued

Gearless-traction. A gearless-traction machine is a traction machine which has the traction sheave and the brake drum mounted directly on the electric motor shaft.

Winding-drum. A winding-drum machine is an elevator machine in which the ropes are fastened to and wind on a drum.

Worm-geared. A worm-geared machine is one in which the power is transmitted to the driving sheaves or drum through worm gearing.

Maintenance. A process of routine examination, lubrication, cleaning and adjustment of parts, components, and/or subsystems for the purpose of ensuring performance in accordance with the applicable Code requirements. (*See* also Repair and Replacement.)

Material Change. The following shall be considered material changes:

(a) if the speed of an existing elevator is increased;
(b) if the capacity of an existing elevator is increased;
(c) if the travel of an existing elevator is extended;
(d) if the machine room of an existing elevator is relocated;
(e) if the classification of an elevator is changed from freight to passenger.

Moving Stairway. A moving stairway is a moving inclined continuous stairway or runway used for raising or lowering persons.

New Installation. A new installation is one for which application for approval of plans or a permit for construction is filed to be made under the provisions of 524 CMR 35.00, or for an installation which is re-located, or which is materially changed.

Non-stop Switch, Elevator. A non-stop switch is a switch which when thrown will prevent the elevator from making hall stops and will automatically transfer these hall stop signals to the next car following, or, where no other car is provided, hold the floor stop calls registered until the elevator answers them.

Oil Buffer Stroke. The stroke of an oil buffer is the oil-displacing movement of the buffer plunger or piston, and does not include the travel of the buffer plunger accelerating device.

Operating Devices. The operating device is the car switch push button, or other device employed to enable the operator to actuate the controller.

Operation. Operation is the method of actuating the controller by the operating devices.

Automatic Operation wherein the starting of the elevator is effected in response to the momentary actuation of the operating devices at the landing, and/or of operating devices in the car identified with the landings, and/or in response to an automatic starting mechanism, and wherein the car is stopped automatically at the landings.

Non-selective Collective Automatic. Non-selective collective automatic operation is automatic operation by means of one button in the car for each landing level served and one button at each landing, wherein all stops registered by the momentary pressure of landing or car buttons are made irrespective of the number of buttons pressed or of the sequence in which the buttons are pressed. With this type of operation the car stops at all landings for which buttons have been pressed, making the stops in the order in which the landings are reached after the buttons have been pressed but irrespective of its direction of travel.

Selective Collective Automatic. Selective collective automatic operation is automatic operation by means of one button in the car for each landing level served and by "up" and "down" buttons at the landings, wherein all stops registered by the momentary pressure of the car buttons are made as defined under non-selective collective automatic operation, but wherein the stops registered by the momentary pressure of the landing buttons are made in the order in which the landings are reached in each direction of travel after the buttons have been pressed. With this type of operation, all "up" landing calls are answered when the car is traveling in the "up" direction and all "down" landing calls are answered when the car is traveling in the "down" direction, except in the case of the uppermost or lowermost calls, which are answered as soon as they are reached, irrespective of the direction of travel of the car.

3.00: continued

Single Automatic. Single automatic operation is automatic operation by means of one button in the car for each landing level served and one button on each landing, so arranged that if any car or landing button has been pressed the pressure of any other car or landing operating button will have no effect on the operation of the car until the response to the first button has been completed.

Car-switch. Car-switch operation is operation wherein the starting, direction of motion, and the stopping of the car are directly and solely under the control of the operator by means of a self-centering switch or by constant pressure buttons in the car.

Car-switch Automatic Floor-stop. Car-switch automatic floor-stop operation is operation in which the stop is initiated by the operator from within the car with a definite reference to the landing at which it is desired to stop, after which the slowing down and stopping of the elevator is automatically effected.

Continuous Pressure. Continuous pressure operation is operation by means of push buttons or switches at landings with or without buttons in the car; any one of which may be used to control a movement of the car so long as the button or switch is manually held in the operating position.

Dual. Dual operation is a system of operation whereby the controller of an automatic operation elevator is arranged so that on the throwing of a transfer switch the starting of the car is solely under the control of an operator in the car. Landing stops may be either automatic or under the control of the operator.

Pre-register. Pre-register operation is operation in which signals to stop are registered in advance by buttons in the car and at the landings. At the proper point in the car travel the operator in the car is notified by a signal, visual, audible, or otherwise, to initiate the stop, after which the landing stop is automatic.

Signal. Signal operation is operation by means of single buttons or switches, or both, in the car, and up or down direction buttons, or both, at the landings, by which predetermined landing stops may be set up or registered for an elevator or for a group of elevators. The stops set up by the momentary pressure of the car buttons are made automatically in succession as the car reaches these landings, irrespective of its direction of travel or the sequence in which the buttons are pressed. The stops set up by the momentary pressure of the up and down buttons at the landing are made automatically by the first available car in the group approaching the landing in the corresponding direction, irrespective of the sequence in which the buttons are pressed. With this type of operation, the car can be started only by means of a starting switch or button in the car.

Out of Service Equipment. All elevators, dumbwaiters, or material lifts, electric or hydraulic, placed out of service for a period of less than one year, shall comply with the provisions of 524 CMR 11.00.

Overhead Structure. The overhead structure is all the structure and platforms which support the elevator equipment at the top of the hoistway.

Overtravel, Bottom. Bottom overtravel of the elevator car is the distance the car floor can travel below the level of the lower terminal landing until the weight of the fully loaded car rests on the buffers, and includes the resulting buffer compression. Bottom overtravel of the counterweight is the distance the counterweight can travel below its position when the car platform is level with the upper terminal landing until the full weight of the counterweight rests on the buffers, and includes the resulting buffer compression.

Overtravel, Top. Top overtravel of the elevator car is the distance the car floor can travel above the level of the upper terminal landing until the counterweight buffer is fully compressed.

Panelboard. A single panel or a group of panel units designed for assembly in the form of a single panel; including buses, and with or without switches and/or automatic overcurrent protective devices for the control of light, heat or power circuits of small individual as well as aggregate capacity; designed to be placed in a cabinet or cutout box placed in or against a wall or partition and accessible only from the front. (*See* Switchboard.)

3.00: continued

Position Indicator. A position indicator is a device which indicates the position of the elevator car in the hoistway. It is called a hall position indicator when placed in the hall or a car position indicator when placed in the car.

Potential Switch, Elevator. An elevator potential switch is a magnetic-type switch which disconnects the power from the elevator apparatus when the supply voltage fails or decreases below a definite value and which is usually opened by various electrical safety devices.

Pressure Tank. A pressure Tank where the fluid pressure is obtained by electrical or mechanical force by admitting steam, air or other gas, to the tank.

Rated Load. The load at which the elevator, dumbwaiter, escalator or private residence inclined lift is designed and installed to lift at the rated speed.

Rated Speed The speed at which the elevator, dumbwaiter, escalator or private residence inclined lift is designed to operate under the following conditions:

(a) Elevator or Dumbwaiter - The speed in the up direction with rated load in the car.

(b) Escalators, Private Residence Inclined Power and Passenger Lifts, Stairway Inclined Lifts, or Chair Devices - The rate of travel of the steps or carriage, measured along the angle of inclination, with rated load on the steps or carriage. In the case of a reversible escalator, the rated speed shall be the rate of travel of the steps in the up direction, measured along the angle of inclination, with rated load on the steps.

Repair. Reconditioning or renewal of parts, components and/or subsystems necessary to keep equipment in compliance with applicable Code requirements. (*See* also Maintenance and Replacement.)

Replacement. The substitution of a device or component and/or subsystems, in the entirety with a unit that is basically the same as the original for the performance in compliance with applicable Code requirements. (*See* also Replacement and Maintenance.)

Runby, Top. The top runby of the elevator car is the distance the car floor can travel above the level of the upper terminal landing until the counterweight strikes the counterweight buffer.

Safety Bulkhead. A closure at the bottom of the cylinder located above the cylinder head and provided with an orifice for controlling the loss of fluid in the event of cylinder head failure.

Safety, Car or Counterweight. A car or counterweight safety is a mechanical device attached to the car or counterweight frame to stop and hold the car or counterweight in case of predetermined overspeed, free fall, or through slackening of the ropes.

Safety Plank. A safety plank is the lower structural member of the car frame which supports the car platform and includes the car safety, its actuating mechanism and the lower set of guide shoes.

Shutdown Device, Elevator Automatic. An elevator automatic shutdown device is one that automatically disconnects the elevator apparatus, usually the motor-generator set, after the elevator has remained stopped for a definite time interval, which time interval may be adjustable.

Signal Button, Elevator Hall. An elevator hall signal button is a push button placed in the elevator hallways, by momentary pressure of which a stop signal is registered in the car.

Signal Device, Elevator Car Flash. An elevator car flash signal device is one providing a signal light in the car, which is illuminated when approaching the landings at which hall buttons have been pressed.

Signal System, Elevator Separate. An elevator separate signal system is one providing push buttons in the hallways, which, when momentarily pressed by a person desiring elevator service, indicate in the car where the operator is to stop, by illuminating a flash signal or operating an annunciator.

3.00: continued

Signal Transfer Device, Elevator Automatic. An elevator automatic signal transfer device is one used with manually operated elevators, by means of which the signal is automatically transferred to the next car following, in case a car passes a set signal without making a stop.

Signal Transfer Switch. A signal transfer switch is a switch in the car which may be thrown by the operator when the car is filled or when, for some other reason, it is desirable to pass a signal, and which thereby transfers the signal to the next car approaching in the same direction.

Slack-rope Switch, Elevator. An elevator slack-rope switch is a device for automatically cutting off the power in case the hoisting ropes become slack.

Starter's Panel, Elevator. An elevator starter's panel is an assembly of devices by means of which the starter is kept informed of the condition of the elevator service. This panel is generally located in the elevator hallway on the main entrance level.

Stroke of Oil Buffer. *See* Oil Buffer Stroke.

Switchboard. A large single panel, frame or assembly of panels, on which are mounted, on the face or back, or both, switches, overcurrent and other protective devices, buses and usually instruments. Switchboards are generally accessible from the rear as well as from the front and are not intended to be installed in cabinets. (*See* Panelboard.)

Terminal Stopping Device, Final. A final terminal stopping device is an automatic device for stopping the car and counterweight from contract speed, within the top clearance and bottom overtravel, independently of the operation of the normal terminal stopping device and the operating device.

Terminal Stopping Device, Normal. A normal terminal stopping device is an automatic device for stopping the elevator car at or near the terminal landings, independently of the operation of the operating device and the final terminal stopping devices.

Travel. The travel, or rise, of an elevator or dumb-waiter is the vertical distance between the bottom terminal landing and the top terminal landing.

Traveling Cable. An electric traveling cable is a cable made up of electric conductors, which provides electrical connection between the car and the stationary apparatus.

Undercounter Dumbwaiter. One which has the terminal landing located beneath a counter and which serves only this landing and the bottom terminal landing.

Valve, Overspeed. A device installed in the pressure piping of a hydraulic elevator, between the hydraulic machine and the hydraulic jack, which restricts and ceases oil flow from the hydraulic jack through the pressure piping when such flow exceeds a preset value. This device is also known as a rupture valve or safety valve.

Waiting Passenger Indicator. A waiting passenger indicator is an indicator which shows, for a single elevator or a group of elevators, where and for which direction hall buttons have been pressed and also indicates when these calls have been answered. This indicator is usually located at the main lobby floor where it may be seen by the starter.

Working Pressure. The pressure measured at the cylinder of a hydraulic elevator when lifting the car and its rated load at rated speed.

REGULATORY AUTHORITY

524 CMR 3.00: M.G.L. c. 143, § 69.

NON-TEXT PAGE

(524 CMR 4.00 THROUGH 6.00: RESERVED)

(PAGES 27 THROUGH 40 ARE RESERVED FOR FUTURE USE.)

524 CMR 7.00: MISCELLANEOUS REGULATIONS

Section

7.01: Miscellaneous Regulations
7.02: Registration Numbers
7.03: Reference to Other Applicable Laws or Regulatory Codes
7.04: Inspection Certificates

7.01: Miscellaneous Regulations

(1) Maintenance of Equipment. It shall be the duty of the owner to maintain in proper working order all parts of the elevator installations and to keep them in compliance with 524 CMR

(2) Welding. Welding of parts upon which safe operation of all equipment referenced in 524 CMR shall be done by qualified welders; and all work upon completion shall be approved by the enforcing authority before the elevator, escalator, dumbwaiter, etc. is placed in service. The welders may be qualified by one of the following:

(a) by the manufacturer,
(b) by a professional consulting engineer,
(c) by a recognized testing laboratory.

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

(3) Cleaning and Inspecting Tanks. Pressure and discharge tanks of hydraulic elevators thoroughly cleaned and inspected at least once in every two years. Pressure tanks shall be painted inside at least once every two years.

(4) Testing Relief Valves. Relief valves on hydraulic elevator pumps shall be tested not less than once each year.

(5) Hoistway Pits. Elevator hoistways and pits shall be kept clean and dry, and shall not be used for storage.

(6) Machine Rooms and Car Tops. The top or cover of an elevator car shall be kept unobstructed. Entrances to hoistways and machine rooms shall be kept clear and accessible at all times.

(7) Hoistway Covers. No hoistway cover shall be used as a thoroughfare or passage unless the elevator is of the sidewalk type.

(8) Signs in Freight Elevators. Freight elevators shall have legible signs posted on each car and at each landing, prohibiting unauthorized persons from riding on or operating the elevator car.

(9) Piston Rods. Piston rods in tension of hydraulic elevators shall be exposed for inspection at least once in every five years.

7.02: Registration Numbers

(1) To provide a uniform system of identification, of all elevators, dumbwaiters, moving stairways and other permanently installed equipment that is subject to 524 CMR a permanent registration number shall be issued by the Elevator Section, Division of Inspection, Department of Public Safety. This number shall be noted on the approved layout or drawings and on all other documents pertaining to the unit during its life, *e.g.* data, records, permit applications, operating certificates, accident reports, decommissioning records.

(2) A permanent record of the assigned registration numbers shall be maintained by the Elevator Section as directed by the Commissioner.

(3) Registration numbers shall be permanently affixed/attached to all the following:

(a) Car crosshead front and center so as to be visible when the hoistway door is opened;
(b) Machine, pump unit or drive unit;

7.02: continued

(c) On the certificate.
(d) The number shall also be affixed to the main line disconnect switch.
(e) Escalators, the plate shall be located near the handrail entrance brush on the side of the unit containing the stop/start section at each end of the unit and on the disconnect switch, controller or machine.

(4) Registration numbers shall be a minimum of ½" in height and of a contrasting color from the background color on which it is applied or mounted. This identification number shall be applied in the form of a metal or plastic plate only.

(5) Existing Elevator Equipment. All permit applications for the required annual safety test shall be posted with the permanent registration number to be assigned to the unit. The inspector shall also note the registration number on the operating certificate before it is issued. The elevator firm conducting the annual safety test for the inspector having jurisdiction shall post the registration numbers on the equipment as provided in 524 CMR 7.02(3) as directed by the inspector.

(6) Only one registration number shall be assigned to each elevator.

(7) Permanent registration numbers shall not be assigned to builders' elevators installed under 524 CMR 25.00 or to temporary workmen's elevators installed under 524 CMR 28.00.

7.03: References to Other Applicable Laws or Regulatory Codes

M.G.L. c. 143, §§ 62 through 71G.

St. 1962, c. 288 and St. 1980, c. 324.

521 CMR (Architectural Access Regulations)

527 CMR (Massachusetts Electrical Code)

780 CMR (Massachusetts State Building Code)

ASME A17.1 (Safety Code for Elevators and Escalators)

N.F.P.A. 130 (Fixed Guideway Transit Systems)

7.04: Inspection Certificates

The certificate of inspection when issued shall be posted in the elevator car or the main floor lobby of the building in which the elevator is located. When posted in the lobby the certificate and the elevator it applies too must be identified. The certificate shall be posted in a vandal resistant frame.

REGULATORY AUTHORITY

524 CMR 7.00: M.G.L. c. 143, § 69.

524 CMR 8.00: PRACTICAL TESTS AND INSPECTIONS

Section

8.01: Practical Tests and Inspections
8.02: Unsafe or Non-compliance Conditions
8.03: Power to Seal Equipment
8.04: Notice of Sealing Out of Service
8.05: Unlawful to Remove Seal

8.01: Practical Tests and Inspections

A practical test of all equipment governed by 524 CMR as required by M.G.L. c. 143, § 64, shall consist of the following:

(1) The initial "Acceptance Test" and subsequent annual tests and/or inspections shall be made of all equipment under the supervision of the state elevator inspector. Such tests shall conform to the following Acceptance Test: A contract load test at governing tripping speed where applicable shall be made for all new installations.

(2) Prior to returning to service any equipment which has undergone a major alteration, material change, or which has been placed out of service due to non-use, accident or a cause of injury, or at the discretion of the state elevator inspector.

(3) Subsequent Tests: A safety test with no contract-load shall be made in the presence of the state elevator inspector, once a year, or as otherwise specified by other sections of 524CMR or M.G.L. c. 143, § 64 of all safety devices and equipment to determine that they function as required by the applicable codes. It is further required that every fifth year a full-load safety test be conducted in the presence of the state elevator inspector. (Refer to 524 CMR 11.00 for elevators placed out of service.)

(4) Car and counterweight safeties and governors shall be tested as follows: Governor operated instantaneous type safeties or sliding type safeties of elevators shall be tested at rated speed by tripping the governor by hand. The governor shall be separately tested for tripping speed.

(5) Each governor shall be sealed directly after testing by the state elevator inspector conducting the test. No person other than a state elevator inspector, shall break or remove the seal.

(6) The application of a safety having no speed governor shall be obtained by a free drop test which may be made without detaching the ropes.

(7) Car and counterweight oil buffers, if any, shall be tested annually with no load on the platform at rated car speed, and with a full contract load every fifth year.

(8) Contract load test for hydraulic elevators: A contract load test under the supervision of the state elevator inspector shall be made of every hydraulic elevator or dumbwaiter before the equipment is placed in regular service.

(a) The test shall be made with no load and a test with full rated load on the car in order to determine the car speed under each specified condition of loading in both the up and down directions.

(b) A test check of the working pressure including, in case of pressure tanks, a check of the accuracy of the tank pressure gauge.

(c) A test of the relief valve by-pass pressure shall be made in accordance 524 CMR 17.23(6).

(d) After the test of the relief valve setting and system pressure test, the following test shall be performed and witnessed by a Massachusetts licensed elevator inspector employed by the Department of Public Safety. Cylinders that are not exposed shall be tested as follows:

1. Note the amount of oil in the pit and seal leak collection container.
2. Park the elevator at a convenient location and open the main line disconnect.
3. Mark the level of the oil in the tank.
4. Wait at least 15 minutes and measure the amount that the car has moved down.

8.01: continued

5. Compute the volume of oil loss as a result of the car movement as follows:
   $V = 3.1416 \times R^2 \times L$
   Where:
   V = volume of oil in cubic inches
   R = radius of plunger (in.)
   L = movement of car (in.)
6. Compare this to the change in volume in the pit seal collection container and the tank.
   Example: 1 = 7", Plunger diameter = 6"
   $V = 3.1416 \times 9 \times 7 = 198\ in^3$
   (Note: $231\ in^3 = 1$ U.S. gallon)
7. If necessary, continue the test to verify the source of the leak.
8. If it is determined that a leak exists underground, the unit should immediately be taken out of service.

(9) All private residence elevators governed by 524 CMR 23.00 and 35.00 shall be tested and inspected every five years. A test with a capacity load will be performed during each test.

(10) All escalators will be tested with contract load at the time of acceptance and will have a brake data plate installed. All escalators with brake date plates may be tested thereafter by verifying the brake torque. If the environment in which a unit is operating makes the stopping capability of the brake questionable, a weight test will be used to reconfirm the torque setting of the brake.

(11) All existing escalators without brake data plates or units with more than one driving machine will be tested with contract load at five year intervals and whenever the stopping capability of the brake is questionable.

(12) All escalators will require annually a step/skirt performance index test complying with A17.1-2000 Section 8.6.8.3, and will have up to one year from the date of the citation to be in compliance.

8.02: Unsafe or Non-compliance Conditions

If upon inspection any equipment covered by 524 CMR is found in an unsafe condition, or not in accordance with the provisions of 524 CMR in effect at the time of its installation, the state elevator inspector shall thereupon serve a written notice upon the building owner or lessee, citing the section of 524 CMR of which said equipment is in violation, stating the action required to bring the equipment into compliance, and the date when recommended repairs or changes shall be completed. After the service of such notice, it shall be the duty of the owner to proceed within the time allowed to make such to make such repairs as are necessary to place the equipment in a safe condition. It shall be unlawful to operate such equipment after the date stated in the notice unless such recommended repairs or changes have been made and the equipment has been approved, or unless an extension of time has been secured from the state elevator inspector in writing.

8.03: Power to Seal Equipment

The state elevator inspector in addition to any other penalties herein provided, shall have the power to seal out of service any device or equipment under his jurisdiction, covered by 524 CMR when in the case of emergency in the opinion of the state elevator inspector, such device is in a condition to render it unsafe for operation; or for willful failure to comply with 524 CMR.

8.04: Notice of Sealing Out of Service

Before sealing any device out of service, the state elevator inspector, except in the case of emergency, shall serve written notice upon the building owner or lessee stating intention to seal the equipment out of service and the reasons therefore.

8.05: Unlawful to Remove Seal

Any device sealed out of service by the state elevator inspector shall be plainly marked with a sign or tag indicating the reason for such sealing. Any tampering with, concealing, defacing, or removal of the sign tag or seal without approval of the state elevator inspector shall constitute a violation 524 CMR.

REGULATORY AUTHORITY

524 CMR 8.00: M.G.L. c. 143, § 69.

NON-TEXT PAGE

524 CMR 9.00: OPERATION OF ELEVATORS

Section

9.01: Licensed Operators: General
9.02: Granting of Licenses
9.03: Display of Licenses
9.04: Revocation and Suspension of Licenses
9.05: Instructions to Operators

9.01: Licensed Operators: General

No Person, Owner, Lessee, Employer or His Agent Shall Operate or Permit to be operated Any Non-Automatic Elevator Except By A Person Duly Licensed For Such Service By The Commissioner Of Public Safety, except:

(1) In case of emergency, such operation by a competent unlicensed person may be permitted for a period not exceeding two consecutive days, provided the Department of Public Safety is immediately notified. Such periods may be extended by the department where necessary to avoid undue hardship, but no single extension shall exceed a period of more than seven consecutive days.

(2) Licensed operators are not required for automatic operation or continuous pressure operation passenger or freight elevators or existing shipper rope elevators, when equipped with the proper safeguards. Where an operator has been designated to be in permanent charge of such elevators or where a car switch is employed, said operator shall be licensed.

(3) An operator's license shall not be required of an elevator contractor or of a qualified mechanic engaged in the construction, maintenance, or repair of elevators or elevator hoistways, or of an inspector having authority to inspect elevators.

9.02: Granting of Licenses

(1) Whoever desires to act as operator of elevators herein required to be operated by a licensed person shall make application to the department on blanks to be furnished by the said department. A license shall not be granted to a person under 18 years of age.

(2) The applicant shall be given a practical examination as to his knowledge of the operation of elevators, particularly as to the safeguarding of passengers and the requirements of 524 CMR 9.00, by an inspector or examiner having jurisdiction, and if found competent shall be granted a license by the executive head of the department. Such executive head may, however, delegate the power to grant licenses to any inspector of the department having jurisdiction.

(3) Licenses shall be issued until the date of birth of the licensee occurring more than 12 months but not more than 24 months after the effective date of such license. If any such license or the renewal thereof expires in an even year, any subsequent renewal shall expire on the next anniversary of the licensee's date of birth occurring in an even year. If any such license or renewal thereof expires in an odd year, any subsequent renewal shall expire on the next anniversary of the licensee's date of birth occurring in an odd year. A license issued to a person born on February 29th shall, for the purposes of 524 CMR 9.02(3), expire on March first. If a license has not been renewed within three years from the date of issuance, a re-examination shall be required.

(4) Should a license become lost, a duplicate thereof shall be granted upon application to the department granting the original license.

(5) The applications and a record of the licenses issued shall be kept by such department.

9.03: Display of Licenses

A licensed operator shall at all times when operating an elevator be prepared to display his license on demand of the owner or tenant of the building, or of any person authorized to inspect the elevator, or of any police officer.

9.04: Revocation and Suspension of Licenses

(1) A willful falsification in the matter of a statement in an application shall be deemed sufficient cause for the revocation at any time of a license granted on said application.

(2) A license may be suspended or revoked by the Commissioner, if the holder is incompetent or untrustworthy or fails to comply with 524 CMR 21.04.

9.05: Instructions to Operators

Learn These Instructions Thoroughly and Keep a Copy Available For Use At All Times.

(1) Always open the service switch or lock the operating mechanism when placing the elevator out of service.

(2) Be sure the operating mechanism is in the "STOP" position before closing the service switch.

(3) Report any defects promptly to the person in charge.

(4) Do not attempt to make any repairs.

(5) Carry no passengers or freight while inspections, repairs, or adjustments are in progress, and operate the car only in response to directions from the inspector or person in charge. Do not move the car when anyone is in the pit or on top of the car except as he may direct.

(6) When in the opinion of the operator an excess load is to be carried, do not ride or allow others to ride on the elevator.

(7) Hoistway doors or gates shall always be closed and locked before the car is started. The car shall be brought to a stop at the landing level before either the car door or car gate where provided or the hoist way door or hoistway gate is opened manually.

(8) Keep car gates closed while car is running, and where no car gates are provided, keep passengers away from the open edge of the car platform.

(9) Limit the number of passengers or load to the contract capacity of the car and do not permit crowding or overloading.

(10) Do not reverse the operating device suddenly; stop the car before reversing.

(11) Move operating device to the stop position on approaching the terminal landings. Do not depend on the terminal stops in the ordinary operation of the car.

(12) Should the power go off while the car is in motion, move the operating device to the "STOP" position and start the car in the usual manner upon return of the power.

(13) Familiarize yourself with the emergency devices, understand their function, and know how to operate them.

(14) Should the car stop suddenly, shut off the power, call for the person in charge and operate the elevator only at their direction. While waiting, keep calm. Do not attempt to release any safety device; remember that it is safer to stay in the car until help arrives than to try to get out, and so instruct your passengers.

9.04: continued

(15) Should the car refuse to stop, do not attempt to jump off.

(16) Before loading or unloading elevators with hand-rope type operation, lock the operating mechanism in the "STOP" position.

(17) Never leave the car in the ordinary course of operation nor leave the operating mechanism unprotected. When going off duty for any reason, even for a few minutes, be sure that the power is disconnected or that the operating mechanism is locked and the hoistway doors are closed.

(18) Always leave a hydraulic elevator operated by a lever at the lower landing with the lever in the position for down motion.

(19) In running a belt-driven elevator, be sure to pull the hand-rope as far as possible when starting the car. In doing so, you throw the belt full on the tight pulley, and thus prevent it from slipping. In stopping, use the centering rope.

(20) Never allow anyone to scuffle or fool on the elevator. It is always dangerous.

(21) Never, under any condition, allow anyone to get on or off the car while it is in motion.

(22) Keep your mind on your work. Always remain at your post while the car is moving, so that you can stop it quickly in an emergency.

(23) If an accident causing material damage or injury to a person by an elevator, escalator, dumb-waiter, or other devices governed by 524 CMR, requires medical attention, the person having knowledge of the accident, be he the owner, lessee, operator, or other person in charge, shall immediately report such accident to the inspector having jurisdiction, who shall forthwith inspect such elevator or devices herein described. Said inspector shall file a complete written report of his inspection with the Commissioner of Public Safety.

REGULATORY AUTHORITY

524 CMR 9.00: M.G.L. c. 143, § 69.

NON-TEXT PAGE

524 CMR 10.00: ALTERATIONS OF ELEVATORS

Section

10.01: Alterations of Elevators, Escalators and Dumbwaiters Requiring a Permit
10.02: Alteration of Elevators, Escalators and Dumbwaiters Requiring a Permit and Test

10.01: Alterations of Elevators, Escalators and Dumbwaiters Requiring a Permit

The following alterations, repairs and replacement of any equipment governed by 524 CMR shall be considered an alteration and shall only be performed by persons with a Massachusetts Elevator License as a construction, maintenance or repair mechanic in accordance with M.G.L. c. 143, § 71B. Such alterations, repairs or replacement shall also require a permit to be filed with the Commonwealth of Massachusetts, Department of Public Safety, Elevator Division.

(1) Replacement of ropes, or addition of rope equalizers, or rope fastening devices.

(2) Change in guide rails.

(3) Replacement of hoistway doors.

(4) Addition of hoistway locking devices and car door or gate electric contacts.

(5) Addition of or change in hoistway door and/or car door operating devices.

(6) Addition of roller guide shoes.

(7) Ventilation of hoistways and machinery spaces.

(8) Addition to or replacement of car enclosures, or addition or replacement of car and hall fixtures.

(9) Decommissioning of Elevator or Escalators in accordance with 524 CMR 11.02.

10.02: Alteration of Elevators, Escalators and Dumbwaiters Requiring a Permit and Test

The following alterations, repairs and replacement of any equipment governed by 524 CMR shall be considered an alteration and in addition requiring a permit to be filed with the Commonwealth of Massachusetts, Department of Public Safety, Elevator Division, and being performed by persons with a Massachusetts Elevator License as a construction, maintenance or repair mechanic in accordance with M.G.L. c. 143, § 71B, shall also require a subsequent test witnessed by a Massachusetts licensed elevator inspector employed by the Department of Public Safety as listed under 524 CMR 8.01(2).

(1) Increase in dead weight of car.

(2) Increase in dead weight of counterweight.

(3) Change in type of operation or control.

(4) Replacement of or change in type of car or counterweight safety.

(5) Replacement of driving machine by a new machine.

(6) Replacement of existing controller to a new controller.

(7) Replacement of existing machine brake to a new brake.

(8) Addition of hoistway access switches and/or car top operating devices

10.02: continued

(9) Addition of car-leveling or truck zoning devices.

(10) Change in type of car loading classes A, B, C.

(11) Installation, additions or alterations of fire emergency controls.

(12) Replacement of any hydraulic control valves.

(13) Replacement of hydraulic plungers, cylinders or complete jack units.

REGULATORY AUTHORITY

524 CMR 10.00: M.G.L. c. 143, § 69.

524 CMR 11.00: ELEVATORS PLACED OUT OF SERVICE

Section

11.01: Elevators Placed Out of Service
11.02: Decommissioned Equipment

11.01: Elevators Placed Out of Service

All elevators, escalators, and dumbwaiters placed out of active service for a period not exceeding one year shall comply with the following:

(1) The owner or his agent shall notify the Department of Public Safety Elevator Division in writing, giving the date when the elevator, escalator, or dumbwaiter will be placed out of service, the reason for removal from service and the date of return to service. A current Inspection Certificate shall be required when placing it back in service during that year.

(2) The elevator main line disconnects shall be secured in an off position with the fuses removed.

11.02: Decommissioned Equipment

All elevators, escalators, and dumbwaiters place out of active service for a period exceeding one year shall comply with the following:

(1) The owner or his agent shall notify the Department of Public Safety Elevator Division in writing giving the date the elevator or dumbwaiter will be decommissioned. A decommissioning permit shall be required.

(2) The car and counterweight shall be lowered to the lowest landing.

(3) All ropes removed.

(4) Main line fuses removed.

(5) Service switch opened and the cabinet sealed with a padlock.

(6) Where landing doors remain in place, the doors shall be bolted securely in the closed position from the hoistway side.

(7) When landing gates are in place, the landing openings shall be totally enclosed and strongly reinforced.
EXCEPTION: The lowest landing door shall be locked from the landing side.

(8) Hydraulic Decommissioning. When a hydraulic elevator is decommissioned the oil pipe line from the hoistway to the power unit, and the oil in the tank will be removed from the premises. The supply wires shall be disconnected at the main line switch and at the power unit.

(9) Moving Stairway Decommissioning. Any moving stairway which is permanently removed from service shall have the electrical power supply disconnected by removing the fuses and disconnecting the wiring on the load side of the disconnect switch.
A permanent barricade shall be erected at each landing of said stairway to prevent access.

(10) Placing Back in Service. Any decommissioned elevator, dumbwaiter or moving stairway placed back in service shall meet the minimum requirements of 524 CMR 17.00 or 22.00 as of March 9, 1950. If the original installation of the equipment was after that date, it shall meet the requirements of 524 CMR in effect at the time of installation.

REGULATORY AUTHORITY

524 CMR 11.00: M.G.L. c. 143, § 69.

NON-TEXT PAGE

(524 CMR 12.00 THROUGH 14.00: RESERVED)

(PAGES 55 THROUGH 70 ARE RESERVED FOR FUTURE USE.)

524 CMR 15.00: ELEVATOR, DUMBWAITER, ESCALATOR AND MOVING WALK: GENERAL

Section

15.01: Elevator, Dumbwaiter, Escalator and Moving Walk Regulations: General
15.02: Age Requirement
15.03: Increase in Dead Weight

15.01: Elevator, Dumbwaiter, Escalator, and Moving Walk Regulations: General

(1) Pursuant to the provisions of M.G.L. c. 143, § 69, the Board of Elevator Regulations herewith amends existing regulations 524 CMR 1.00 through 35.00 for the construction of elevators, dumbwaiters, moving stairways (escalators), moving walks and other special hoisting equipment included therein.

(2) 524 CMR 1.00, 3.00, 7.00, 8.00, 9.00 (in part and by reference 17.00), 26.00, 27.00, 29.00, 31.00, and 35.00 shall be applicable to a new installation, a relocation, or a material change for which plans and specifications are submitted for approval on or after January 1, 1998, and subsequent amendments as published in the *Massachusetts Register*.

All plans for elevator installations, relocation, or material change shall be signed by a registered architect or a registered professional engineer and shall bear his registering stamp certifying that he has examined the plans and finds that the building structure will comply with the contract load plus its tare as they are shown on the elevator drawing. The architect or engineer shall not be responsible for any material on the elevator drawing. The complete installation shall comply with Massachusetts Elevator Code at the time of filing.

The following shall be considered material changes:

(a) If the speed of the elevator is increased.
(b) If the capacity of an existing elevator is increased.
(c) If the travel of an existing elevator in extended.
(d) If the machine room of an existing elevator is relocated; or
(e) If the classification of an elevator is changed from freight to passenger.

NOTE: The date such plans are approved by the Commonwealth of Massachusetts Department of Public Safety, Elevator Division shall be considered the date of installation, relocation, or material change for that equipment.

(3) Any change from DC (direct current) to AC (alternating current) or any change in voltage shall not be considered a material change, provided that the speed or capacity of the installation is not increased.

Any complete part of an existing installation which is replaced, such as a machine, car, hoistway enclosure, gates, doors door locking devices, controller, operating devices, load weighing devices, *etc.*, shall be installed in accordance with the regulations for new installations; but such existing parts as remain in service (and which are properly maintained in accordance with regulations at the time of installation, relocation, or material change) need not be changed to conform with the regulations for new installations.

EXCEPTION: Existing Parts of elevators, dumbwaiters and escalators (moving stairways) that were installed in accordance with regulations prior to March 9, 1950 shall be maintained as a minimum in conformity with the applicable provisions of ELV-2, Elevator, Dumbwaiter, and Escalator Regulations, Part 1.00 through 34.00, as of March 9, 1950. If the installation was originally installed after that date, any existing parts remaining shall meet the requirements of ELV-2 or 524 CMR in effect at the time of installation.

15.02: Age Requirement

No person under the age of 18 shall be allowed to work on or operate any elevator equipment covered under 524 CMR.

15.03: Increase in Dead Weight

Where alterations, additions or changes to an elevator installed prior to March 9, 1950 result in an increase in the dead weight of the car and/or counterweight, they shall conform to the requirements of 524 CMR 1.00 through 17.00, governing the following:

15.03: continued

(1) Machine beams, sheave beams, supporting beams, supports and foundations, ropes, suspension rope hitch supporting beams, hoist and counterweight ropes and governor connections.

(2) Car and counterweight guide rails.

(3) Car and counterweight buffers.

(4) Car frames, platforms, car safeties, counterweight safeties, if any, speed governors.

(5) When an elevator carries or is loaded or unloaded by an industrial power truck other than a hand truck, it shall comply with 524 CMR 17.15(3).

Repairs and replacement of damaged, broken or worn parts necessary for the safe operation of the equipment installed prior to March 9, 1950 shall unless otherwise prohibited herein, be made with parts of equivalent material, strength and design.

Broken or damaged parts subject to tension, torsion or bending, or parts on which the support of the elevator car depends shall not be repaired by welding.

REGULATORY AUTHORITY

524 CMR 15.00: M.G.L. c. 143, § 69.

(524 CMR 16.00: RESERVED)

NON-TEXT PAGE

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

Section

17.01: Hoistway Enclosures: General
17.02: Machine Rooms, Sheave Rooms and Secondary Levels
17.03: Venting of Hoistways
17.04: Clearance and Pits
17.05: Hoistway Guards
17.06: Pipes and Wiring
17.07: Hoistway Doors: General
17.08: Landing Doors for Power Passenger Elevators
17.09: Landing Doors for Power Freight Elevators
17.10: Hoistway Door Interlocks
17.11: Landings for Power Passenger and Freight Elevators
17.12: Power Operation, Power Opening and Power Closing of Hoistway Doors and Car Doors
17.13: Car Construction
17.14: Car Enclosures
17.15: Capacity and Loading
17.16: Car and Counterweight Safeties and Speed Governors
17.17: Car Speeds
17.18: Illumination of Cars and Lighting Fixtures
17.19: Contract-Load Test
17.20: Equipment Prohibited Inside Car
17.22: Machines and Machinery
17.23: Hydraulic Elevator Machines, Tanks, Pumps, Valves and Gauges
17.24: Venting of Hydraulic Machinery Spaces
17.25: Venting of Hydraulic Elevator Hoistways
17.26: Hoisting Ropes
17.27: Governor Ropes
17.28: Governor Tail-ropes
17.29: Compensating Ropes or Chains
17.30: Guide Rails
17.31: Car and Counterweight Buffers
17.32: Counterweights
17.33: Control and Operating Devices and Systems: General
17.34: Control Devices
17.35: Operating Devices
17.36: Terminal Stopping
17.37: Signals
17.38: General
17.39: Fire Emergency Service - Automatic Passenger Elevators
17.40: Medical Emergency

17.01: Hoistway Enclosures: General

(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..

(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.

17.01: continued

(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 any 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.

17.02: continued

(f) Machine room, sheave room and secondary level flooring shall fill the entire top of the hoistway where the cross-sectional area is 150 square feet or less. Where the cross-sectional area is greater than 150 square feet, the flooring shall either fill the entire top of the hoistway or shall extend not less than two feet beyond the general contour of the sheaves, machines, and controllers, and shall also extend to the entrance of the room. Where this flooring does not entirely cover the top of the hoistway, all open or exposed sides of the platform shall be provided with masonry or open metal construction which will reject a ¾ inch ball and not less than six feet high and so designed and supported that when subjected to a pressure of 75 lbs. applied horizontally at any point on the walls of the enclosure, the deflection will not exceed one inch.

(g) Where a section of bar type or other metal cover is part of a machine room floor, it shall conform to the following requirements:

1. The section shall be installed in a steel frame set flush with the top of the machine room floor.
2. The cover shall be hinged to the steel frame and shall be equipped with a lock and key which will lock the cover in the closed position. Such cover or grating shall not be removable.
3. EXCEPTION: Floors are not required above the hoistway of elevators where the machine is located below or at the side of the hoistway and the overhead sheaves are mounted in frames at the sides of the hoistway, provided that:
   a. There is no other equipment, such as selectors, signal machines, *etc.*, exclusive of governors on the same level.
   b. The sheaves are equipped with ball or roller bearings packed in lubricant; or, if they have bearings requiring frequent lubrications, means are provided to lubricate the bearings from the top of the car or the machine room.

(3) Machine room, sheave room, and secondary level enclosures shall be constructed as follows:

(a) Where solid construction hoistways are required by 524 CMR 17.00, the walls shall be 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 17.00, 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 524 CMR 17.00, 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.

(e) No machinery, equipment, water lines, drainage lines, or other equipment shall be located in an elevator machine room or hoistway, except that necessary to operate the elevator.

EXCEPTIONS:

1. Heating and cooling apparatus for the machine room.
2. Pumps for the removal of water from the pit.

NOTE: Elevator machinery spaces that require air conditioning to maintain their temperature shall not locate the units needed for that purpose within the walls of the machine room

(4) Machine room walls shall be not less than two feet from the front and not less than two feet from any side of the hoisting machine.

(5) In the space provided for elevator machinery, the head room above the floor or platform shall be not less than the following:

(a) For elevator hoisting machines -- seven feet.

(b) For secondary sheave spaces housing machinery in addition to the sheaves -- four feet six inches.

(c) For secondary sheave spaces housing no machinery in addition to the sheaves, or for spaces housing other sheaves vertically over the car -- three feet six inches.

17.02: continued

Machine and supporting beams may encroach on this headroom in the secondary sheave space provided there is a clearance of not less than two feet six inches between the underside of such beams and the top of the secondary sheave level slab or grating.

(d) Means of access for the inspection, as necessary, of speed governors shall be provided from outside the hoistway, the clear opening to be not less than 30" x 30"

(e) When the speed governor is not accessible from outside the hoistway, a flooring or grating shall be provided.

(f) The access opening shall be provided with a self-closing door equipped with a spring lock that can be opened by hand from the inside of the hoistway. Where solid construction is required doors shall have a fire-resistive construction of not less than 1½ hours. Where open construction is permitted doors shall be constructed of non-combustible material.

(g) No emergency entrance, or door, or opening for any purpose shall be installed in an elevator hoistway other than that required for the operation of the elevator as required by 524 CMR.

(h) An enclosed switch or circuit breaker shall be installed in all overhead machinery rooms, sheave rooms, *etc*. The switch or circuit breaker shall not be bypassed by any other means, shall be located at the entrance to such spaces, and shall comply with 527 CMR 12.00 (*Massachusetts Electrical Code* in effect at the time of installation) and 524 CMR 17.34(2).

(6) Exposed gears, sprockets, tape and rope sheaves, or ropes and tapes passing through the secondary levels shall be equipped with guards.

(7) Each machine room, sheave room or secondary level shall be electrically illuminated with lighting of not less than ten foot candle at the floor level, and each lighting circuit shall be provided with an enclosed type switch located within the room at the lock jamb of the entrance door.

(8) All machine rooms shall be provided with natural or mechanical ventilation to avoid overheating of the equipment and to insure safe and normal operation of the elevator.

(9) Machine rooms shall be provided with self-closing doors not less than 30" wide by six feet six inches high equipped with spring-locks that can be opened by hand from the inside of the machine room. Where solid construction is required, doors shall have a fire-resistive construction of not less than one and one half hours. Machine room doors shall be identified with a sign that will read "ELEVATOR MACHINE ROOM – NO STORAGE ALLOWED". The letter size shall be a minimum of ¾ inch and shall be of a contrasting color with that of the background.

Location of controllers for floor mounting: Location of one or a bank of controllers shall have the minimum clearance to walls or permanent room partitions. (Such clearances are to "live" panel parts.)

One or a group of controllers:

(a) Front of panel to wall: 30".

(b) Back of frame to wall: 24".

(c) One side of frame to wall: 18".

(10) Where the entrance to machine rooms and overhead machinery spaces is more than five feet above the adjacent floor or roof surface, and where entrance to secondary sheave levels is through openings in machine room floors and the difference in floor levels is more than five feet, access shall be provided by means of a metal ladder or stairway having an angle not exceeding 60° from the horizontal.

(a) Where the difference in level is over one foot and not over five feet and when the entrance door opens inward, ladders may be vertical, provided the ladder has hand grips at the top to extend above the door opening and is located in the center of the machine room door opening. The rungs on the ladder shall be located not less than six inches from the wall.

Where the difference in level is one foot or less, no ladder or stairs are required.

(b) Inclined ladders or stairways shall be fitted with a metal handrail above all outside stringers. Vertical ladders shall be fitted with hand grips at the top.

(c) When the entrance door opens outward and is more than three feet above the adjoining roof, a metal or masonry platform shall be provided not more than eight inches below the door sill.

17.02: continued

(d) The platform shall be not less than two feet wide and shall project not less than two feet beyond the lock jamb of the door.
(e) A guard rail shall be provided at the edges of this platform. This guard rail shall be not less than 42" high.

(11) Elevator machine rooms shall not be used as public thoroughfares and are restricted to licensed elevator mechanics, authorized personnel accompanied by a licensed mechanic, or other authorized personnel after the equipment has been made safe.

(12) All overhead machinery and sheaves shall be supported on steel beams. Controllers, motor generator sets and other auxiliary equipment may be mounted on the machine room or secondary level floor provided the floor is designed to support the imposed static load. Governors may be mounted on machine room or secondary level floors if the floor is designed to withstand the impact load resulting from the application of the car safety device. Supports for machinery and sheave beams shall be of sufficient strength to support the imposed loads and may be building walls or frames.

(13) Supporting beams if used shall be so supported and fastened in place as to effectively prevent same from becoming loose or displaced under the conditions imposed in service.

(14) 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, controllers, *etc.* The load suspended from the beams shall include the sum of the tensions of all ropes suspended from the beams.

(15) No elevator machinery, other than the deflector or secondary sheaves or signal devices, shall be fastened to the overhead supporting beams by means of a tension connection.

(16) Where winding drum machines are used, a permanent beam or bar shall be provided at the top of the counterweight guides and beneath the counterweight rope sheaves to prevent the counterweights from being drawn into the sheaves. It shall be of such strength that the ropes will be pulled out of the sockets before there is failure of the beam. The bar or beam shall be located in line with the center of mass of the counterweight, or if more than one stop is used, they shall be located symmetrically with respect to the counterweight.

(17) The required factor of safety for all steel overhead beams and their supports, based upon both the average ultimate strength of the material and the loads, shall be not less than five.

(18) The allowable deflections of overhead beams and their supports shall be in accordance with the following:
(a) For overhead machine beams of all A.C. installations, and for D.C. installations where the car speed is over 150 f.p.m., the deflection under static load shall not exceed 1/2000 of the span.
(b) For overhead machine beams of D.C. installation, where the car speed is 150 f.p.m. or less, the deflection under static load shall not exceed 1/1666 of the span.
(c) For all overhead sheave beams the deflection under static load shall not exceed 1/1333 of the span.
(d) For overhead beams supporting the machine beams, the deflection under static load shall not exceed 1/1666 of the span.

(19) Heating of Machinery Spaces and Hoistways.
(a) Any source of heat may be used which does not contaminate the air in the above-mentioned spaces, and which does not conflict with any existing health, fire or building ordinance.
(b) Temperature. Any system of heating shall have a capacity to insure a continuous uniform temperature in machinery spaces and hoistways of not less than 50°F and higher as required by the elevator manufacturer's specifications.

17.02: continued

(c) Machine rooms shall be provided with natural or other means of ventilation to avoid overheating of the electrical equipment and to insure safe operation of the elevator, with the temperature not to exceed 90°F.

(20) The following applies to all existing elevator machine rooms:

(a) All materials not directly related to the elevator equipment shall be prohibited from storage in any elevator machine room or machinery space.

(b) Elevator related material stored in machine rooms shall be stored in non-combustible containers.

(c) All flammable/combustible liquids shall be kept in approved containers and secured in approved flammable liquids locker.

(d) All machine rooms shall contain a fire extinguisher approved by 527 CMR: *The Massachusetts Fire Prevention Regulations.*

(e) The machine room door fire rating, penetrations in the fire rated assembly of the machine room and other building conditions that would prevent the spread of fire and/or smoke from the machine room shall conform to the requirements of 780 CMR: *The Massachusetts State Building Code.*

(f) If an existing electric, drum or hydraulic elevator machine room hoistway or pit contains sprinklers, they shall be removed as follows:

1. Water supply piping for all the sprinklers shall be cut off at the wall outside the machine room or hoistway and the piping shall be capped. All sprinkler piping within the hoistway or machine room shall be removed.
2. Automatic main line power disconnecting devices shall be disabled or removed.
3. The removal of sprinkler piping and disabling or removal of automatic main line power disconnecting devices shall require a permit to be filed with the Commonwealth of Massachusetts, Department of Public Safety, Elevator Division.

Note: The above shall be in compliance with the M.G.L. c. 148, § 27A.

17.03: Venting of Hoistways

(1) Required Venting. Hoistways of all elevators regardless of height shall be provided with means for venting smoke and hot gases to the outer air in case of fire.

(2) Location of Vents. Vents shall be located:

(a) In the side of the hoistway enclosure not more than two feet directly below the top of the hoistway, opening either directly to the outer air or through non combustible ducts of two-hour fire-rated construction 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.

(c) When elevator hoistways are vented to the atmosphere below the machine room floor, the machine room must also be vented to the atmosphere. That ventilation shall be a minimum 1% of the area of the machine room. but not less than one square foot.

(d) Where the roof of a building has a fire-resistive rating in whole or in part of less than two hours, the hoistway may be covered at or below the roof line with a two-hour fire-rated cap, provided a two-hour vent extends directly vertically upward from hoistway through roof and at least three feet beyond the roof surface. In all cases, bottom of vent opening shall be at least three feet above the roof. In sloping roof, the three-foot distance above the roof line shall be measured from the highest point where the vent emerges through the roof.

(e) Where the entire roof of a building has a fire-resistive rating of two hours or more, the hoistway may be capped with two-hour fire-rated construction. Hoistway ventilation shall be brought directly through the roof to a height of three feet above the roof, that portion below the roof must be of two-hour fire-rated construction.

(f) A horizontal or inclined duct of two hour fire rated material may be used when powered by a fan connected to the emergency generator and activated by smoke detectors.

(3) Area of Vents. The area of the vents shall be not less than 3½% of the area of the hoistway or 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.

17.03: continued

EXCEPTIONS: Where mechanical ventilation, moving the same volume or more of air as the required vent, is provided in the overhead elevator machine room (*see* 524 CMR 17.02(8)), the 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.

(e) Normally power closed dampers may be installed and actuated to the open position by a thermostat, fire alarm initiating device, or a power failure.

(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" thick. Power closed ventilation may be used in the hoistway or machine room provided that it is opened under each one of the following circumstances:

(a) by an approved automatic thermostat designed to open at a temperature of not more than 90°F.

(b) by a building fire alarm system.

(c) in the event of a power failure.

(5) 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.

17.04: Clearance and Pits

(1) Horizontal.

(a) The clearance between a hoistway enclosure and a loading side of the car platform opposite a car opening shall not be more than the following:

1. Seven inches where pass type vertical biparting counterbalanced doors are installed wholly within the hoistway.
2. Five inches for all others.

(b) The clearance between the sill of the car and the threshold of the landing shall be not less than ¾ inch nor more than 1½ inches.

(c) There shall be a clearance of not less than ¾ inch between cars and the hoistway enclosures and a clearance of not less than one inch between cars and their counterweights.

(d) There shall be a clearance between elevator counterweights and the hoistways of not less than ¾ inch.

(e) If two or more cars are operated in adjacent hoistways, the clearance between cars shall be not less than two inches.

(f) All recesses or offsets in hoistways which are opposite a car opening shall be protected by substantial curtain walls, grating or vertical bars of the fixed type. They shall be firmly secured set on a flush line with the general surface of the hoistway. The distance between the vertical members shall not exceed four inches.

(g) Sides not used for loading and unloading recesses other than for windows or recesses necessary for elevator equipment shall not be permitted. Beams, floor slabs or building equipment construction shall not project more than two inches inside the general line of the hoistway unless the top surface of the projection is beveled at an angle of not less than 75° with the horizontal. Where setbacks occur in the enclosure wall, the top of the setback shall be beveled at an angle of not less than 75° from the horizontal. The maximum clearance between the car and the hoistway shall not exceed four inches other than space necessary for elevator equipment. Separator beams between elevators are not required to have bevels

EXCEPTION: The provisions of 524 CMR 17.04(1) shall not apply to existing hoistway projections in elevator installations made prior to March 9, 1950.

17.04: continued

(2) Vertical Bottom Clearances.

(a) A pit shall be provided at the bottom of every power elevator hoistway. The pit shall be not more than the sufficient depth necessary to contain the buffers, unless the elevator does not serve the lowest floor. The pit shall be of sufficient depth to contain the buffers, compensating ropes sheaves (if any) and any other equipment necessary for the safe and satisfactory operation of the elevator and to provide the following minimum vertical clearance between the car the counterweight and their buffers when the car is at the bottom and top landing respectively:

Not less than six inches where oil buffers are used or where spring buffers are used with "generator field control".

Not less than 12 inches where spring buffers are used with "Rheostatic control" for contract speeds of 100 f.p.m. or less.

Not less than 18 inches where spring buffers are used with "Rheostatic control" for car speeds of from 101 to 200 f.p.m.

(b) The floor of the pit shall be of concrete and approximately level. Where structural conditions make it essential, trenches or depressions may be provided for the installation of buffers and compensation sheaves located in the pit.

(c) The clear vertical distance between the underside of the car platform or between the underside of any equipment attached thereto, exclusive of the car frame channels, car safety blocks, guide shoes and any aprons or guard attached to the car sill, and the pit floor when the car rests on the fully compressed buffer shall be not less than two feet. In measuring this clearance the depth of any trenches or depressions in the pit floor shall not be included.

(3) Vertical -- Top Clearances. The top clearances for power passenger and freight elevators shall be:

(a) Car Clearance. When the car is at its top landing, the clear distance between the top of the crosshead of the car and the corresponding point of any obstruction or equipment in the hoistway vertically above it shall be not less than the sum of the following four items:

1. The clearance between the counterweight buffer and its striker block.
2. The stroke of the counterweight buffer used.
3. Two feet.
4. ½ the distance required to stop the car from 115% of contract speed with a retardation of 32.2 feet per second. This item may be omitted if provision is made to eliminate the jump of the car at counterweight buffer engagement

When any equipment on the car projects more than two feet above the car crosshead, the minimum overhead car clearances required shall be increased by the amount by which this projection exceeds two feet.

(b) Counterweight Clearance. When the car floor is level with the bottom landing, the clear distance between the top of the counterweight assembly and the corresponding point of any obstruction or equipment in the hoistway vertically above it shall be not less than the sum of the following items:

1. The clearance between the top of the car buffer, and its striker block.
2. The stroke of the car buffer used
3. Six inches where oil buffers are used, and 12 inches where spring buffers are used.
4. ½ the distance required to stop the car from 115% of contract speed with a retardation of 32.2 feet per second. This item may be omitted if provision is made to eliminate the jump of the counterweight at car-buffer engagements.
5. Where the car precompresses the buffer, the total stroke of the buffer minus the precompression shall be added in lieu of 524 CMR 17.04(3)(b)1. and 2.

(4) Access to Pits. Safe and convenient access shall be provided to all pits, and shall conform to the following:

(a) Access may be by means of the lowest hoistway door or by means of a separate pit access door.

(b) Access to pits extending more than four feet below the sill of the pit access door shall be provided by means of fixed vertical ladders of non combustible material, located within reach of the access door. The ladder shall extend not less than 30 inches above the sill of the access door, or hand grips shall be provided to the same height.

17.04: continued

(c) Pits shall be accessible only to authorized persons.

Where a separate pit access door is provided, it shall be self-closing and provided with a spring type lock arranged to permit the door to be opened from inside the pit without a key. Such doors shall be kept locked and electrically contacted when a hazard from moving equipment exists immediately upon entering the pit. The pit entrance door of a walk-in pit shall be identified with a sign which will read "DANGER ELEVATOR PIT". The letter size shall be a minimum of ¾" and shall contrast with the background.

(5) Illumination of Pits. A permanent lighting fixture shall be provided in all pits, which shall provide an illumination of not less than five foot candles at the pit floor. A light switch shall be provided and shall be so located as to be accessible from the pit access door or adjacent to the pit access ladder and the bulb shall be guarded.

17.05: Hoistway Guards

(1) Counterweight Runways. Counterweight runways of power 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, other than where compensating chains or ropes which practically compensate for the weight of the hoisting ropes are attached to the counterweight. In this case, counterweight enclosures shall not be required on the side facing the elevator.

(2) Adjoining Hoistways. Where two or more elevators are located in the same hoistway and where the pit floors of adjacent elevators are located at different levels exceeding two feet, a hoistway guard extending from the floor of each higher pit to a height of not less than seven feet above the floor of such higher pit shall be provided to separate all hoistways adjoining each other. Where the difference in level is two feet or less, a metal railing 36" high may be installed in lieu of the guard.

(3) Landing Sill Guards.

(a) All elevator landing sills shall be guarded on the underside with smooth metal guard plates of not less than No. 14 U. S. Gauge (0.078125 in.) extending the full width of the car entrance, securely fastened in place as follows:

(b) Where a car leveling or inching device is provided and the hoistway edge of the sill is either flush with or projects into the hoistway, the guard shall have a straight vertical face extending below the sill not less than the depth of the leveling or inching zone plus three inches, provided that where the sill projects inward from the general line of the hoistway the bottom of the guard shall also be beveled at an angle of not less than 75° with the horizontal or the guard shall be extended from the hoistway edge of the landing sill to the soffit of the hoistway landing door next below.

(c) Where no car leveling or inching device is provided and the sill projects inward from the general line of the hoistway, the guard shall either be beveled at an angle of not less than 75° with the horizontal or it may have a straight vertical face extending from the hoistway edge of the landing sill to the soffit of the hoistway landing door next below.

(d) Where vertical biparting-parting counterbalanced landing doors are provided, the landing sill guards may be omitted provided that, where the trucking sills of such doors project inward from the hoistway face of the door, the lower edge of the trucking sill is equipped with a guard having an angle of not less than 60° with the horizontal.

(4) Soffits of Other Projections. The soffits of all other projections other than door interlocks or contacts, door operating devices, and indicator and signal devices which extend into the hoistway and which are opposite a car entrance, shall be guarded on the underside with smooth metal guard plates of not less than No. 14 U. S. Gauge (0.078125 in.) having an angle of not less than 75° with the horizontal.

(5) Hoistway Guard. Hoistway guards shall be building walls, solid or latticed partitions, grille work, metal gratings or expanded metal with smooth edges, as follows:

(a) Where wire grille work is used, the wire shall be not less than No. 13 Steel Wire Gauge (0.0915 in. diameter) and the mesh shall be not more than two inches.

17.05: continued

(b) Where expanded metal is used, its thickness shall be not less than No.13 U. S. Gauge (0.094 in.).
(c) The spacing between bars shall be not more than two inches, other than where used as "furring" material, in which case the spacing between bars or slats shall be not more than four inches.
(d) Where sheet metal is used it shall be not less than No. 14 U. S. Gauge.
(e) Where building walls are used, they shall be of not less than two hour fire-resistive construction

(6) Rope Enclosures. Where ropes pass through floors on the outside of the hoistway, they shall be enclosed completely from floor to ceiling at all floors with solid enclosure to not less than two hour fire resistive construction.

(7) Hoistway not to Lowest Floor. 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:
(a) Buffers shall be provided.
(b) The cars and counterweights shall be provided with safety devices.
(c) There shall be a structure under the hoistway sufficiently strong to withstand the impact of the car with contract load or the impact to the counterweight when either is descending at contract speed or at governor-tripping speed where a governor-operated safety is used.

17.06: Pipes and Wiring

(1) No pipes, ducts, vessels, electrical conduits or cables shall be located within an elevator hoistway or its pit other than those used to furnish or control power, light, heat, communications or signals for the elevator or hoistway, or for low voltage fire detection systems for the hoistway. EXCEPTION: Existing non-elevator related pipes and wiring installed prior to March 9, 1950 which are still in use and which are located within elevator machine rooms or hoistways, may remain. Sprinklers shall not be installed in elevator machine rooms, hoistways, or pits per 780 CMR: *the Massachusetts State Building Code.*

(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. Flexible conduits or armored cables may be used between fixed conductors and limit switches, interlocks, push buttons and similar devices.

(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 used to heat the elevator machine rooms or hoistway shall not exceed 15 lbs. above atmospheric pressure.

(6) No pipes, ducts or vessels conveying gases or liquids shall be discharged or vented into the hoistway.

(7) No part of any electric circuit having a rated system or circuit voltage in excess of 300 volts shall be used either for any operating circuit or for any control circuit or any equipment which is located in the hoistway, on the car, on the landing doors, or at the landing openings. Circuits of rated system in excess of 300 volts may be used in machine rooms for the operation of motors and for generators, provided that wiring subject to such higher voltage is thoroughly insulated from all other wiring.

(8) All live parts of electrical apparatus in elevator hoistways shall be suitably enclosed to protect against accidental contact. Metal coverings shall be permanently grounded. All wiring for electricity shall be done in accordance with the best practice.
In case any question arises as to what is the best practice, work done according to the requirements of 527 CMR 12.00 (*Massachusetts Electrical Code*) shall be considered as so done.

17.07: Hoistway Doors: General

(1) All landing openings in power-elevator fire-resistive hoistways shall be provided with doors, panels and frames of not less than 1½ hour fire-resistive construction.

(2) All landing opening doors shall provide a clear passage of not less than six and one half feet in height.

(3) (a) All hoistway doors shall be provided with interlocks.
(b) When landing doors at terminal floors or any other floors are locked preventing access to an exit stairway the elevator shall be equipped with a telephone to the connected to an outside location that is answered on a 24-hour basis.

(4) No hardware, other than as required for interlocking, indicators, door operators and signal devices, shall extend into the hoistway beyond the line of any landing threshold.

NON-TEXT PAGE

17.07: continued

(5) There shall be installed an emergency release system which permits the operation of the car by the operating devices when the hoistway doors are open. It shall be located only at the top and lowest landing if the latter is the normal point of access to the pit. A continuous-pressure key-operated switch, made operable only by the control switch described in 524 CMR 17.35(11)(b) shall be located within easy reach of the landing door. This key shall cut out all corridor operating devices and shall permit operation of the car only when all landing doors except the top and lowest landing doors are closed and locked, and shall permit operation of the car only in a zone extending below the top landing for a distance not exceeding the height of the car cab enclosure. This key shall not be master-keyed and shall not be operable by any key which will operate locks or devices used for other purposes in the building. The key shall be removable only when the switch is in the "Off" position and shall be available only to licensed elevator mechanics and elevator inspectors.

(a) Operation Requirements of Hoistway Access Switches. The operation of the switch at either access landing shall permit, and may initiate and maintain movement of the car with the hoistway door at this landing unlocked or not in the closed position, and with the car door or gate not in the closed position, subject to the following:

1. The operation of the switch shall not render ineffective the door interlock or electric contact at any other landing.
2. The car cannot be operated at a speed greater than 150 feet per minute.
3. For automatic and continuous pressure operation elevators, provided:
   a. Landing operating devices of continuous-pressure operation elevators, and car and landing operating devices of automatic operation elevators shall be first made inoperative by means other than the access switch.
   b. Power operation of the hoistway door and/or car door or gate is inoperative.
4. Automatic operation by a car-leveling device is inoperative.

(b) The top-of-car operating device (see 524 CMR 17.35(10)) is inoperative.

Where electrically operated switches, relays or contacts are used to render inoperative the hoistway door interlock or electric contact or the car door or gate contact, the control circuits shall be arranged to conform to the requirements of 524 CMR 17.10 and 17.14(8), and in addition to render the normal car and hall operation ineffective if any such switch, relay or contact fails to function in the intended manner.

EXCEPTION: Emergency release systems as described in 524 CMR 17.07 shall not be required on elevators installed prior to March 9, 1950. For elevators installed after March 9, 1950 but prior to December 10, 1971, a continuous pressure key-operated hoistway access switch shall be required at the top landing only.

(6) No keys or devices shall be permitted which will unlock any landing door when the car is not within the landing zone.

EXCEPTION: If all the door panels and interlocks are replaced on an existing elevator, hoistway door unlocking devices for use only by Massachusetts licensed elevator mechanics and trained firefighters are required.

(7) Hoistway doors for passenger elevators shall be so arranged that it is not necessary to reach back of any panel, jamb, or sash to operate them.

(8) Hangers for power-operated hoistway doors shall be designed to withstand a downward thrust of five times the weight of the door and an upward thrust of four times the weight of the door.

(9) Means shall be provided to prevent hangers for all sliding hoistway doors from jumping the tracks. Stops shall be either provided to prevent the hanger carriage from leaving the ends of the track or suitable stops shall be provided on the door.

(10) Manually operated or self-closing hoistway doors of the sliding type for elevators with automatic or continuous-pressure operation shall be provided with either one or more vision panels, or a hall position indicator or a hall lantern. All swing-type hoistway doors shall be provided with vision panels. Vision panels may be provided for any type of hoistway door irrespective of the type of operation of the elevator. Where required or used, vision panels shall conform to the following requirements:

17.07: continued

(a) The area of any single panel shall not be less than 25 square inches, and the total area of one or more panels in any hoistway door shall be not more than 80 square inches.
(b) Each clear panel opening shall reject a ball six inches in diameter.
(c) Panels shall be of clear wired glass.
(d) The center of the vision panel for horizontal, slide and swing type doors shall be not less than 54" nor more than 66" above the elevator landing. For vertical biparting-parting counterbalanced doors, it shall be located to comply with the dimensions specified insofar as the conditions will permit.
(e) If used for power-operated hoistway doors, the wired-glass panel shall be substantially flush with the surface of the landing side of the door.

(11) Door counterweights shall run in metal guides in such a manner that they cannot become dislodged or shall be boxed in. The bottoms of the guides or boxes shall be constructed so as to retain the counterweight if the counterweight rope breaks.

(12) Power opened hoistway doors shall be equipped with interlocks, operating mechanisms and control systems which are arranged to prevent the opening of all doors in the hoistway other than the door or doors which are located as follows:
(a) At that landing where the car is at rest.
(b) At that landing when the car is coasting through the landing zone with its operating device in the stop position.
(c) At that landing where the car is being moved by the car leveling devices within the landing zone.

(13) Hoistway doors shall be arranged so that they may be opened by hand from the hoistway side unless locked "out of service". Neither the door at the main floor landing or at the top or bottom terminal landing shall be locked "out of service" when the elevator is in service.

(14) Where an elevator is installed in a single blind hoistway, there shall be installed in the blind portion of the hoistway an emergency door at every third floor, which fully protects the opening, but not more than 42 feet apart, conforming to the following:
(a) The clear opening shall be at least two feet four inches wide and six feet six inches high
(b) It shall be easily accessible and free from fixed obstructions.
(c) It shall be either of the horizontally sliding type or swinging single section type, irrespective of the type of door installed at other landings.
(d) It shall be self-closing and self-locking with the firefighter's key lock (524 CMR 17.39(2)), and shall be marked in letters not less than two inches high "DANGER - ELEVATOR HOISTWAY."
(e) It shall be provided with an electric contact conforming to 524 CMR.
(f) It shall be unlocked from the landing side only through the use of the firefighter's key (524 CMR 17.39).
(g) The key lock shall be so designed that the key shall be removable only in the locked position.

(15) All landing door frames must be thoroughly grouted to obtain the proper fire rating.

(16) The hoistway side of each landing entrance shall have a minimum four inch high numeral identifying the floor level. Said numeral shall be a decal or adhesive backed material.

17.08: Landing Doors for Power Passenger Elevators

(1) Automatic Fire Door. No automatic fire door shall lock any landing opening in the hoistway enclosure of any passenger elevator or lock any exit leading from any hoistway landing door to the outside of the building.

(2) Landing Openings. Landing openings in passenger elevator hoistway enclosures shall be protected by horizontal sliding doors, combination sliding and swinging doors, or by swinging doors.

17.08: continued

(3) Certain Measurements. The distance between the hoistway side of the landing door opposite the car opening and the hoistway edge of the landing threshold on elevators which can be operated only from the car shall be not more than four inches. For automatic-operation elevators, the distance between the hoistway side of the hoistway door opposite the car opening and the hoistway edge of the landing threshold, shall be not more than the following:

(a) For swinging doors, ¾ inch.

(b) For sliding doors, 2¼ inches.

In no case shall the hoistway face of the hoistway door project into the hoistway beyond the edge of the landing sill. When the hoistway door consists of two or more sections, the distance specified in 524 CMR 17.08(3)(b) shall be measured from the section of the door nearest to the edge of the hoistway landing sill. Where distances are greater that specified above, space guards or baffles may be installed in accordance with 524 CMR 17.14(8).

17.09: Landing Doors for Power Freight Elevators

(1) Landing Opening. Each landing opening in a freight elevator hoistway shall be equipped with a door set within four inches of the face of the landing threshold.

Bi-parting counterbalanced doors shall have the lower edge of the upper door section provided with a fire-resistive, non-shearing, non-crushing member to provide a spacing of not less than ¾" between the rigid members of the door sections when closed.

Any rigid astragal, locking or latching device overlapping the meeting edge is prohibited.

(2) Types of Landing Doors. Landing doors may be horizontally or vertically sliding, counterbalanced vertically sliding, combination sliding and swinging or swinging type.

(3) Power-operated Vertical Bi-parting Counterbalanced Doors. If vertical bi-parting counterbalanced doors are power operated, the landing door shall not start to close until after the car gate is within 12" of full closure, and, on opening, the car gate shall not start to open until the landing door is within 12" of its full open position.

(4) Pull Straps on Manually-operated Vertically-sliding Bi-parting Counterbalanced Hoistway Doors. Manually-operated vertically sliding bi-parting counter-balanced hoistway doors of elevators which can be operated from the landings shall be provided with pull straps on the inside and the outside of the door and shall be located at the lower edge of the upper door section. The length of the straps shall conform to the following:

(a) The bottom of the straps shall be not more than six feet above the floor when the door is in the fully-opened position.

(b) The length of the straps shall not be extended by means of ropes or other materials.

Pull straps where provided on manually operated vertically sliding bi-parting doors of elevators which can be operated from the car shall only be mounted on the inside of the door and shall also conform to the requirements of 524 CMR 17.09(4)(a) and (b).

(5) Counterbalanced Doors. Single or multisection vertically-sliding doors and vertically-sliding bi-parting counterbalanced doors shall be so counterbalanced that they will not open by gravity. Fastenings shall be provided to prevent the detachment or dislodgment of the counterbalancing weights of doors. Suspension means and their connections for vertically-sliding counter weighted doors shall have a safety factor of not less than five.

17.10: Hoistway Door Interlocks

(1) Interlocks shall be arranged to prevent the operation of the elevator machine by the operating devices in a direction to move the car away from the landing unless all hoistway doors are both closed and locked in the closed position; and the interlock shall not be required to prevent the movement of the car by inching or leveling devices with the hoistway door open.

(2) The interlock shall prevent the opening of the hoistway door from the landing side unless the car either is at rest within the landing zone or coasting through the landing zone with its operating devices in the stop position.

17.10: continued

(3) For automatic operation or continuous-pressure operation, the hoistway door shall not be considered in the closed position until the door is within ⅜ inch of the nearest face of the door jamb; or, in the case of horizontally sliding bi-parting doors, ⅜ inch of contact with each other.

(4) For power elevators where the hoistway door is not equipped with a door closer, the door shall be considered in the closed position only when the door is within ⅜ inch of the nearest face of the door jamb; or, in the case of bi-parting doors, either ⅜ inch of contact with each other when horizontal sliding doors are used; or two inches of contact with each other when vertical sliding doors are used, and the upper sections of the vertical sliding bi-parting doors are equipped with astragals which close the opening between the door section when the interlock circuit is closed.

(5) Where the hoistway door of an elevator requiring the presence of an operator in the car is equipped with a door closer, the door shall be considered to be in the closed position and the car may be started when the door is within four inches of the nearest face of the jamb; or, in the case of a bi-parting door, when the sections are within four inches of contact of each other, if at this position and any other up to the closed position, the door cannot be opened from the landing side more than four inches from the jamb, or the sections more than four inches from each other in the case of a bi-parting door.

(6) All interlocks for all hoistway doors shall be so designed that the door is locked in the closed position (as defined in 524 CMR 17.10(3), (4) and (5) immediately preceding) before the car can be operated by the operating devices. Devices employing locks and contacts of a type in which the interlocking contact is made when the door is closed and the locking of the door takes place subsequently, are not interlocks and are not permitted where interlocks are required under 524 CMR 17.00.

(7) Interlock contacts shall open the operating circuit and shall be positively opened by the locking member. They shall be maintained in the open position by the action of gravity or a restrained compression spring or both, or by means of a positive linkage. The interlock shall hold the door in the locked position by means of gravity or a restrained spring or by both.

(8) Each type and make of door interlock shall be tested and approved on the basis of test conforming to the best engineering practice made by or under the supervision of a competent designated laboratory. Minor changes in design may be made without re-testing, subject to the approval of either the enforcing authority or the testing laboratory. In case any question arises as to what is the best engineering practice, test conforming to the American National Standard Safety Requirements for Elevators, Dumbwaiters, Escalators, and Moving Walks, ASME A17.1 shall be considered as conforming thereto.

(9) Approved interlocks shall be suitably and plainly marked for identification, the marking to be permanent and so placed as to be readily visible when the interlock is mounted in position. Only one identification marking is required, which shall include the following.

(a) Manufacturer's name or trademark;
(b) Type of style letter or number;
(c) Rated voltage.

(10) The car cam used to actuate any particular interlock shall exert a force at least double the average force, and shall have a movement at least ½" in excess of the average movement, as given in the test certificate for that interlock.

(11) On all vertical BIPARTING-parting doors, means shall be provided to prevent the closing of the interlock circuit by hand when the doors are in the open position.

(12) No electrically released, gravity or spring applied rope gripper or rope-lock shall be used as a component device in any interlock system.

(13) Where required, interlocks, or combination mechanical locks and electric contacts, or electric contacts, and the wiring, shall be so located that they are not accessible from the landing side when the hoistway doors are closed.

17.11: Landings for Power Passenger and Freight Elevators

(1) The landing threshold shall be constructed and maintained so that persons will not readily slip thereon.

(2) If there is a railroad track upon any elevator landing, the tops of the rails shall be flush with the floor for a distance of six feet from the threshold.

17.12: Power Operation, Power Opening and Power Closing of Hoistway Doors and Car Doors

(1) Types of Doors and Gates Permitted. Where both a hoistway door and a car door or gate are opened and/or closed by power, the hoistway door and the car door or gate shall either:
(a) Both be of the horizontal sliding type, or
(b) Both be of the vertically sliding type.

(2) Power Opening of Car Doors or Gates. Power opening of a car door or gate shall be subject to the following:
(a) Power opening shall occur only when the car is stopping, or is leveling, or is at rest.
(b) Collapsible type car gates shall not be power opened to a distance exceeding the clear gate opening and in no case more than ten inches.

(3) Power Opening of Hoistway Doors. Power opening of a hoistway door shall conform to the following:
(a) Power opening shall occur only at that landing where the car is stopping, or is leveling, or is at rest, and shall start only when the car is within the landing zone or is within the leveling zone where an automatic car leveling device is provided.
(b) Power opening may be initiated automatically through control circuits provided that the car is being automatically stopped or leveled and provided that, when stopping under normal operating conditions, the car shall be at rest or substantially level with the landings before the hoistway door is in the fully open position.
(c) Sequence opening of a vertically sliding hoistway door and adjacent car door or gate shall be provided.

(4) Power Closing or Automatic Self-Closing of Car Doors or Gates Where Used with Manually Operated or Self-Closing Hoistway Doors. Where a car gate of an automatic or continuous pressure operation passenger elevator is closed by power, or is of the automatically released self-closing type, and faces a manually operated or self-closing hoistway door, the closing of the car door or gate shall not be initiated unless the hoistway door is in the closed position; and the closing mechanism shall be so designed that the force necessary to prevent closing of a horizontally sliding car door or gate from rest shall not be more than 30 lbs.
EXCEPTION: Where a car door or gate is closed by power through continuous pressure of a door-closing switch, or the car operating device, and where the release of the closing switch or operating device will cause the car door or gate to stop or to stop and reopen.

(5) Power Closing of Hoistway Doors and Car Doors or Gates by Continuous Pressure Means. Horizontally or vertically sliding hoistway doors with manually closed or power operated or power closed car doors or gates may be closed by continuous pressure means, subject to the following:
(a) The release of the closing means shall cause the hoistway door and a power-operated or power-closed car door or gate to stop or to stop and reopen.
(b) The operation of the closing means at any landing shall not close the hoistway door at any other landing nor the car door or gate when the elevator car is at any other landing.
(c) For elevators having more than one hoistway opening at any landing level, a separate closing means shall be provided in the car for each car door or gate and its adjacent hoistway door. Any closing means at a landing shall close only that hoistway door and the car door or gate at the side where such means is located.
EXCEPTION: A separate closing means need not be furnished for a horizontally sliding hoistway door and adjacent car door or gate which conform to the requirements of 524 CMR 17.12(8).
(d) Sequence closing of a vertically sliding hoistway door and adjacent car door or gate shall be provided where required by 524 CMR 17.12(10).

17.12: continued

(6) Power Closing of Horizontally Sliding Hoistway Doors and Horizontally Sliding Car Gates by Momentary Pressure or by Automatic Means. Power closing by momentary pressure or by automatic means shall be permitted only for automatic or continuous pressure elevators. The closing of the doors shall be subject to the following:

(a) It shall conform to the requirements of 524 CMR 17.12(8).

(b) A momentary pressure switch shall be provided in the car, the operation of which shall cause the doors to stop or to stop and reopen.

(7) Power Closing of Vertically Sliding Hoistway Doors and Vertically- Sliding Car Doors or Gates by Momentary Pressure or by Automatic Means. Power closing by momentary pressure or by automatic means shall be permitted only for automatic or continuous pressure elevators. Vertically sliding hoistway doors used with vertically power-operated car doors or gates may be closed by momentary pressure or automatic means, subject to the following:

(a) A warning bell or other audible signal shall be provided on the car which shall start to sound at least five seconds prior to the time the car door or gate starts to close and shall continue to sound until the hoistway door is substantially closed.

EXCEPTION: The five-second time interval may be omitted when the doors are closed by a closing switch in the car.

(b) Sequence closing of the hoistway door and adjacent car door or gate shall be provided and shall conform to the requirements of 524 CMR 17.12(10).

(c) The car door or gate shall be equipped with a reopening device conforming with the requirements of 524 CMR 17.12(9).

(d) A momentary-pressure type switch shall be provided in the car and at each landing, which when operated shall cause the car door or gate and the hoistway door at the landing to stop or to stop and reopen.

(e) The average closing speed shall not exceed one foot per second for a vertically sliding counter weighted hoistway door or for each panel or section of a bi-parting counterbalanced hoistway door or car gate, and shall not exceed two feet per second for a vertically sliding counter weighted car door or gate.

(8) Kinetic Energy and Force Limitations for Power Door Operators Used with Horizontally Sliding Hoistway Doors and Horizontally Sliding Car Doors or Gates. Where a power operated horizontally sliding hoistway door is closed by momentary pressure or by automatic means (see 524 CMR 17.12(6)) or is closed simultaneously with another door from one continuous pressure means (see 524 CMR 17.12(5)(c)), the closing mechanism shall be designed and installed to conform to the following requirements:

(a) The kinetic energy of the hoistway door and all parts rigidly connected thereto, computed for the average closing speed, shall not exceed seven foot pounds where a reopening device for the power-operated car door or gate conforming to the requirements of 524 CMR 17.12(9) is used, and shall not exceed two and one half foot pounds where such door reopening device is not used. Where the hoistway door and the car door or gate are closed in such a manner that stopping either one manually will stop both, the sum of the hoistway and the car door weights as well as all parts connected rigidly thereto shall be used to compute the kinetic energy. The average closing speed shall be determined by timing the closing door as follows:

1. With single-slide and two-speed doors, determine the time required for the door to travel from a leading edge of the point two inches away from the open jamb to a point six inches away from the opposite jamb.

2. With center-opening or two-speed center-opening doors, determine the time required for the leading edge of the door to travel from a point one inch away from the open jamb to a point one inch from the center meeting point of the doors.

(b) The force necessary to prevent closing of the hoistway door (or the car door or gate if power operated) from rest shall be not more than 30 lbs.

(9) Reopening Device for Power Operated Car Doors or Gates. Where required by 524 CMR 17.12(7)(c) or 17.12(8), a power operated car door or gate shall be provided with a reopening device which will function to stop and reopen a car door or gate and the adjacent hoistway door in the event that the car door or gate is obstructed while closing. For center opening doors the reopening device shall be so designed and installed that the obstruction of either door panel when closing will cause the reopening device to function.

17.12: continued

(10) Sequence Operation of Power Operated Hoistway Doors with Car Doors or Gates.

(a) Where Required. Sequence operation shall be provided under the following conditions: Sequence opening and closing shall be provided for power operated vertically sliding bi-parting counterbalanced or power operated vertically sliding hoistway doors which slide down to open where used on passenger elevators or on freight elevators permitted to carry employees. (*See* 524 CMR 17.15(4) in conjunction with power operated vertically sliding car door or gate).

EXCEPTION: Doors at openings used exclusively for freight.

(b) Operating Requirements. The sequence operation of a hoistway door and adjacent power operated vertically sliding car door or gate shall conform to the following:

1. In opening, the hoistway door shall be opened at least ⅔ its travel before the car door or gate can start to open.
2. In closing the car door or gate shall be at least ⅔ its travel before the hoistway door can start to close.

17.13: Car Construction

(1) Car suspension frames and platform frames of passenger and freight elevators, and platform stringers of freight elevators shall be constructed of steel meeting not less than the requirements of specification A7 of the ASTM.

(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 1* for passenger cars and in 524 CMR 17.13: *Table 2* for freight cars.

The stresses tabulated below are based on steels having an ultimate strength from 55,000 to 65,000 lbs. per sq. inch for rolled sections or cast steel and 46,000 to 56,000 lbs. per sq. inch for rivets. For steels of greater ultimate strength, the allowable stresses may be increased proportionately.

TABLE 1.
ALLOWABLE STRESSES FOR PASSENGER CAR-FRAME AND PLATFORM MEMBERS

Loading	Maximum Allowable Stress (lb.per.sq.in.)		Basis
Tension	10,000		Net area
Bending	10,000		Gross section
Shear on shop rivets	8,000		Net area
Bearing on shop rivets	16,000		Net area
Shear on bolts in clearance holes	7,000		Gross section
Bearing on bolts in clearance holes	14,000		Gross section
Bolts or threaded portions of rods in tension	6,000		Net area
Compression	11,700	59 L/R	Gross area

L = effective free length of member in inches R = least radius of gyration in inches

17.13: continued

TABLE 2.
ALLOWABLE STRESSES FOR FREIGHT CAR-FRAME AND PLATFORM MEMBERS

Loading	Maximum Allowable Stress (lb.per.sq.in.)		Basis
Tension	12,000		Net area
Bending of car frame member and platform framing at entrance	12,000		Gross section
Bending on platform stringers	15,000		Gross section
Shear on shop rivets	9,500		Net area
Bearing on shop rivets	19,000		Net area
Shear on bolts in clearance holes	8,000		Gross section
Bearing on bolts in clearance holes	16,000		Gross section
Bolts or threaded portions of rods in tension	8,000		Net area
Compression	14,000	59L/R	Gross section

L = effective free length of member in inches R = least radius of gyration in inches

(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 anchorage's, releasing carriers and guideshoe stands.

(4) The deflection of crosshead and safety plank shall not exceed ⅛ 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° with the horizontal.

(10) The requirements for loading classifications will 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 qualified welders; and all work upon completion shall be approved by the state elevator inspector before the elevator, escalator, dumbwaiter, *etc.*, is placed in service. EXCEPTION: Tack welds not later incorporated into finished welds carrying calculated loads.

17.14: Car Enclosures

(1) General.

(a) Each power passenger or freight elevator car shall be fully enclosed on top and at all sides other than above the top of a power freight elevator car gate.

17.14: continued

(b) The car enclosure shall be secured to the car platform and sling in such a manner that it cannot work loose or become displaced in ordinary service.
(c) No part of a car enclosure shall deflect either so as to reduce the minimum clearances specified in 524 CMR 17.04 or more than one inch when subjected to any single horizontally applied force of 75 lbs.
(d) Means for ventilating shall be provided for all cars with solid enclosures and solid doors.
(e) No elevator shall have more than two entrances.
(f) No elevator shall have more than one compartment.
(g) Glass exceeding one square foot in area may be used in passenger elevator cars. Such glass shall:
1. Be laminated type glass and properly secured;
2. Meet all requirements, except as to transparency, as provided in Reference Codes ANSI Z97.1.
3. Be so mounted in the structure that the structure, including the glass in place, shall withstand without damage all required elevator tests.
4. The Z97.1 marking must be visible on each piece of glass after installation.

(2) Passenger or freight elevators may have two compartments, one of which is located immediately above the other provided the compartments elevator conforms to the following requirements:
(a) The elevator shall be used exclusively for passengers or exclusively for freight at any one time.
(b) Each compartment shall conform to the requirements of 524 CMR 17.00 except that a trap door in the floor of the upper compartment shall provide access to the top emergency exit for the lower compartment.
(c) Where either or both compartments are intended for passenger service, the minimum rated load for each compartment shall conform to the requirements of 524 CMR 17.15.
Where one compartment is intended for freight use, its minimum rated load shall conform to the requirements of 524 CMR 17.15 or shall be based on the freight loads to be handled, if greater than the minimum rated load requirement.
Where both compartments are used exclusively for freight, the minimum rated load of each compartment shall conform to the requirements of 524 CMR 17.15(3).
The rated load of the elevator shall be the sum of the rated loads of the individual compartments.
(d) An emergency stop switch conforming to the requirements of 524 CMR 17.35(6) and 17.35(7) shall be provided in each compartment, and these emergency stop switches shall be so connected that the car cannot run.
(e) All hoistway doors shall be closed and locked and the car doors for each compartment closed before the car can be operated.

(3) Power Passenger Elevator Car Enclosures, Sides and Top.
(a) Power passenger elevator car enclosures shall be either of metal, fire-retardant wood or equally fire-retardant materials provided that untreated wood or materials of equivalent combustible characteristics may be used if covered with sheet metal not less than No. 27 U. S. Gauge (0.0172 inch) or equivalent approved non-combustible material applied directly to all exterior surfaces of the enclosure. Finishes or linings of materials shall be permitted on the interior of the car provided that the requirements of ANSI/ASTM E84 and E648 are met.
(b) Openings in an enclosure, other than as required for entrance, vision panels, emergency exit, and ventilation, are prohibited.
(c) Ventilating openings less than seven feet above the car platform shall reject a ball two inches in diameter.
(d) No cast iron shall be used for car tops.
(e) Each passenger elevator car shall be of solid construction and designed and installed to be capable of sustaining a load of 300 lbs. on any square area two feet on a side and 100 lbs. applied at any point. Simultaneous application of these loads is not required.
(f) Smoking or carrying a lighted pipe, cigar, cigarette or other ignited smoke or flame carrying device in a passenger elevator shall be prohibited.

17.14: continued

(4) Power Passenger Elevator Car Emergency Exits.

(a) Each power passenger elevator car shall be provided with an emergency exit in the top of the car.

(b) In addition to the top emergency exit, whenever there is an adjacent elevator which is not more than two feet six inches away and without intervening hoistway partitions, counterweights, or similar obstruction, a side emergency exit may be provided in each car to permit emergency passage to each adjacent car.

(c) Top emergency exit panels shall:

1. Be not less than 400 sq. inches in area;
2. Measure not less than 16" on any one side.

The exit panel shall open outward and shall be so hinged or otherwise attached to the car top that the panel can be opened from the top of the car only. At no time shall the panel project beyond the line of the car top and shall be arranged so that no equipment mounted in or on the car top obstructs a clear passageway.

NOTE: The exit cover shall be kept in the closed position when not in use by a manually operated self-locking latch or bolt without the use of keys or tools. A handle shall be attached to the top of the exit frame for convenience in opening.

(d) Side emergency exit panels if installed shall:

1. Be of the hinged type, open only into the car;
2. Be not less than 16" in width;
3. Be extended from the floor or base molding up to the soffit molding and in no case less than five feet in height;
4. Be located where passage of persons is not obstructed by car frame members or by fixed hoistway equipment;
5. Be provided with a lock arranged so that the door may be opened from inside the car by means of a removable key and from the outside of the car by means of a non-removable handle.
6. Be provided with an electric contact which shall prevent the operation of the car by the operating devices when the panel is open on all automatic operation or continuous pressure operation elevators which may be operated from both the car and the landings.

(5) Power Passenger Elevator Car Doors.

(a) Cars of passenger elevators which can be operated from the car only and cars of automatic operation passenger elevators shall be provided with a horizontal door or horizontal gate at each entrance as follows:

1. Elevators shall be provided with horizontal car doors.
2. Elevators installed in hoistways where space conditions do not permit the installation of car doors may be provided with horizontal gates.

(b) The car door or gate when closed shall guard the full opening, and each door or gate shall be provided with a car door or gate electric contact. Car gates where permitted shall be of a design which will reject a ball three inches in diameter and shall be so guided top and bottom and of such strength as not to deflect past the line of the car sill when subjected to a force of 100 lbs. applied horizontally at any point. Collapsible type power gates shall not be power opened for a space in excess of nine inches from full closure.

(c) Car doors for passenger elevators, employing a type of operation which does not require the presence of an operator in the car and which are closed by power other than by hand, shall be driven by a mechanism so designed and set that the force necessary to prevent the closing of the door shall not exceed 30 lbs. The kinetic energy of the door plus all parts connected rigidly thereto, computed for the average closing speed, shall not exceed five foot-pounds. Where the same mechanism also closes the hoistway door, the total kinetic energy shall not exceed seven foot-pounds.

(d) All power operated car doors and gates shall be provided with a reopening device which will function to stop and reopen the car door or gate and the adjacent hoistway door, in the event that the car door or gate is obstructed while closing.

For center opening doors the reopening shall be so designed and installed that the obstruction of either door panel when closing will cause the reopening device to function.

(e) For automatic-operation passenger elevators having power closed or automatically released, self-closing car doors and manually closed or self-closing hoistway doors, the closing of the car door shall be delayed until the hoistway door is in the closed position.

17.14: continued

(f) Each car door for power passenger elevators may be provided with wired glass panels not to exceed a width of six inches and a height of 24".
(g) Sliding car doors shall operate in guides.
(h) Hangers for power-operated car doors shall be designed to withstand a downward thrust of five times, and an upward thrust of four times, the weight of the door.
(i) Each car door or gate shall be provided with a car door or gate electric contact.

(6) Power Freight Elevator Car Enclosure Sides and Top.
(a) Freight elevator car sides shall be of solid metal construction to a height of not less than six feet above the car platform. Above six feet, car sides other than that section opposite a counterweight shall be extended to the car top or crosshead and shall be of solid metal construction or of perforated metal or of wire mesh not less than No. 13 Steel Wire Gauge construction which will reject a ball 1½ inches in diameter. The section of the car enclosure opposite a counterweight shall be extended to the car top or crosshead and shall be of solid metal construction.
(b) Each freight elevator car top shall be of solid construction or open metal construction which will reject a ball 1½ inches in diameter, capable of sustaining a load of 300 lbs. on any square area of two feet on each side or 150 lbs. applied on any spot.
(c) Where sheet metal is used, it shall be equal in strength and stiffness to not less than No. 14 U. S. gauge sheet metal (0.078 inch).
(d) The front section of each freight elevator car top shall be hinged along a line not less than 18 inches from the front of the car or an emergency top exit shall be provided.

(7) Power Freight Elevator Car Doors or Gates.
(a) A car door or gate shall be provided at each entrance to power elevator freight cars.
(b) Each door or gate shall be provided with a car-door or gate electric contact, or with an interlock.
(c) Car gates for freight elevators when closed shall guard the full width of the opening, and they shall be not less than six feet high.
(d) If vertical bi-parting counterbalanced doors are power operated, the landing door shall not start to close until after the car gate is within twelve inches of full closure and, on opening, the car gate shall not start to open until the landing door is within twelve inches of its full open position.
(e) Collapsible gates when fully expanded shall reject a ball four and one half inches in diameter. Vertical lifting type car gates shall be of a design to reject a ball two inches in diameter.
A gate made in two or more parts which slide or telescope by each other in the same direction may be used if the gate is solid or if the openings are ⅜ inch square or smaller, and if the edges of adjacent parts of the gate always lap so that the danger of injury due to shear is eliminated.
(f) A weight used to close automatically or counterbalance a car door or gate shall run in metal guides from which it cannot become dislodged, or it shall be boxed in. The bottoms of the guides and boxes shall be so constructed as to retain the weight if the suspension member breaks.
(g) Sliding car doors for power freight elevators may be solid, may be provided with open grille or bars which shall reject a ball two inches in diameter, and may be provided with glass vision panels. Grilles or bars may extend the full height of the door panel.
(h) Sliding car doors or gates shall operate in guides.
(i) Hangers for power operated car doors shall be designed to withstand a downward thrust of five times, and an upward thrust of four times, the weight of the door.

(8) Location of Power Passenger and Power Freight Car Doors and Gates. Doors or gates for automatic or continuous-pressure operation elevators shall be so located that the distance from the face of the car door or gate to the face of the hoistway door shall be not more than the following:
(a) Where a swing-type hoistway door and a car gate are used -- four inches.
(b) Where a swinging-type hoistway door and a car door are used -- 5½ inches.

17.14: continued

(c) Where a sliding-type hoistway door and a car gate or door are used -- 5½ inches. The distance specified shall be measured as follows:

1. Where multi-section car and hoistway sliding doors are used, or where one of these doors is multi-section and the other is single-section, between the section of the two doors nearest to each other.

2. Where a multi-section car door and a swinging-type hoistway door are used, between the hoistway door and the section of the car door farthest from it.

3. Where a car gate is used, between the car gate and that section of the hoistway door nearest to the car gate.

Where existing distances are greater than specified by 524 CMR 17.14(8)(a), (b), or (c), a space guard or baffle of sheet metal shall be provided, attached to the hoistway door and/or car door. The guard is to be mounted by a tamper-proof means. The bottom of the guard shall be not less than one eighth inch, nor more than one half inch from the edge of the sill. The face of the guard shall run vertically not less than forty inches nor more than the height of the vision panel. The guard shall extend the full width of the door. The top of the guard shall be inclined toward the face of the door at an angle of not less than 60°. nor more than 75° from the horizontal. Exposed edges shall be beveled or rolled to eliminate sharp edges. The guard shall be sufficiently rigid or reinforced to prevent collapsing or denting. Mounting of the guard shall have proper clearances at the bottom and sides to permit easy closing of the door and shall not interfere with self-closing. On multi-section horizontally sliding doors only the leading or fast panel shall be fitted with the space guard. For swinging doors, the sides of the guard shall be closed.

(9) Power Elevator Car Door or Gate Electric Contact.

(a) The electric contact of the car door or gate, other than when the car is being operated by inching or leveling devices, shall prevent the operation of the car by the operating devices unless the door or gate is in the closed position.

(b) Horizontal sliding type doors or gates shall be considered in the closed position when the clear open space between the edge of a door or gate and the nearest face of the jamb does not exceed two inches. Where the car gate is the vertical slide type, the gate shall be considered in the closed position when the lower horizontal member of the gate is not more than three inches above the car sill. Where the car door or gate of an elevator that can be operated from the car only is provided with a door closer, the electric contact on the car door or gate may permit the starting of the car when the clear open space does not exceed four inches.

(c) The car door or gate contact shall be located so that it is not normally accessible to a person standing on the car platform.

(d) Car door or gate contacts shall open the operating circuit and shall be positively opened by a lever or other device attached to and operated by the door or gate. Contacts shall be maintained in the open position by gravity or a restrained spring or both, or by means of a positive linkage.

(e) Each type and make of contact shall be tested and approved on the basis of tests conforming to the best engineering practice made by or under the supervision of a competent designated laboratory. Minor changes in design may be made without retesting, subject to the approval of either the state elevator inspector or the testing laboratory. In case any question arises as to what is the best engineering practice, tests conforming to the American National Standard Safety Code for Elevators and Escalators (ASME A17.1) shall be considered as conforming thereto. Such contacts shall be suitably marked for identification.

(10) Platform Guards (Aprons). The entrance side of the platform of passenger and freight elevators equipped with leveling devices or truck-zoning devices shall be provided with smooth metal guard plates of not less than No. 16 US gauge steel, or material of equivalent strength and stiffness, adequately reinforced and braced to the car platform and conforming to the following:

(a) It shall extend not less than the full width of the widest hoistway door opening.

(b) It shall have a straight vertical face, extending below the floor surface of the platform, of not less than the depth of the leveling or truck zone, plus three inches.

(c) The lower portion of the guard (three inches) shall be bent back at an angle of not less than 60° nor more than 75° from the horizontal.

17.14: continued

(d) The guard plate shall be securely braced and fastened in place to withstand a constant force of not less than 150 lbs. applied at right angles to and at any position on its face without deflecting more than one quarter inch and without permanent deformation.

Where the car entrance on the truck loading side is provided with a collapsible type gate and the height of the hoistway door opening is greater than the distance from the car floor to the car top, a head guard extending the full width of the door opening shall be provided on the car to close the space between the car top and the soffit of the hoistway door opening when the car platform is level with the floor at the truck loading landing entrance.

17.15: Capacity and Loading

(1) Contract Load of Passenger Elevators

(a) For passenger elevators having platform areas not exceeding 50 square feet the contract load shall be not less than determined by the following formula:

$L = .667A^2 + 66.7A$

(b) For platform areas exceeding 50 square feet, the contract load shall be not less than:

$L = .0467A^2 + 125A - 1367$ where L = contract load in pounds and A = net inside area of car in square feet.

(c) Table below shows the maximum net inside car areas for various contract loads:

TABLE 1.

Duty Load	Net Car Area	Duty Load	Net Car Area
500	7.0	4500	46.2
600	8.3	5000	50 .0
700	9.6	6000	57.7
1000	13.25	7000	65.3
1200	15.6	8000	72.9
1500	18.9	9000	80.5
1800	22.1	10000	88.0
2000	24.2	12000	103.0
2500	29.1	15000	125.1
3000	33.7	18000	146.9
3500	38.0	20000	161.2
4000	42.2	25000	196.5

(2) Capacity Plate and Signs for Passenger and Freight Elevators.

(a) In each passenger 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 one-quarter inch 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.

(b) In each freight elevator car, the capacity shall be indicated in a conspicuous place in letters and figures not less than one inch high, by the word "CAPACITY", followed by figures giving the contract load in pounds.

(c) Upon the crosshead of each power elevator car, a metal plate shall be placed, bearing the following information:

The weight of the complete car, including the safeties;

The contract car speed in feet per minute at which the elevator is designed to travel;

The number, diameter in inches, and the rated ultimate strength in pounds of wire ropes.

(d) In every freight elevator a sign shall be posted with one of the following markings:

1. THIS ELEVATOR DESIGNED FOR GENERAL FREIGHT LOADING.
2. THIS ELEVATOR DESIGNED FOR MOTOR VEHICLE LOADING.
3. THIS ELEVATOR DESIGNED FOR INDUSTRIAL TRUCK LOADING.

Sign plates shall be of metal and letters shall be not less than ½" and stamped in, etched, or raised on the surface of the plate.

17.15: continued

(3) Minimum Load for Freight Elevators.

(a) Minimum Load Permitted.

The minimum load for freight elevators in pounds shall be based on the weight and class of the load to be handled, but shall in no case be less than the minimum specified in 524 CMR 17.15(3)(b) for each class of loading based on the inside net platform area.

(b) Classes of Loading.

Freight elevators shall be designed for one of the following classes of loading:

1. Class A -- General Freight Loading.

Where the load is distributed, the weight of any single piece of freight or of any single hand truck and its load is not more than ¼ the rated load of the elevator, and the load is handled on and off the car platform manually or by means of hand trucks.

For this class of loading, the rated load shall be based on not less than 50 lbs. per square foot of inside net platform area.

2. Class B -- Motor Vehicle Loading.

Where the elevator is used solely to carry automobile trucks or passenger automobiles up to the rated capacity of the elevator.

For this class of loading, the rated load shall be based on not less than 30 lbs. per square foot of inside net platform area.

3. Class C. -- Where an elevator carries or is loaded or unloaded by an industrial power truck other than a hand truck with a total weight of more than ¼ of the rated load of the elevator one of the three following types of Class loading shall apply.

Class C1 -- Industrial Truck Loading where truck is carried by the elevator.

Class C2 -- Industrial Truck Loading where truck is not carried by the elevator but used only for loading and unloading.

Class C3 -- Other loading with Heavy Concentrations where industrial truck is not used.

These loadings apply where the weight of the concentrated load including an industrial power or hand truck, if used, is more than ¼ the rated load and where the load to be carried does not exceed the rated load.

The following requirements shall apply to Class C1, Class C2 and Class C3 loadings:

The rated load of the elevator shall not be less than the load (including any truck) to be carried, and shall in no case be less than load based on 50 lbs. per square foot of inside net platform area.

The elevator shall be provided with a two-way automatic leveling device (see definition).

For Class C1 and Class C2 loadings, the following additional requirements shall apply:

For elevators with rated loads of 20,000 lbs. or less, the car platform shall be designed for a loaded truck of weight equal to the rated load or for the actual weight of the loaded truck to be used, whichever is greater. For elevators with rated loads exceeding 20,000 lbs., the car platform shall be designed for a loaded truck weighing 20,000 lbs., or for the actual weight of the loaded truck to be used, whichever is greater.

For Class C2 loading, the maximum load on the car platform during loading or unloading shall not exceed 150% of the rated load.

For any load in excess of rated load on elevators with a rated load of 20,000 lbs. or less, the driving machine motor, brake and traction relation shall be adequate to sustain and level the full 150% of rated load.

For any load in excess of the rated load on elevators with a rated load exceeding 20,000 lbs., the driving machine motor, brake and traction relation shall be adequate to sustain and level the rated load plus either 10,000 lbs. or the weight of the unloaded truck to be used, whichever is greater.

(4) Employees and Emergency Loading of Freight Elevators.

(a) Freight elevators may be used only by those persons required for handling freight.

(b) It shall be allowable at stated hours to carry employees, but not the general public, on a freight elevator, provided that the freight elevator conforms to the load-carrying requirements for passenger elevators (524 CMR 17.15(1)) and a special permit is granted by the enforcing authority subject to the following:

Car-switch operated elevators and continuous-pressure operated elevators shall be in charge of a licensed operator when used to carry employees at stated hours.

Stated hours shall be determined by the enforcing authority.

17.15: continued

(c) It shall be allowable to carry passengers on a freight elevator under emergency conditions, equal in number to the contract load divided by 150.

(5) Safe Lift Devices.

(a) When power freight elevators are used for carrying safes or other one-piece loads greater than the contract load of the elevator, and when power passenger elevators are used for carrying concentrated loads greater than 75% of the contract load of the elevator, the requirements of 524 CMR 17.15(5)(b) through 17.15(5)(i) shall be complied with as follows:

(b) A locking device shall be provided which will hold the car at any landing independently of the hoisting ropes while the safe or other object is being loaded or unloaded.

(c) The locking device shall be so designed that it cannot be unlocked unless the entire weight of the car and load is suspended on the ropes.

(d) The wrench or other device for operating the locking device shall be removable.

(e) The locking device shall be designed to withdraw the bars should it come in contact with the landing locks if the car is operated on the up motion.

(f) A metal plate shall be provided in the elevator car which shall bear the words "Capacity Lifting Safes" in letters followed by figures giving the capacity in pounds for lifting safes for which the machine is designated, the letters and figures to be no less than one-quarter inch high, stamped, etched, or raised on the surface of the plate

(g) The car platform, car frame, sheaves, shafts, ropes and locking devices shall be designed for the specified "Capacity Lifting Safes" with a factor or safety of not less than five.

(h) The car safeties shall be designed to stop and hold the specified "Capacity Lifting Safes" with the ropes intact.

(i) Where there is a passageway under the hoistway, the machine shall be designed to operate with the "Capacity Lifting Safes" at slow speed and the car safety shall be designed to stop and hold the car and "Capacity Lifting Safes" independently of the ropes.

(6) Operating Switch Location. All elevator machines equipped for carrying safes or other one-piece loads greater than the contract load of the elevator shall be provided with a special car switch near the machine for operating under such conditions.

17.16: Car and Counterweight Safeties and Speed Governors

(1) Power elevators suspended by ropes shall be provided 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" 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 lbs. per sq. in. and cast steel of an ultimate strength of not less than 65,000 lbs. per sq. in., may, in action, be stressed to 17,000 lbs. per sq. in. 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 ½ 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(19)) 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.*

17.16: continued

TABLE 1.
MAXIMUM AND MINIMUM STOPPING DISTANCES
TYPE B CAR SAFETIES WITH RATED LOAD, AND OF TYPE B
COUNTERWEIGHT SAFETIES

Rated Speed in Feet Per Minute	Maximum Governor Trip Speed in Feet Per Minute	Stopping Distances in Feet-Inches Minimum	Maximum
0 to 125	175	0-6	1-3
150	210	0-6	1-4
175	250	0-8	1-7
200	280	0-9	1-10
225	308	0-10	2-0
250	337	0-11	2-3
300	395	1-1	2-9
350	452	1-3	3-4
400	510	1-6	4-0
450	568	1-9	4-10
500	625	2-1	5-8
600	740	2-9	7-7
700	855	3-7	9-10
800	970	4-6	12-6
900	1085	5-5	15-3
1000	1200	6-8	18-6
1100	1320	7-11	22-4
1200	1440	9-4	26-4
1300	1560	10-11	30-11
1400	1680	12-7	35-7
1500	1800	14-5	40-10

(i) Counterweight safeties where furnished shall conform to the requirements for car safeties except where otherwise specified.

EXCEPTIONS:

1. Where otherwise specified in 524 CMR 17.16(3).
2. For rated speeds of not over 125 feet per minute counterweight safeties may be operated as the result of breaking or slackening of the hoisting ropes and may be of the inertia or other approved type without governors. (See 524 CMR 17.16(3)).

(j) Safeties shall be so designed that on their application the forces which provide the stopping action shall be compressive forces on each side of the guide-rail section.

(2) Speed governors for car safeties shall be set to trip at over speeds as follows:

(a) At not less than 115% of rated speed.

(b) At not more than the tripping speed listed opposite the applicable rated speed in 524 CMR 17.16: *Table 2.*

17.16: continued

TABLE 2.
MAXIMUM SPEEDS AT WHICH SPEED GOVERNOR TRIPS
AND GOVERNOR OVERSPEED SWITCH OPERATES

Rated Speed in Feet Per Minute	Maximum Governor Trip Speed in Feet Per Minute	Maximum Speed at Which Governor Overspeed Switch Operates, Down Feet Per Min.
0 to 125	175*	
150	210*	
175	250	225
200	280	252
225	308	277
250	337	303
300	395	355
350	452	407
400	510	459
450	568	512
500	625	563
600	740	703
700	855	812
800	970	921
900	1085	1031
1000	1200	1140
1100	1320	1254
1200	1440	1368
1300	1560	1482
1400	1680	1596
1500	1800	1710

* Governor Overspeed Switch Not Required

(3) The counterweight safety, where required, shall be operated by a separate speed governor. Provision shall be made to cause the application of the counterweight safety at a speed greater than that at which the car safety is applied, but not more than 10% above that speed. Broken rope safeties of the instantaneous type may be used on counterweights within the limits of the following:

TABLE 3.

Contract Speed	Total Weight of Counterweight
250 fpm	2000 lbs
200 fpm	3000 lbs
160 fpm	4000 lbs
125 fpm	5000 lbs

EXCEPTION: Speed governors are not required for the operation of counterweight safeties having a rated speed of not more than 125 feet per minute.

Every car safety shall be provided with a switch operated by the car safety mechanism. This switch shall conform to the requirements of 524 CMR 17.16(10).

(4) Car safeties shall be either of the instantaneous type or shall be of the sliding type which will bring the car to a stop or within the limits of the retardation hereinafter specified. Instantaneous type car safeties shall not be used for contract speeds exceeding 125 F.P.M.

17.16: continued

(5) The distance between the safety jaws shall not be less than the thickness of the guide rail plus 3/32" and the jaws shall not drag against the rail. Where roller or other types of guide shoes are used arranged with springs or other means which provide for a definite and limited movement of the car or counterweight with respect to the guide rails, minimum clearance specified shall be increased by an amount sufficient to prevent the safety jaws from coming in contact with the guide rails should the maximum car movement permitted by the guide shoes occur.

(6) Safeties shall be marked by the manufacturer with the range of weight and speed for which they are designed; said weight to include the complete car structure, the safety, the contract load in the car, and all moving equipment the weight of which is borne by the safety.

(7) Overspeed instantaneous safeties shall be applied by the governor. On the parting of the hoisting ropes governor applied instantaneous safeties shall apply instantly and independently of the speed action of the governor.

(8) No safety shall be permitted for stopping an ascending car or counterweights.

(9) The governor shall be located where it cannot be struck by the car in case of overtravel and where there is sufficient space (that is, not less than eight inches) for full movement of governor parts.

(10) A switch shall be provided on the speed governor and operated by the overspeed action of the governor when used with Type B and C car safeties of elevators having a rated speed exceeding 125 feet per minute, and when used with counterweight safeties.

Every car safety shall be provided with a switch operated by the car safety mechanism when the safety is applied.

These switches shall, when operated, remove power from the driving-machine motor and brake before or at the time of application of the safety.

(a) The setting of the car speed-governor overspeed switch shall conform to the following:

1. For rated speeds more than 125 feet per minute, up to and including 500 feet per minute, 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.

2. For rated speeds more than 500 feet per minute, the car speed-governor overspeed switch shall open in the down direction of the elevator at not more than 95% of the speed at which the governor is set to trip in the down direction.

3. The switch, when set as specified in either 524 CMR 17.16(10)(a)1. or 17.16(10)(a)2., 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.

EXCEPTION: The speed-governor overspeed switch may be set to open in the down direction of the elevator at not more than 100% of the speed at which the governor is set to trip in the down direction, subject to the following requirements:

A speed-reducing switch of the manually reset type is provided on the governor which will reduce the speed of the elevator in case of overspeed, and which shall be set to open as specified in 524 CMR 17.16(10)(a)1. and 17.16(10)(a)2.

Subsequent to the first stop of the car following the opening of the speed-reducing switch, the car shall remain inoperative until the switch is manually reset.

(b) Switches used to perform the functions specified shall be positively opened. Overspeed and speed-reducing switches, permitted by the exception to 524 CMR 17.16(10)(a), operated by the speed governor shall remain in the open position until manually reset. Switches operated by the car safety mechanism shall be of a type which will not reset unless the car safety mechanism has been returned to the off position.

(11) The size, material, and construction of the governor rope, together with the rated tripping speed of the governor, shall be stamped on the governor stand or given on a brass plate attached to it in letters not less than ¼ inch in height.

17.16: continued

(12) The arc of contact between the governor rope and the driving sheave shall, in conjunction with a tension device, provide sufficient traction to cause proper operation of the governor.

(a) The minimum length of governor jaws shall be such that no serious cutting, tearing, or deformation of the rope shall result from the operation of the safety.

(b) Governor jaws for sliding type safeties shall be so designed that the rope will pull through these jaws on the application of a stress exceeding that required to operate so as to stop the car.

(13) Elevators having winding-drum machines shall be provided with a slack-rope device which will cut off the power and stop the elevator machine if the car is obstructed in its descent. Slack-rope switches shall be constructed so that they will not automatically reset when the slack in the rope is removed.

(14) No car safety which depends on the completion or maintenance of an electric circuit for the application of the safety shall be used. Car safeties shall be applied mechanically.

(15) The gripping surfaces of the car or counterweight safeties shall not be used to guide the car or counterweights.

(16) A pawl or ratchet or chisel point safety shall not be used.

(17) Speed governors shall have their means of speed adjustment sealed after test. If speed governors are painted after sealing, all bearing and rubbing surfaces shall be kept free or freed of paint and a hand test made to determine that all parts operate freely as intended. Seals shall be of a type which will prevent readjustment of the governor tripping speed without breaking the seal.

(18) Each governor shall be sealed directly after testing by the authorized inspector conducting the test. No person other than an authorized inspector shall tamper with, break, or remove the seal.

(19) The governor-rope releasing carrier on the car (or on the counterweight) shall be set to require a tension in the governor rope, to pull the rope from the carrier, of not more than 60% of the pull-through tension developed by the governor; and the carrier shall be designed so that the pull-out tension cannot be adjusted in a normal manner to exceed the amount specified.

(20) Car safety devices (safeties) are identified and classified on the basis of performance characteristics after the safety begins to apply pressure on the guide rails. On this basis, there are three types of safeties:

(a) Type A Safeties. Safeties which develop a rapidly increasing pressure on the guide rails during the stopping interval, the stopping distance being very short due to the inherent design of the safety. The operating force is derived entirely from the mass and the motion of the car or the counterweight being stopped. These safeties apply pressure on the guide rails through eccentrics, rollers or similar devices, without any flexible medium purposely introduced to limit the retarding force and increase the stopping distance.

(b) Type B Safeties. Safeties which apply limited pressure on the guide rails during the stopping interval, and which provide stopping distances that are related to the mass being stopped and the speed at which application of the safety is initiated. Retarding forces are reasonably uniform after the safety is fully applied. Continuous tension in the governor rope may or may not be required to operate the safety during the entire stopping interval. Minimum and maximum distances are specified on the basis of governor tripping speed (see 524 CMR 17.16(1)(h)).

(c) Type C Safeties. (Type A with Oil Buffers). Safeties which develop retarding forces during the compression stroke of one or more oil buffers interposed between the lower members of the car frame and a governor-operated type A auxiliary safety plank applied on the guide rails. The stopping distance is equal to the effective stroke of the buffers.

17.16: continued

(21) Type C safeties may be used subject to the following requirements:

(a) The rated speed shall be not more than 500 feet per minute.

(b) The oil buffers shall conform to all requirements specified in 524 CMR 17.31 for oil buffers, except that the stroke shall be based on governor tripping speed and on an average retardation not exceeding 32.2 feet per second.

(c) After the buffer stroke, as defined in 524 CMR 17.16(21)(b) has been completed, provision shall be made for an additional travel of the plunger or piston of not less than 10% of the buffer stroke to prevent excessive impact on the buffer parts and the auxiliary safety plank.

(d) Where the distance between guide rails exceeds eight feet, the safety shall be provided with two oil buffers of substantially identical calibration; and the buffers shall be so located as to develop minimum stresses in the auxiliary safety plank during safety operation. Buffers shall be located in line with and symmetrically between the guide rails.

(e) The auxiliary safety plank shall be so supported and guided below the car frame that the clearances specified in 524 CMR 17.16(5) for the safety parts are maintained during normal operation. The auxiliary safety plank shall be so designed that the maximum stresses in the plank shall not exceed those specified for similar car-frame members in 524 CMR 17.13.

(f) The rail-gripping device of the auxiliary safety plank shall be so arranged and connected as to prevent the plank from being out of level more than ½" in the length of the plank when the safety is operated to stop the car.

(g) An electric switch shall be provided and so arranged and connected that the elevator cannot be operated by means of the normal operating device if any buffer is compressed more than 10% of its stroke.

(h) Means shall be provided to prevent operation of the elevator by means of the normal operating device if the oil level in any buffer is below the minimum allowable level.

(22) For all type B safeties the movement of the governor rope, relative to the car or the counterweight respectively, required to operate the safety mechanism from its fully retracted position to a position where the safety jaws begin to exert pressure against the guide rails, shall not exceed the following values based on rated speed:

(a) For Car Safeties:

200 feet per minute or less -- 42 inches
201 to 375 feet per minute -- 36 inches
Over 375 feet per minute -- 30 inches

(b) For Counterweight Safeties: All speeds -- 42 inches.

Drum-operated car and counterweight safeties, requiring continual unwinding of the safety drum rope to fully apply the safety, shall be so designated that not less than three turns of the safety rope will remain on the drum after the overspeed test of the safety has been made with rated load in the car.

(23) Speed Governor Data Plate. A metal plate shall be securely fastened to all speed governors and shall include the following information in legible, permanent figures and letters ¼ inch in height:

(a) The speed in feet per minute at which the governor is set and sealed to trip the governor rope grip jaws.

(b) The size, material, and construction of the governor rope on which the governor jaws were designed to operate.

(24) Hydraulic cylinders buried in the ground, installed without a safety bulkhead shall have governor-operated safeties or a plunger gripper installed by January 1, 2004.

17.17: Car Speeds

Depending upon the type of control, the maximum contract speeds of elevators shall be as follows:

(1) Variable voltage or unit multi-voltage shall not exceed 1500 feet per minute.

(2) Direct current Rheostatic shall not exceed 600 feet per minute.

(3) Hydraulic shall not exceed 500 feet per minute.

17.17: continued

(4) Alternating current 200 feet per minute.

(5) Continuous pressure 150 feet per minute.

(6) Electro-hydraulic 200 feet per minute.

17.18: Illumination of Cars and Lighting Fixtures

(1) Lights and Illumination Required. Cars shall be provided with an electric light or lights; not less than two lamps shall be provided. The minimum illumination at the landing edge of the car platform when the car and landing doors are open shall be not less than the following:

(a) For passenger elevators, five foot candles.
(b) For freight elevators, 2½ foot candles.
(c) Adequate car top lighting will be installed with a guarded bulb.

(2) Light Control Switches. Light control switches are not required, but if provided they shall:

(a) be located in or adjacent to the operating device in the car.
(b) in elevators having automatic operation, be of the key operated type or located in a fixture with a locked cover.

(3) Passenger Car Lighting Devices. Suspended glass used for lighting fixtures shall be supported by a metal frame secured at not less than three points. Fastening devices shall not be removable from the fixture. Glass shall not be drilled for attachment. Light troughs supporting wire raceways and other auxiliary lighting equipment where used shall be of metal, except where lined with non-combustible materials.

NOTE: Lighting arrangements using slow-burning combustible materials for diffusing and illumination purposes shall be permitted provided such combustible materials do not come in contact with lighting equipment.

(4) Guarding of Light Bulbs or Tubes in Passenger Cars. Light bulbs or tubes in passenger cars shall be so guarded as to prevent injury to passengers from breakage of the bulbs or tubes.

(5) Lamp Guards for Freight Cars. Lamps shall be equipped with substantial guards to prevent breakage.

(6) Glass in Car Lighting Fixtures. Glass used in connection with car lighting fixtures shall conform with 524 CMR 17.13(6). Glass exceeding one square foot in area shall be laminated type. The total area of glass in enclosure and doors shall not exceed four square feet.

(7) Emergency Lighting. All elevators, except freight elevators installed prior to June 7, 1991, and passenger elevators installed prior to November 30, 1971, shall be provided with battery operated emergency lighting conforming to the following:

(a) The emergency system shall provide some general illumination for the car. The intensity of illumination four feet above the car floor and approximately one foot in front of a car station shall be not less than 2/10 of a foot candle. Lights shall be automatically turned on in all elevators in service not more than ten seconds after normal lighting power fails. The power system shall be capable of maintaining the above light intensity for a period of four hours.
(b) Not less than two lamps approximately of equal wattage shall be used.
(c) The emergency lighting system shall be kept in workable condition with a built in charger so that it will perform the functions for which it is intended.

NOTE: If an emergency generator provides emergency car lighting within ten seconds after power failure, a battery operated lighting unit is not required.

17.18: continued

(8) Emergency Signal System All elevators, except freight elevators installed prior to June 7, 1991, and passenger elevators installed prior to November 30, 1971, which are located in buildings other than private residences and which are operated at any time without a designated operator in the car shall be provided with an emergency signal system. If the bell and/or the means of two-way conversation is normally connected to the building power supply, it shall automatically transfer to a source of emergency power within ten seconds after the normal supply fails. The power source shall be able to provide for the operation of the bell for one hour and the means of two-way conversation for four hours.

17.19: Contract-Load Test

(1) A contract load test under the supervision of the authorized inspector shall be made of elevators as required by 524 CMR 8.01 This test shall be made with contact load in the car. The brakes, limit switches, buffers, car safety, and speed governor shall be caused to function in each test, and approval of any elevator shall be granted only upon satisfactory completion of such test.

(2) Car and counterweight safeties and governors shall be tested as follows:
(a) Governor operated instantaneous type safeties or sliding type safeties of alternating current elevators shall be tested at rated speed by tripping the governor by hand. In such cases, the governor shall be separately tested for tripping speed.
(b) Sliding type safeties of elevators other than alternating current type shall be tested at governor tripping speed with the wire ropes attached and all electrical apparatus operative except for the overspeed control switch on the governor, if any.
(c) On overspeed tests, the stopping distance of sliding type safeties shall be determined by measuring the marks made on the guide rails by the safety jaws and with rated load in the car shall in accordance with ASME A17.2.1 (Inspectors Manual for Electric Elevators)

17.20: Equipment Prohibited Inside Car

Apparatus or equipment other than that used in connection with the operation of the elevator shall not be installed inside any elevator car.
EXCEPTIONS:
(a) Railroad and conveyor tracks in freight elevators.
(b) Light, heating, ventilation and air conditioning equipment.

17.22: Machines and Machinery

(1) Drums and leading sheaves shall be of cast iron or steel, and shall have finished grooves. U-grooves shall be not more than one-sixteenth 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° 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 mechanism 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.

17.22: continued

(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. 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 qualified in accordance with the requirements of the American Welding Society. At the option of the manufacturer, the welders may be qualified by one of the following:

(a) By the manufacturer.
(b) By a professional engineer.
(c) By a recognized testing laboratory.

(10) Numbering of Elevators. 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

17.23: Hydraulic Elevator Machines, Tanks, Pumps, Valves, and Gauges

(1) Types of Driving Machines. Types of driving machines shall be of the direct plunger type or roped hydraulic type.

(2) Machine and sheave beam supports and their foundations, and overhead beams and overhead sheaves and their supports for counterweights where provided shall conform to 524 CMR 17.02(12) through (17).

(3) Vertical Bottom Clearance. Vertical bottom clearance shall comply to 524 CMR 17.04(2).

(4) Gas Releases. Cylinders of hydraulic-elevator machines shall be provided with means for releasing air or other gas.

(5) Tanks, Pipes and Fittings.

(a) The outlet of pressure tanks shall be so located near the bottom to prevent the entrance of air or other gas into the elevator piping and cylinder under any condition of service. Hydraulic cylinders buried in the ground installed without a safety bulkhead shall have installed governor operated safeties or a plunger gripper by January 1, 2004.
(b) Pressure tanks that may be subjected to vacuum shall be provided with one or more vacuum relief valves to prevent the collapse of the tanks.
(c) Pressure tanks shall be so located and supported that inspection may be made of the entire exterior.
(d) Discharge tanks shall be covered to prevent the entrance of foreign material and provided with a suitable vent to the atmosphere.
(e) Pressure tanks, pipes and fittings shall be made and tested in accordance with the best practice. In case any question arises as to what is the best practice, work done according to the requirements of the ASME Unfired Pressure Vessels Code shall be considered as conforming to the best practice. Welding of all parts on which safe operation depends shall conform to the requirements of 524 CMR 17.22(9). Any person adding hydraulic oil to a unit shall notify the building owner that the cylinder must be replaced or the elevator removed from service.
(f) All piping shall be so supported as to eliminate undue stresses at joints and fittings, particularly at any section of the line subject to vibration.
(g) Flexible connections shall not be installed between the check valve, or control valve, and the cylinder.

17.23: continued

(h) Flexible connections may be installed other than between the check valve, or the control valve, and the cylinder provided the failure of the sealing element shall not permit separation of the joints connected.

(i) Flexible hose shall have a bursting strength of not less than ten times the working pressure. The replacement date of all hose shall not exceed six years and shall be permanently marked with the SAE hose type identification and the required replacement date.

(j) Atmospheric storage and discharge tanks shall conform with the following:

1. They shall be so designed and constructed that when completely filled, the factor of safety shall be not less than four, based on the ultimate strength of the material.

2. They shall be provided with a means of checking the liquid level. Such means shall be accessible without removal of any cover or other part.

(6) Relief Valve. Each pump or group of pumps shall be equipped with a relief valve conforming to the following requirements:

(a) Type and Location. The relief valve shall be located between the pump and the check valve and shall be of such a type and so installed in a by-pass connection that the valve cannot be shut off from the hydraulic system.

(b) Setting. The relief valve shall be pre-set to open at a pressure not greater than 125% of the working pressure at the pump.

(c) Size. The size of the relief valve and by-pass shall be sufficient to pass the maximum rated capacity of the pump without raising the pressure more than 20% above that at which the valve opens. Two or more relief valves may be used to obtain the required capacity.

(d) Sealing. Relief valves having exposed pressure adjustments, if used, shall have their means of adjustment sealed after being set to the correct pressure.

EXCEPTIONS: No relief valve is required for centrifugal pumps driven by induction motors, provided the shut-off, or maximum pressure which the pump can develop, is not greater than 135% of the working pressure at pump.

(e) Manual lowering valves shall be painted a distinctive color, preferably red, and shall have a permanently marked metal plate attached to the hand wheel or other opening or closing device with letters not less than ⅜" in height reading, "Relief Valve".

(f) All work including installation, adjustment, and sealing of valves after being set to correct position, and including the lowering of the car by manual operation of the valves, shall be performed only by a licensed elevator mechanic.

(7) Gauges.

(a) Each pressure tank shall be provided with a gauge glass, having fittings and valves of material that will not be corroded by the fluid, and equipped to automatically shut off the fluid in case of failure of the gauge glass. The gauge glass shall be attached directly to the tank and so located as to indicate the level of the fluid within the working limits.

(b) Each pressure tank shall have a pressure gauge which correctly indicates pressure to at least 1½ times the normal working pressure allowed in the tank. This gauge shall be connected to the tank by a pipe of such material that it will not be corroded by the fluid and in such a manner that the gauge cannot be shut off from the tank except by a cock with a "T" or lever handle. The cock shall be located near the gauge.

(c) Pressure tanks shall be provided with a ¼ inch pipe-size valve connection for attaching an inspector's test gauge while the tank is in service.

(d) Tanks shall be provided with means to render the elevator inoperative in the up direction, if for any reason the liquid level in the tank falls below the permissible minimum.

(8) Plungers and Cylinders of Hydraulic Elevators.

(a) The plunger shall be of uniform diameter and as nearly as possible of uniform thickness and finished on the outside. The pressure end of the plunger shall be provided with a plunger bottom either of greater diameter than the plunger or other means shall be provided to prevent the plunger from traveling beyond the limits of the cylinder without loss of fluid and to prevent the car striking the limits of the hoistway.

(b) Plungers of hydraulic elevators shall be of ample strength and rigidity as a column to support the loads and to withstand the compressive forces impressed upon them with a factor of safety not less than three for any position of the car in the hoistway. Walls of plungers of hydraulic elevators, subject to external pressure, shall be of sufficient thickness to insure stability of the cross-section with a factor of safety not less than three.

17.23: continued

(c) Cylinders of hydraulic elevators shall be designed with a factor of safety of at least five against bursting.
(d) Where plungers are composed of more than one section, the strength at the joints shall be equal to or greater than the strength of the plunger.
(e) Plungers of plunger elevators shall be securely fastened to the car frame or car platform.
(f) Where plunger elevators are provided with a counterbalance and the length and weight of the plunger is such that the weight of the counterweight and counterweight ropes exceeds the weight of the elevator car, the fastening between the plunger and the car frame or platform shall be of sufficient strength to support the entire weight of the plunger. In addition, a rod or loop of galvanized wire rope shall be provided inside the plunger, attached to the bottom of the plunger and the car frame, of sufficient strength to support the weight of the plunger in case the fastening between the top of the plunger and the car should fail.
(g) Sufficient clearance shall be provided at the bottom of the cylinder of hydraulic elevators so that the bottom end of the plunger will not strike the bottom head of the cylinder when the car is resting on the fully compressed buffers or stops.
(h) A permanent type data tag shall be affixed to the tank reservoir unit in the machine room in clear sight, and shall contain the following information:

1. Date of installation
2. Name of installing company
3. Name of manufacturer
4. Piston diameter
5. Manufacturer's designed head pressure.

(i) Hydraulic cylinders buried in the ground without safety bulkheads shall either be replaced or shall have a governor-operated safety or a plunger gripper installed.
(j) All cylinders replaced below ground shall be provided with schedule 40 or greater PVC liner surrounding it for corrosion protection. The PVC liner shall be sealed at the top. If a hydraulic elevator is not equipped with an overspeed (rupture) valve, one shall be added the same time as the cylinder replacement.

(9) General Requirements for Plunger Elevators.
(a) Cars of plunger elevators are not required to be equipped with car safeties, provided the ram or plunger is directly connected to the structural member comprised of the steel bolster, or steel crosshead channels, where steel stile channels are an integral part of the assembly.
(b) Top clearances of plunger elevator cars and counterweights shall comply with the following for contract speeds not in excess of 100 feet per minute:

There shall be a clear distance of not less than two feet (2'-0") between the top of the crosshead of the car and the corresponding point of any obstruction or equipment in the hoistway vertically above it when the plunger is in its fully extended position.

When any equipment on the car projects more than two feet above the car crosshead, the minimum overhead car clearances required shall be increased by the amount which this projection exceeds two feet.

There shall be a clear distance of not less than six inches above the top of the counterweight where provided and the corresponding point of any obstruction in the hoistway vertically above it when the plunger is in its lowest position.
(c) Plunger elevators shall have car guide rails of metal of such dimensions and strength as to withstand the thrusts to which they are subjected.
(d) In all other respects, plunger elevators shall be subject to the requirements for freight and passenger elevators.
(e) When liquid in excess of two gallons per month is added to the tank of a hydraulic elevator or dumbwaiter, where the driving machine is of the direct plunger type, the following rules shall be fully complied with:

1. A log shall be posted in the pump room on the liquid tank in full view of a person instructed to add liquid.
2. The log shall read as follows:
   Amount of liquid added in gallons.
   Date when liquid was added.
   Full name of person adding liquid to the hydraulic tank.
   A letter shall be mailed immediately to the authorized inspector having jurisdiction and a copy of the letter mailed to the Department of Public Safety, Elevator Division, One Ashburton Place, Boston, when the given amount of liquid is added.

17.23: continued

(10) Automatic Leveling for Hydraulic Elevators. All hydraulic elevators shall be provided with two-way automatic leveling.
EXCEPTION: 524 CMR 17.23(10) shall not apply to hydraulic elevators installed prior to March 9, 1978.

(11) Anti-creep Leveling Devices. Every hydraulic elevator shall be provided with an anti-creep leveling device conforming to the requirements of the following:

(a) It shall maintain the car within three inches of the landing from any point within the interlock zone irrespective of the position of the hoistway door.

(b) For the electro-hydraulic elevators, it shall be required to operate the car only in the up direction.

(c) For maintained pressure hydraulic elevators, it shall be required to operate the car in both directions.

(d) Its operation may depend on the availability of the electric power supply provided that:

1. The disconnect switch required by 524 CMR 17.34 is in the closed position at all times except during maintenance, repairs and inspections, and

2. The electrical protective devices required by 524 CMR 17.23(11) shall not cause the power to be removed from the device.

EXCEPTION: Stop switches in pits, stop switches on top of cars, and car side emergency exit door contact switches may be connected to cause the power to be removed from the anti-creep leveling device.

(12) Power Disconnecting Switch. The power disconnecting switch conforming to requirements of 524 CMR 17.34 shall be provided except that it shall be connected into the power supply line to control valve operating magnets, and to the pump motor in the case of electro-hydraulic elevators. Where the hydraulic pressure is supplied by a pressure tank and an electric pump, a separate disconnecting switch shall be provided to disconnect the power from the pump driving motor. The disconnect switch shall be kept in the closed position at all times except during maintenance, repair or inspection.

17.24: Venting of Hydraulic Machinery Spaces

(1) Machinery spaces of hydraulic elevators shall be provided with means for venting smoke and hot gases to the outer air in case of fire.
EXCEPTION: Machinery spaces located not more than ten feet from the hoistway may be vented to the hoistway through continuous fire rated ducts with a fire rating equal to that of the hoistway securely fastened to and penetrating the hoistway structure.

(2) Area of Vents. The area of the vents shall be not less than one per cent of the area of the machinery space with a minimum of one square foot and shall conform to the following:

(a) Vent openings in machinery spaces shall be located directly under the roof in the machinery enclosure.

(b) The openings for all ducts shall be covered with a wire enclosure which shall have not greater than three eighths inch mesh.

(c) If a duct is used to vent the machine room it shall be fire rated and shall be inclined or if horizontal the flow of air shall be power driven by fan that is connected to the normal and the emergency power source and capable of moving the equivalent amount of air that is moved by gravity through a vertical vent.

17.25: Venting of Hydraulic Elevator Hoistways

Hydraulic elevator hoistways shall be vented in accordance with the requirements of 524 CMR 17.03

17.26: Hoisting Ropes

(1) Power elevators shall be provided with iron or steel wire hoist and counterweight ropes. The rope hitch shall be babbitted or wedge sockets.

17.26: continued

(2) No covering shall be permitted on ropes other than where liability to excessive corrosion or other hazard exists, in which case marline covering may be used.

(3) The factor of safety based on static loads for car and counterweight ropes for power passenger and freight elevators shall be not less than the values given in 524 CMR 17.26, Figures 1 and 2, corresponding to the contract speed of the car.

NON-TEXT PAGE

17.26: continued

(4) Hoisting ropes shall be not less than ½ inch in diameter.
EXCEPTION: The provisions of 524 CMR 17.26 shall not apply to elevators installations made prior to March 9, 1950.

(5) The minimum number of hoisting ropes shall be determined by using the factor of safety found in 524 CMR 17.26, Figures 1 and 2, together with the rated ultimate strength of the wire rope. The computed load on the car hoisting ropes shall be of the weight of the elevator car plus the contract load, plus the weight of the car-hoisting rope and the compensation minus the weight of the independent car counterweight, if any.

(6) The minimum number of hoisting ropes used with traction elevators shall be three. If any wire hoist rope of a set is worn or damaged and requires replacement, the entire set of ropes shall be replaced.

(7) The minimum number of ropes used with winding-drum elevators shall be two car-hoisting ropes and two ropes for each counterweight used.

(8) Where winding-drum machines are used, the required crosshead capacity plate shall bear the following information:

FIGURE 1.

Factors of Safety for Hoisting and Counterweight Ropes for Power Passenger Elevators

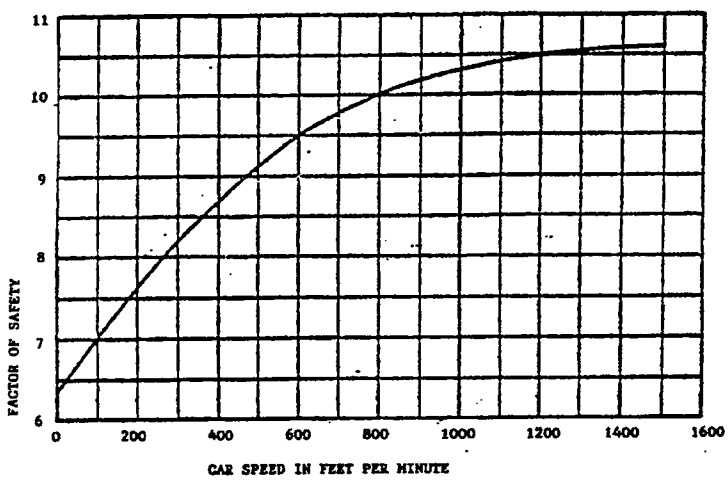
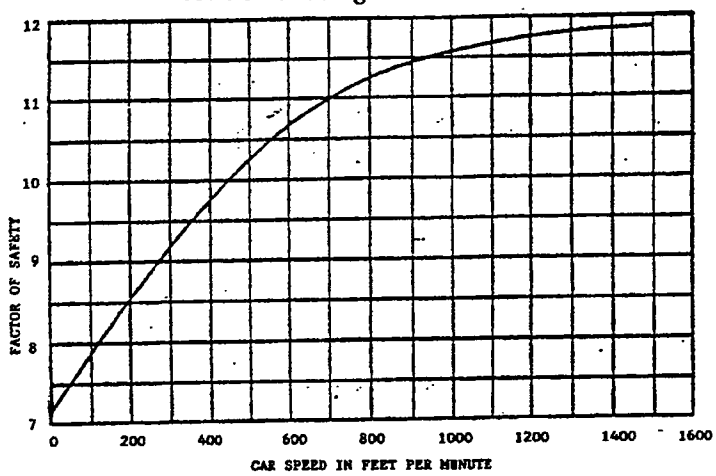


FIGURE 2.

Factors of Safety for Hoisting and Counterweight Ropes for Power Freight Elevators



17.26: continued

FIGURE 3.
WIRE ROPE SPECIFICATIONS

Rope	Number	Diameter in Inches	Rated Ultimate Strength in lbs.
Hoisting	_____	_____	_____
Car Counterweight	_____	_____	_____
Machine Counterweight	_____	_____	_____

(a) Where traction machines are used, the crosshead capacity plate shall bear the following information:

FIGURE 4.
WIRE ROPE SPECIFICATIONS

Rope	Number	Diameter in Inches	Rated Ultimate Strength in lbs.
Hoisting Ropes	_____	_____	_____

(b) Where hydraulic machines are used, the crosshead capacity plate shall bear the following information:

FIGURE 5.
WIRE ROPE SPECIFICATIONS

Rope	Number	Diameter in Inches	Rated Ultimate Strength in lbs.
Hoisting	_____	_____	_____
Car Counterweight	_____	_____	_____

(9) A metal tag shall be attached to the rope fastenings. On this tag shall be stated the following:

(a) Diameter.
(b) Rated ultimate strength.
(c) Material of the ropes.
(d) Date of the rope installation.
(e) Name of company or person installing ropes.
(f) Name of manufacturer.
(g) Whether non-preformed or preformed.

A tag shall be reinstalled at each rope renewal.

(10) Where wire rope equalizers are used, the equalizers and their fastenings in their several parts and assembly shall have a strength of not less than 10% in excess of the required strength of the rope. Rope equalizers, when used, other than those of the single swing tree type used with drum type machines and those of the individual compression spring type capable of being fully compressed without failure, shall be approved on the basis of tests, made by a competent designated laboratory, showing the ultimate strength of the equalizer and its fastenings in its several parts and assembly.

(11) All wire ropes anchored to a winding drum shall have not less than one turn of rope on the winding drum when the car or counterweight has reached the extreme limit of its over-travel.

(12) No car or counterweight rope shall be lengthened or repaired by splicing.

17.26: continued

(13) The winding-drum ends of car or counterweight ropes shall be secured by clamps on the inside of the drums or by individual tapered babbitted sockets.

(14) The car and counterweight rope ends shall be fastened by individual babbitted sockets or wedge type socket. Individual babbitted sockets are not required for elevators installed prior to March 9, 1950, however when hoist and counterweight ropes are replaced, adjustable babbitted sockets shall replace non-adjustable sockets where practical.

(15) Where socketed rope fastenings are used, adjustable shackle rods shall be provided to attach wire ropes to cars and counterweights in such a manner that all portions of the rope other than the portion within the socket shall be readily visible.

(16) Method of Socketing Wire Ropes.

(a) Where a babbitted socket is used, the length of the socket shall be not less than 4.75 times the nominal diameter of the rope.

(b) The hole at the small end shall be as given in the following table:

524 CMR 17.26(18) TABLE 1.
RELATION OF WIRE ROPE TO SMALL DIAMETER OF WIRE ROPE SOCKET

Nominal Diameter of Rope in inches.	Inside Diameter of Small End of Rope Socket
¼ to 7/16 inclusive	shall not be more than 1/16 in. larger than the actual rope diameter
½ to ¾ inclusive	shall not be more than 3/32 in. larger than actual rope diameter
⅞ to 1⅛ inclusive	shall not be more than ⅛ in. larger than actual rope diameter
1¼ to 1½ inclusive	shall not be more than 3/16 in. Larger than actual rope diameter

(c) The hole opening at the small end of the socket shall be rounded and free from cutting edges.

(d) The hole opening at the large end of the socket shall be not less than 2.25 times the nominal diameter of the rope.

(e) The socket shall be drop-forged steel, or steel casting.

(f) The socket shall be of such strength that the rope will break before the socket is perceptibly deformed.

(g) Rope ends to be socketed shall be served with three seizings at each side of any point at which the rope is to be cut.

(h) Only annealed iron wire shall be used as a seizing wire. The wires shall be wound tight and even. The twisted ends of the seizing shall be so placed that they fall into the valleys between strands and away from the ends of the rope, as otherwise the seizing will not pass through the small hole end of the socket.

(i) For ⅝ inch or smaller wire rope, the first two seizings shall be not less than ½" long, and the third seizing not less than ¾" long. The first seizing shall be close to the cut, and the second seizing shall be spaced back from the first seizing the length of the end to be turned in. The third seizing shall be at a distance from the second seizing equal to the length of the socket. Larger rope requires longer seizing than specified above.

(j) Tape shall not be used for seizing.

17.26: continued

(k) The rope thus served shall be entered at the small hole and slipped through the socket a sufficient distance for manipulating, and after removing the first two seizings the strands shall be spread and the hemp center cut out as close as possible to the remaining seizing and removed. All grease shall be carefully removed by wiping off the extended strands and washing with a non-flammable solvent. The strand ends shall then be bent and turned in and bunched closely together. The portion turned in shall have a length not less than two and one half times the nominal diameter of the rope. Then, with the rope end pulled as far as possible into the socket, the turned ends or loops in the strand of all socketed ropes shall be turned towards the center of the socket and shall project above the babbitted end not more than ¼ inch and not less than ⅛ inch. The third seizing shall slightly project outside the hole at the small end of the socket. The socket, when ready for pouring, shall be held vertical and the rope held truly axial with the socket. Tape or waste may be wound around the rope at the small end of the socket to prevent the metal from seeping through but shall be removed after the metal has cooled.

(l) Only clean babbitt metal free from dross shall be used heated to a fluidity just sufficient to char a piece of soft wood without igniting it.

(m) Where the seizing and socketing has been done properly, the original and uniform relation of rope lay will not be disturbed. Any disturbance of rope lay is a clear indication of careless seizing and socketing and is not permitted.

(n) Whenever elevator ropes are replaced or shortened, the counterweight top clearances shall not be reduced below those required.

(o) Auxiliary rope-fastening devices, designed to support elevator cars or counterweights if any regular rope-fastening fails, may be provided subject to the following requirements:

1. They shall be approved by the enforcing authority on the basis of adequate tensile and fatigue tests made by a competent designated laboratory.
2. The device and its fastenings, in its several parts and assembly, shall have a strength at least equal to that of the manufacturer's breaking strength of the rope to which it is to be attached.
3. Steel parts used in the device shall be cast or forged with an elongation of not less than 20%, conforming to ASTM specifications A235-63T, Class C for forgings and A27-62, grade 60/30 for cast steel, and shall be stress relieved.
4. The device shall be so designed and installed that:
   It will not become operative unless there is a failure of the normal rope fastening.
   It will function in a rope movement of not over 1½".
   It will not interfere with the vertical or rotational movements of the rope during normal service.

(17) Periodic Resocketing of Babbitted Rope Sockets of Car Hoisting Ropes on Winding-Drum Driving Machines.

(a) Refastening Periods. The hoisting ropes of power elevators having winding-drum driving machines with 1:1 roping, if of the babbitted rope socket type, shall be resocketed at the car ends at time intervals no longer than:

1. 24 months
2. All drum to counterweight and drum to car ropes shall be resocketed every 24 months.

(b) Tags. A metal tag shall be securely attached to one of the wire rope fastenings after each resocketing and shall bear the following information:

1. The name of the person or firm who performed the resocketing.
2. The date on which the rope was resocketed.

17.27: Governor Ropes

(1) Governor ropes shall be of uncovered iron, steel, or Monel metal.

(2) Governor ropes shall not be of tiller rope construction.

(3) Governor ropes shall be not less than three eighths inch in diameter.

(4) Governor ropes shall run clear of governor jaws during the normal operation of the elevator.

17.27: continued

(5) Governor ropes shall run not more than one eighth inch either side of the common center line of the governor jaws.

(6) Governor rope ends shall be fastened by tapered babbitted sockets or a wedge type clamp.

(7) Where socketed rope fastenings are used, the length of the socket shall conform to the requirements for wire rope sockets for hoisting ropes and shall be not less than 4.75 times the nominal diameter of the rope and shall be installed in such manner that all portions of the rope other than the portion within the socket shall be readily visible.

17.28: Governor Tail-ropes

(1) Material Tail-ropes. Tail-ropes shall be of iron, steel, Monel-metal, phosphor bronze, or stainless steel, of regular-lay construction, and shall be not less than ⅜ inch in diameter.

(2) Tiller rope construction shall not be used.

(3) The factor of safety of governor ropes shall be not less than five.

(4) Tail-ropes shall be secured to car on counterweight safety operating drums by clamps or tapered babbitted sockets on the inside of the drum.

(5) Tail-ropes shall be connected to governor ropes by tapered babbitted sockets.

(6) Deflecting sheaves for tail-ropes shall be fastened by metal brackets to car frame safety planks.

17.29: Compensating Ropes or Chains

(1) Compensating chains shall be firmly secured to the car frame, the counterweight, or the hoistway.

(2) Compensating ropes shall be of uncovered iron or steel.

(3) Whenever compensating ropes are employed, a compensating rope tension sheave shall be installed in the elevator pit. This tension sheave shall be guided and equipped with a contact switch arranged to positively open the motor and brake operating circuits before the compensating sheave reaches its upper or lower limit of travel.

17.30: Guide Rails

(1) General. Guide rails for power elevator cars and counterweights shall be of steel, other than where the use of steel rails presents an accident hazard, as in chemical or explosive industries, wood guide rails may be used.
EXCEPTIONS: For passenger oil hydraulic elevators only, guide rails, guide rail brackets and their fastenings shall be of steel and may have other approved shapes subject to the following regulations:

(a) They shall have a section modulus and movement of inertia equal to or greater than that of a section shown in 524 CMR 17.30(1): *Figure 1*, for a given condition.

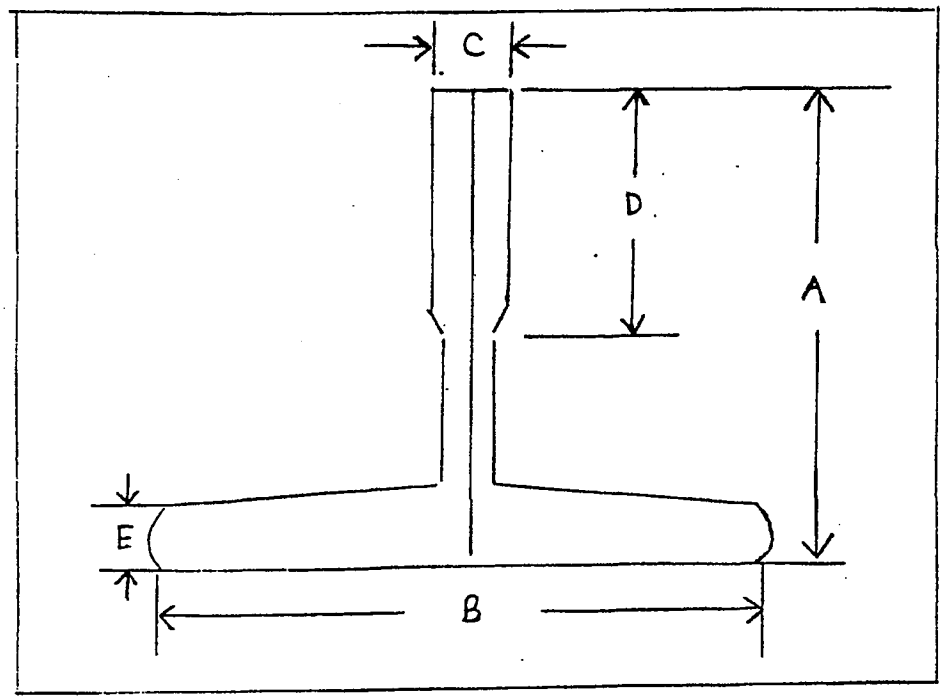
(b) Welding may be used to fasten rail supports provided the welding is done by certified welders. For elevators installed prior to March 9, 1950, wood counterweight rails may remain provided that the shaft is fire rated and that there is no other wood found in the hoistway.

17.30: continued

524 CMR 17.30(1) TABLE 1.
GUIDE RAIL DIMENSIONS

Nominal Weight Per Foot in Lbs.	Nominal Dimensions in Inches				
	A	B	C	D	E
8	2-7/16	3½	⅝	1¼	5/16
11	2½	4½	⅝	1½	5/16
12	3½	5	⅝	1¾	5/16
15	3½	5	⅝	1-31/32	½
18½	4¼	5½	¾	1-31/32	½
22½	4	5½	1⅛	2	9/16
30	5	5½	1¼	2¼	11/16

FIGURE 1.
T-Section Rail



17.30: continued

(2) Length of Guide Rails.

(a) For hydraulic elevator 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.

(3) Weight of Guide Rails.

(a) The weight of steel guide rails shall not be less than given in the following table:

524 CMR 17.30(3) TABLE 2.

Total Weight of car and load Total Weight of Counter weight per pair of rails (pounds)		Minimum weight of each car guide rail (pounds per lineal foot) (pounds per linear foot)	Minimum weight of each counterweight guide rail			
			With guide rail safeties		Without guide rail safeties	
Above:	To and including		1 to 1 Roping		2 to 1 Roping	
		4,000**	7.5**	7.5*	7.5	7.5
	4,000	15,000	15.	15.	7.5	7.5
	15,000	27,500	22.5	22.5	15.	15.
	27,500	40,000	30.	30.	15.	15.

* If the rails are effectively bracketed or tied at intervals of six feet or less to prevent spreading, this load may be doubled. This applies only to 7½ pound rails and only when such rails are used for counterweights.
** If car guide rails weighing 7½ pounds were effectively bracketed or tied at ten foot intervals, the 4,000 lb. load may be increased to 4,500 lbs., and if bracketed or tied at 6½ foot intervals, this load may be increased to 5,000 lbs.

(b) Where cars equipped with duplex safety devices are employed, the Maximum Car and Load Weights given in 524 CMR 17.30: *Table 2* may be multiplied by the following factors based upon the vertical distance between centers of safeties:

524 CMR 17.30(3) TABLE 3.
CAR DUPLEX SAFETIES

Distance Between Safeties in Feet	Multiply Maximum Load Given in Table I by
18 (or over)	2.0
15	1.83
12	1.67
9	1.50
6	1.33

(c) Where counterweights equipped with duplex-safety devices are employed, the Maximum Counterweight with Safety Weights given in 524 CMR 17.30: *Table 2* may be multiplied by the following factors based upon the vertical distance between centers of Safeties:

524 CMR 17.30(3) TABLE 4.

Distance Between Counterweight Duplex-Safeties	Factor
15' (or over)	2.0
10' to 14.99 incl.	1.67
5' to 9.99 incl.	1.33

17.30: continued

(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 the following table:

524 CMR 17.30(3) TABLE 5.
SIZE OF GUIDE RAIL BOLTS

Weight of Rails per Foot	Diameter of Bolt in Inches
7.5 lb. to 8.2 lb.	½
14.0 lb. to 16.0 lb.	⅝
22.5 lb. to 23.0 lb.	¾
30.0 lb. to 32.0 lb.	¾

(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 ¼ inch under normal operation. Welding may be used to fasten rail supports to building steel provided the welding is done by certified welders approved by the enforcing authority.

(b) Where the supports are more than 14' 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.

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.

(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:

(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" x 2½" where the car and load is not in excess of 5,000 lb. or not less than 2⅝" x 3" where the car and load is not in excess of 8,000 lb.

17.30: continued

(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.

17.31: Car and Counterweight Buffers

(1) Buffers of the spring, oil, or equivalent type shall be installed under cars and counterweights.

(2) Spring buffers may be used with elevators having a contract speed not in excess of 200 feet per minute. Oil buffers shall be used with elevators having a contract speed in excess of 200 feet per minute.

(3) The minimum stroke of spring buffers shall be as follows, based on contract speed:
100 feet per minute or less --1½ inch stroke
101 to 150 feet per minute -- 2½ inch stroke
151 to 200 feet per minute -- four inch stroke
NOTE: Stroke as applying to spring buffers is the difference between the free length of the spring and its length when compressed to a point where all coils are practically in contact.

(4) The static load required to compress spring buffers a distance equal to their stroke shall be within a minimum of twice and a maximum of three times the total weight of the car plus contract load or of the counterweight, respectively.

(5) Each spring buffer shall be provided with a metal plate marked in a legible and permanent manner to show the stroke or compression of the spring and the maximum and the minimum loads for which the spring may be used in conformity with 524 CMR 17.31. This plate shall not be wired or attached to the spring coils in such manner as to become unfastened when the spring is fully compressed.

(6) The minimum stroke of oil buffers shall be based on the following:
(a) The stroke shall be such that the car or the counterweight on striking the buffer at 115% of contract speed shall be brought to rest with an average retardation not exceeding 32.2' per second.
(b) Where a speed retarding device is installed that will limit the speed at which the car or the counterweight can strike their buffers, the buffer stroke shall be based on at least 115% of such reduced striking speed and an average retardation not exceeding 32.2' per second. In no case shall the stroke used under such conditions be less than 50% of the stroke required by 524 CMR 17.31(6)(a), or less than 17", whichever is greater.

(7) Car and counterweight oil buffers shall develop an average retardation not in excess of 32.2' per second and shall develop no peak retardation greater than 80.5' per second having a duration exceeding 1/25th of a second with any load in the car from contract load to a minimum load of 150 lbs. when the buffers are struck with an initial speed of not more than:
(a) 115% of contract speed where no speed retarding device is used, and
(b) 115% of the pre-determined reduced speed for buffers where a speed retarding device is used.

(8) Oil buffers shall be provided with means for determining that the oil level is within maximum allowable limits. Glass sight gauges shall not be used.

(9) Buffers shall be located symmetrically with reference to the vertical center line of the car frame or the counterweight frame within a tolerance of two inches.

(10) Counterweight buffers similar to those required for cars shall be installed symmetrically under the counterweights of power elevators.

17.31: continued

(11) Car and counterweight oil buffers shall be field tested by running on to them with the car and contract load and the counterweight, respectively, at contract speed with the normal terminal slow-down device inoperative and final limit switches operative. Where a speed retarding device is installed the buffers shall be field tested by running on to them at the reduced striking speed with the car and contract load and the counterweight, respectively, with the normal terminal slow-down device and the speed-retarding device inoperative, and final limit switches operative.

(12) Car and counterweight oil buffers when installed and filled with oil shall be fully compressed and, when released, the buffers shall return to the fully extended position within 90 seconds.

(13) Buffers of the spring return type shall be tested for plunger return with a 50 lb. test weight resting on the plunger during the test. The plunger shall be depressed two inches and, when released, the plunger while supporting the test weight, shall return to the fully extended position within 30 seconds.

(14) No field test of spring buffers is required.

(15) Car and counterweight oil buffers may be compressed not to exceed 25% of their stroke when the car is level with the terminal landings.

(16) Every oil buffer installed shall be provided with a metal plate marked by the manufacturer in a legible and permanent manner indicating:

(a) The maximum and the minimum loads and the maximum striking speed for which the buffer may be used.
(b) The permissible range in viscosity of the buffer oil to be used at 100°F.
(c) The viscosity index number of the oil to be used.
(d) The pour point in degrees F. of the oil to be used.

17.32: Counterweights

(1) Counterweights shall run on guide rails within the elevator hoistway.

(2) Where two counterweights run on the same guides, the car counterweight shall be above the machine counterweight and there shall be a clearance of not less than eight inches between the counterweights. The ropes of the machine counterweight shall be covered or protected by metal or fiber sleeves firmly attached to the rope. These sleeves shall be not less than six inches longer than the car counterweight. The ends of metal sleeves shall be carefully reamed before being placed on the ropes.

(3) Where an independent car counterweight is used, it shall be of a weight to prevent undue slackening in any of the ropes during acceleration or retardation of the car.

(4) All counterweight sections shall be secured by at least two tie rods passing through holes in all the sections. The tie rods shall have lock nuts at each end, secured by cotter pins.

(5) Counterweights shall be located only in the hoistway of the elevators to which they are connected.

(6) No elevator car shall counterbalance another car.

17.33: Control and Operating Devices and Systems: General

(1) The frame of the electric elevator machine, the frame of the controller, and frames of electric appliances in or on the elevator car shall be effectively grounded.

(2) No circuit-breaker operated automatically by a fire alarm system shall cut off the power of a power elevator.

17.33: continued

(3) Each electric power elevator driven by a polyphase alternating-current motor shall be provided with a device which will prevent starting the motor if:
(a) the phase rotation is in the wrong direction, or,
(b) there is a failure in any phase.

(4) Where an overload circuit-breaker is used for a direct current electric elevator, the wiring shall be arranged so that the circuit of the brake-magnet coil is opened at the same time that the line circuit is opened.

(5) Electric slack-rope switches shall be enclosed.

(6) The installation of condensers which may either by functioning or failure cause an unsafe operating condition is prohibited.

(7) No person shall at any time make any required safety device or electrical protective device inoperative, except where necessary during tests, inspections, and maintenance. Immediately upon completion of such tests, inspections, and maintenance, such devices shall be restored to their normal operating condition in conformity with applicable requirements of this code.

(8) Operation of an elevator in a leveling zone at any landing by a car-leveling zoning device when the landing doors and/or the car gates or doors are not in the closed position, is permissible subject to the following:
(a) Operating devices of the manually operated car-leveling devices shall be of the continuous pressure type located in the car.
(b) Car-platform guards conforming to 524 CMR 17.05(3) and 17.05(4) shall be provided; and where a car-leveling device is used, landing sill guards conforming to 524 CMR 17.13(9) shall also be provided.
(c) The landing zone at any landing shall not extend more than 30" above and 30" below any landing where an automatic leveling device is used, and not more than eight inches above and below where a manually operated leveling device is used.

17.34: Control Devices

(1) A fused disconnect switch or a circuit breaker shall be installed and connected into the power supply line to each elevator and dumbwaiter motor or to the motor of the motor generator set and controller. Disconnect switches or circuit breakers shall be of the manually closed multi-pole type, and their location shall conform to 524 CMR 17.34(2). Where circuit breakers are used as a disconnecting means, they shall not be of the instantaneous type and shall not be opened automatically by a fire alarm system. Where there is more than one driving machine in a machine room, disconnect switches or circuit breakers shall be numbered to correspond to the numbers of the driving machine which they control. (*See* 524 CMR 17.22(10).) All fused disconnect switches or circuit breakers shall be capable of being locked in the open position by January 1, 2006.

(2) The fused disconnect switch or circuit breaker shall be of the manually closed multi-pole type, and shall be located adjacent to and visible from the elevator machine or motor-generator set to which it is connected and shall be located in the machine room at the lock jamb side of the entrance door. The switch shall be located not more than 18" from the lock-jamb side of the entrance door and should not extend more than 5'-6" above the finished floor. In the case of multi-car machine rooms the switches or circuit breakers shall be grouped together as close as possible.
NOTE: For elevators installed prior to December 10, 1971, the switch must be adjacent and visible to the machine and located by the door only where practical.

(3) No provision shall be made to close the disconnecting switch from any other part of the building.

(4) No control system shall be used which depends on the completion or maintenance of an electric circuit for the interruption of the power and the application of electro-mechanical brakes at the terminals, for the application of safeties, or for the closing of contractor by an emergency button. 524 CMR 17.00 does not apply to dynamic braking or to speed control devices.

17.34: continued

(5) On electro-hydraulic elevators all stop valves shall be arranged so to be opened electrically and to be closed either by gravity or by springs in compression, or by hydrostatic pressure, or by any combination of the above.

17.35: Operating Devices

(1) No power elevator 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.

(2) The maximum rated system or circuit voltage permitted in the operating devices of power elevators shall be 300 volts.

(3) The handle of car-switch operating devices shall be arranged to return to the "stop" position and lock there automatically when the hand of the operator is removed.

(4) Where more than one operating device of the car switch or continuous pressure type is used in a car, the operating devices shall be so interlocked that only one can be used at a time.

(5) Where a single operating device is used, it shall be so located as to be near the car opening serving the greatest number of landing openings.

(6) An emergency stop switch which will cut off the sources of power shall be provided in the car adjacent to the operating device for all elevators and shall be suitably identified and of a distinctive color.

(7) Emergency stop switches may be operated by buttons or levers but shall be of the manually opened and closed type so installed that when opened gravity will not tend to close the switch.

(8) An emergency stop switch shall be installed in the pit and on top of the car of every electric elevator, electric hydraulic elevator, and every hydraulic elevator equipped with an electrically operated valve. An emergency switch shall not be required on elevators equipped with hoistway covers or mechanical brakes. An emergency switch shall be installed in the pit of all elevators equipped with hoistway covers and an electric brake. The switch in the car top shall be located vertically near the center of the car crosshead facing the front of the car. The switch in the pit shall be located vertically not more than six inches below the top of the pit, and not to exceed two feet from the face of the landing opening in full view of the landing near the front of the car. When access to the pit is by means of an access door, this switch shall be so located as to be accessible from the pit access door. Where access to the pits of elevators in a multiple hoistway is by means of a single access door, the stop switch for each elevator shall be located adjacent to the nearest point of access to its pit from the access door. Every car top and pit emergency switch shall be provided with a red metal plate marked "EMERGENCY", permanently and securely fixed to the front of the switch. The height of the lettering shall be not less than ¼ inch.

(9) Contact of emergency stop switches or buttons shall be directly opened mechanically and shall not be solely dependent upon springs for the opening of the contacts.

(10) Temporary operating devices installed on the top of any elevator to operate the car by a licensed elevator mechanic for construction, inspection and testing purposes, may be used provided that such devices are operative only when the normal operating devices are inoperative and all hoistway doors are closed and locked is allowed. Access shall be as described in 524 CMR 17.07(5).

(11) For elevators installed after December 10, 1971, a rigidly mounted operating switch without extension cords shall be mounted on the top of the car for the purpose of operating the car for construction, inspection and testing purposes, subject to the following:

(a) The operating switch shall conform to the following requirements:

1. It shall be of the continuous-pressure button-operated type with the operating buttons located flush with the switch box cover plate and shall be permanently marked, "CAR TOP SWITCH" in letters not less than ¼ inch high.

17.35: continued

2. It shall be located on top of the car crosshead and on that side of the car which is nearest the car door facing the top access landing

3. It shall operate the car subject to the following:

At a speed not exceeding 150 feet per minute.

Only when the car door gate is closed and all hoistway doors are closed, and where required by the code, locked.

Only when all car and landing operating devices are inoperative and the movement of the car is solely under the control of this switch.

(b) The operating switch shall be made operative, subject to the limitations specified in 524 CMR 17.35(11)(a)3. only by the operation of a control switch conforming to the following requirements:

1. The control switch shall, except as provided in 524 CMR 17.35(11)(b)5., be located in the car operating panel or in a separate panel located adjacent to the operating panel.

2. The control switch shall be operated by a cylinder type lock having not less than a five pin or five disc combination which shall not be operable by any key which will operate any other lock or device used for any other purpose in the building, except the key operating the access switch permitted by 524 CMR 17.07(5).

3. The control switch key shall be removable in either the OFF or ON position.

4. The control switch key shall be available to and used only by licensed elevator mechanics or an authorized state inspector.

5. In lieu of locating the key control switch in or adjacent to the car operating panel it may be mounted on the elevator controller in the elevator machine room.

(c) Separate additional means of the continuous pressure type may be provided on the car top to make power door operating devices and automatic car leveling devices operative for testing purposes.

(12) One lead to the emergency stop switch shall be run to the car through a separate and independent traveling cable where elevators have winding-drum machines.

(13) Where springs are used to break the circuit to stop an automatic-operation elevator at the terminal, they shall be of the compression type.

(14) The completion of another electric circuit shall not be depended upon to break the circuit to stop an automatic-operator elevator at the terminals. The interruption of the electric circuit shall prevent the movement of the car.

(15) Levers of operating devices for car switch operation elevators shall be so arranged that the movement of the lever toward the car gate which the operator usually faces will cause the car to descend and the movement of the lever away from the gate will cause the car to ascend. The direction of travel shall be indicated on the car switch.

(16) Automatic-operation elevators shall conform to the following requirements:

(a) When the car has started for a given landing, no impulse may be given from any landing to send the car in the reverse direction until the car has reached the destination corresponding to the first impulse. The car may stop at any intermediate landing to take on or discharge passengers going in the original direction.

(b) When the car has been stopped to take on or discharge passengers and is to continue in the direction determined by the first impulse, the car may be started by the closing of the car door or gate contact.

(c) The car cannot be started under normal operation by the operating devices unless every hoistway door is closed and locked in the closed position and every car door or gate is closed in the closed position.

(17) Continuous-pressure operation shall not be used for elevators unless they are provided with all of the safety devices required for automatic operation.

(18) Load-weighing devices which will prevent operation of the elevator shall not be installed in connection with passenger elevators.

17.35: continued

(19) Operation of an elevator in a leveling or truck zone at any landing by a car-leveling or truck-zoning device, when the landing doors and/or car doors or gates are not in the closed position, is permissible subject to the following:

(a) Operating devices of manually operated car-leveling devices or truck-zoning devices shall be of the continuous pressure type located in the car. See 524 CMR 17.05(3)(b).

(b) Car-platform guards conforming to 524 CMR 17.05(3) shall be provided; and where a car-leveling device is used, landing-sill guards conforming to 524 CMR 17.05(3) shall also be provided.

(c) The leveling zone at any landing shall not exceed more than 30" above or below any landing where an automatic leveling device is used, and not more than eight inches above or below where a manually operated leveling device is used.

(d) The truck zone at any landing shall not extend more than five feet six inches above the landing.

(e) Where a truck or leveling zone for one hoistway entrance extends into the door interlocking zone for a second entrance, the truck zoning or leveling operation shall be inoperative unless the hoistway door at the second entrance is in the closed position.

Where a truck or leveling zone for one hoistway entrance extends into the leveling zone for a second entrance, the leveling operation for the second entrance shall be inoperative while the hoistway at the first entrance is open.

EXCEPTION: The car may be operated by a car-leveling device at any landing having two hoistway entrances within two inches of the same level, with both car doors or gates and the corresponding hoistway doors open, provided landing-sill guards conforming to 524 CMR 17.05(4) are installed at both floors.

(20) A stop switch conforming to the requirements of 524 CMR 17.35(8) shall be provided for each elevator in the overhead machinery space in the hoistway, adjacent to the lock jamb side of the door.

17.36: Terminal Stopping

(1) Power elevators shall be provided with upper and lower normal terminal stopping devices arranged to stop the car automatically from any speed attained in normal operation within the top and bottom overtravel independently of the position of the operating devices and the final terminal stopping devices and before the buffer is fully compressed.

(2) Normal terminal stopping devices shall be installed in connection with power elevators as follows:

(a) Electric power elevators having winding-drum machines shall have stopping switches on the car or in the hoistway, operated by the movement of the car.

(b) Electric power elevators having traction machines shall have stopping switches on the car, or in the machine room or in the hoistway operated by the movement of the car. If located in the machine room, the stopping contacts shall be mounted on and operated by a stopping device mechanically connected to the car, and with no dependence on friction as a driving means. An automatic safety switch shall be provided which will stop the machine should the tape, chain, rope, or other similar device mechanically connecting the stopping device to the car, fail. In the case of electric power elevators using floor controllers or other similar devices for automatic stopping at the floor landings, only one set of floor-stop contacts is necessary for each terminal landing, provided these contacts and the means for operating them comply with the requirements for terminal stopping devices. These contacts then serve also as normal terminal stopping devices.

(3) Electric power elevators shall be provided with upper and lower final terminal stopping devices arranged to stop automatically the car and counterweight from contract speed within the top clearance and bottom overtravel independently of the operation of the normal terminal stopping devices and the operating device, but with buffers operative. Final-limit switches shall be set to operate with the car as close to the terminal landing as practical without interfering with the normal operation of the elevator. Where spring buffers are provided, the final-limit switches shall be set to open before the buffer is engaged. Where oil buffers are provided and also means to prevent jumping of the car or counterweight, the final-limit switch shall open before the buffer is fully compressed.

17.36: continued

(4) Final terminal stopping devices shall be installed in connection with electric power elevators as follows:

(a) Electric power elevators having winding-drum machines shall have stopping switches on the machines and also in the hoistway operated by the movement of the car.

(b) Electric power elevators having traction machines shall have stopping switches in the hoistway operated by the movement of the car.

(c) Final terminal stopping devices are not required on electro hydraulic elevators.

(5) The final terminal stopping device shall act to prevent movement of the car in both directions of travel. The normal and final terminal stopping devices shall not control the same switches on the controller unless two or more separate and independent switches are provided, two of which shall be closed to complete the motor and brake circuit in each direction of travel.

When two-phase or three-phase alternating current is used to operate the elevator, the above switches shall be of the multi-pole type. If the final terminal stopping device controls the same controller switch or switches as the operating device or the normal terminal stopping device, it shall be connected into the control circuit on the opposite side of the line.

(6) Chain, rope, or belt driven final machine terminal stopping devices shall not be used for power elevators having winding-drum machines.

(7) Electric power elevators having winding-drum machines driven by two-phase or three-phase alternating-current motors shall have the mainline circuit to the motor and brake directly opened either by contact in the machine stop-motion switch or by hoistway limit switches operated by a cam attached to the car. The opening of these contacts shall take place before or coincident with the opening of the final terminal stopping device and shall prevent movement of the machine in either direction.

Elevator machines with alternating current motors and direct current brakes and direct current mainline potential switches controlled by final terminal hoistway stopping switches do not require a mainline machine stop motion switch.

(8) Normal and final terminal stopping switches, whether on the car or in the hoistway, shall be of enclosed type. Normal and final terminal stopping devices, where on the car or in the hoistway, shall be securely mounted in such a manner that the movement of the switch lever or roller to open the contacts shall be in a direction as nearly at right angle as is possible to a line drawn between the face of the car guide rails. The cam or cams for operating the terminal stopping switches shall be of metal and shall be so located and of sufficient length to maintain the switch in the open position when the car is in contact with the overhead structure or resting on the fully compressed buffer with the overhead structure and the buffer in their normal position.

(9) The contacts of all terminal stopping devices shall be directly opened mechanically. Spring or gravity arrangements permitting the opening of the contact on withdrawal of the cam, lug, or similar device are prohibited.

17.37: Signals

(1) Landing Signals. Every power elevator, other than continuous pressure operation, automatic operation type elevators and elevators arranged to stop automatically at the floor landings, shall be equipped with a signal system indicating the landing at which the car is desired.

(2) Emergency Signals. Every elevator shall be provided with an emergency signal audible outside of the hoistway that is operative from within the car. It may also be provided with two-way communication connected to a location that can respond with aid on a 24 hour basis.

17.38: General

Connections. Connections between members of car frames and platforms shall be riveted, bolted, or welded, and shall conform to the following:

17.38: continued

(1) Bolts. Bolts, where used through sloping flanges of structural members, shall have bolt heads of the tipped-head type or shall be fitted with beveled washers.

(2) Nuts. Nuts, used on sloping flanges of structural members, shall seat on beveled washers.

(3) Welding. Welding of all parts of apparatus governed by 524 CMR 15.00 through 35.00 and upon which safe operation depends shall be done in accordance with the appropriate standards established by the American Welding Society.

17.39: Fire Emergency Service - Automatic Passenger Elevators

(1) All automatic passenger elevators described as follows must be provided with fire emergency service as described in American National Standard ASME A17.1-1991 with .MA Modifications 524 CMR 35.00:

(a) All automatic passenger elevators having a travel of 70 feet or more from the lowest accessible grade elevation surrounding the building must have fire emergency service.

(b) All automatic passenger elevators installed after July 24, 1987 having a travel of 25 feet or more must have fire emergency service.

NOTE: If any other automatic passenger elevator not included in 524 CMR 17.39 (1)(a) or (b) has fire emergency service of any kind, it shall also operate in accordance with ASME A17.1-1991 with Massachusetts Modifications 524 CMR 35.00.

(2) Switch Keys. Fire service shall only be activated with the use of the 3502 key and cylinder. The possession of the Massachusetts Firefighters key number 3502 shall be limited to fire department personnel, Massachusetts licensed elevator mechanics and Massachusetts elevator inspectors employed by the Department of Public Safety. This key shall not be a part of a building master key system.

(3) Fire Emergency Sign re. Use of Stairways. There shall be a sign securely fastened to the wall over every hall button station. Minimum size shall be 3¼" x 2¼". The lettering shall be impressed or engraved on a contrasting background, and shall read and be sized as follows

In Case of	⅛ inch equals 14 point lettering	Color: Black
Fire	⅜ inch equals 30 point lettering	Color: Red
In This Building	⅛ inch equals 14 point lettering	Color: Black
Use Exit Stairways	3/16 inch equals 16 point lettering	Color: Red
Do Not Use This Elevator	⅛ inch equals 14 point lettering	Color: Black

(4) Responsibility of the Fire Department.

(a) On completion of the elevator installation and safety test, the elevator inspector shall notify the local fire department to have an authorized representative available to receive instructions by the elevator manufacturer or his agent on the purpose, operation, and use of the firefighter's keyed switch.

(b) All elevators operated by the use of the firefighter's keyed switch and the safety of all persons carried by or permitted to use such elevators during firefighting operations shall be the sole responsibility of the local fire department during firefighting operations.

(c) The opening of car doors and landing doors and the closing of same shall be the sole responsibility of the local fire department during firefighting operations.

(d) When elevators or elevator machine rooms have been involved in damage by a fire the local fire department shall notify the state or local elevator inspectors having jurisdiction. A thorough inspection shall be made by authorized elevator inspectors to determine that all systems continue to function as required by 524 CMR.

(5) Auxiliary Generators for Emergency Power. All automatic passenger elevators installed in new buildings after June 12, 1972 with a travel of 70 feet or more from the lowest grade elevation surrounding the building are required to have auxiliary generators for emergency power as follows:

17.39: continued

An auxiliary generator shall be provided of sufficient capacity and proper rating to supply elevator circuits in conjunction with the operation of fire emergency service. Said auxiliary generator shall be capable of handling the emergency load and shall start automatically within 25 seconds from the time the normal power has dropped to a pre-determined value as sensed by the automatic starting device for the auxiliary generator. The auxiliary generator shall have sufficient power to operate at least one elevator at a time on firefighter's keyed switch service with full load at a minimum of one third it rated speed with a maximum of 500' per minute. The system shall have the capability to transfer the emergency power to any elevator car on emergency firefighter's service through transfer switch arrangements or other suitable means. NOTE: Should any elevator regardless of travel or installation date have an auxiliary generator for emergency power, it shall operate as described above.

(6) Penalty. Any person violating or failing to comply with any provision of 524 CMR 17.39 or any regulation established hereunder shall be punished by a fine of not more than $500.00.

17.40: Medical Emergency

(1) Medical Emergency Elevators.

(a) All new buildings, or complete new additions to existing buildings in which an elevator is being installed, and for which building permits were issued on or after January 20, 1989 shall be provided with at least one passenger elevator designed to accommodate the loading and transportation of an ambulance gurney or stretcher (22½" wide by 75" long) in its horizontal position. This elevator shall serve all landings of the building or if the building is divided into banks one car in each bank shall conform to 524 CMR 17.40. Complete new additions to existing buildings shall mean a hoistway constructed outside the confines or footprint of the existing building.

(b) Elevators installed after January 20, 1989 which have E.M.S. features, or equipment that is being installed, or was on order prior to the filing date of this change, shall conform to 524 CMR by June 1, 1993.

(c) The hoistway and car shall be provided with power operated passenger type horizontally sliding doors, minimum size to be 42" wide by 78" high. When center opening doors are used they shall be located on the narrow end of the car or car size and/or the door size will be altered to comply with 524 CMR 17.40(1)(d).

(d) The elevator car shall have a minimum inside dimension of 80" by 54" arranged for the entry of the gurney in a supine position. The platform dimensions and/or the clear entrance opening dimension may be altered where it can be demonstrated, prior to installation, that the car and entrance configuration to be provided shall handle the designated gurney or stretcher with equivalent ease.

(2) Medical Emergency Key Switches and Markings.

(a) This elevator shall be controlled by a two position key switch at the main floor of a building and by a similar key switch in the car operating panel. The lock and key shall be that manufactured by Medeco Security Locks, Inc. and the key number shall be 65W-2650-T101-26-R7. The lock shall be arranged so that the switch shall be off when the key is in a vertical position and it shall be on when the key cut is facing approximately 90° to the right of the vertical. The key shall only be removable in the off position.

(b) Only elevator companies or manufacturers authorized by the Massachusetts Department of Public Safety, Elevator Section may order this lock.

(c) Only personnel authorized by the Massachusetts Department of Public Safety, Elevator Section may purchase this key.

(d) Both locks shall be identified with the words "MEDICAL EMERGENCY" engraved adjacent to the lock. The lettering shall be a minimum of 14 points with lettering or background color blue.

(3) Medical Emergency Operation.

(a) When the main floor key is turned to the on position, it shall activate a continuous audible signal in the car which can be the same signal used for fireman's service. It shall also activate a visual signal in the car and at the main floor key call station that reads Medical Emergency. All car calls shall be canceled and be unable to be re-registered. The car shall not accept any hall calls after this service is activated.

(b) When the car is in motion, the in car stop switch shall be de-activated.

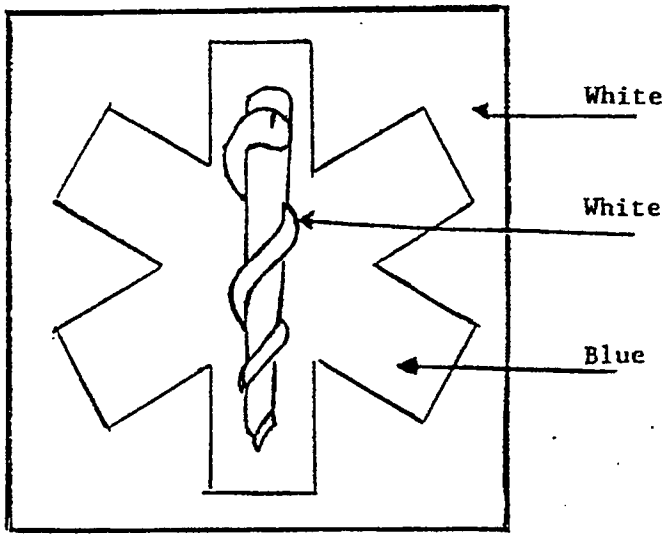
17.40: continued

(c) When the car is moving toward the main floor it shall return non-stop and open its doors on arrival. It shall not comply with 524 CMR 17.40(3)(b), until the car begins to move.
(d) When the car is moving away from the main floor it shall reverse direction at the next available floor without opening its doors and return non-stop to the main floor.
(e) When the car is at a floor, other than the main floor with its doors open, they shall close without delay, and the car return to the main floor.
(f) The car shall return to the main floor after being called by the EMS main floor switch and open its doors even if the main floor EMS key switch has been returned to the off position during travel. On arrival at the main floor the audible signal in the car shall cease.
(g) Upon arrival at the main floor the doors shall open and if the main floor EMS key switch is "on" they shall remain open until that switch is turned "off". If the main floor EMS key switch is "off" the visual signals shall remain illuminated for a minimum of 60 seconds. During this delay the EMT must insert his key into the car control panel and turn it to the "on" position to retain control of the car. Upon expiration of the delay, without the key in the car being turned on the car shall return to normal service.
(h) If the elevator is an automatic car with attendant or independent service operation it shall activate its audible and visible signal and if on attendant service shall return to automatic operation after a minimum of 15 seconds and a maximum delay of 60 seconds and then proceed to the main floor.

(4) Car Operation.
(a) Upon entering the car it shall not accept a car call until the in car EMS key switch is turned to the on position. After turning that key on and registering a call, the car shall automatically close its doors and proceed to the call. All door zone detection devices shall be operative. If more than one call is registered, it shall stop at the first call and cancel all others at which time a second choice can be made.
(b) Upon arriving at the desired floor, the doors shall open automatically and the EMT shall remove his key when the switch is in the off position, the car shall then remain at that floor and will not accept a call or move away from that floor until the key is again turned on.
(c) The car must be returned to the main floor on EMS service and the key removed in its off position before returning the car to normal operation.
(d) If the car is on any form of special service such as inspection, firefighters, etc., when EMS service is initiated the audible and visible signals in the car shall be activated but the car shall not respond to the main floor EMS call.
(e) If the car has responded to a Medical Emergency call prior to a call for fireman's service, the EMT call for service shall not be overridden by firefighters service call until it returns to the main floor but the fireman's service audible and visible signals shall be activated.

(5) Designation. Medical Emergency Service shall be identified as follows:
(a) At the main floor this elevator shall be identified by the national medical symbol (star of life), shown below.
(b) These symbols (two) shall be permanently attached to the hoistway door frame on each side of that frame at right angles to the sill at a height not less than 66" and not more than 78" above the floor level at the sill.
(c) The symbol shall be blue in color with contrasting background, the staff and serpent shall be white.
(d) The symbol itself shall be two to three inches in height.

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.

REGULATORY AUTHORITY

524 CMR 17.00: M.G.L. c. 143, § 69.

NON-TEXT PAGE

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.

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.

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.

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:

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.

524 CMR 19.00: DUMB-WAITERS (FOR INSTALLATIONS MADE PRIOR TO JUNE 7, 1991)

Section

19.01: Hoistway Enclosures
19.02: Machine Sheave Enclosures
19.03: Venting of Hoistways
19.04: Thoroughfares
19.05: Pipes and Wiring
19.06: Dumb-waiter Hoistway Doors
19.07: Car Construction
19.08: Hydraulic Driving Machines
19.09: Power Dumb-waiter Machines
19.10: Terminal Stopping and Machine and Safety Devices
19.11: Suspension Means

19.01: Hoistway Enclosures

(1) The hoistways of all dumb-waiters shall be enclosed throughout their height.

(2) Where the dumb-waiter hoistway penetrates any fully enclosed solid floor above the bottom landing, the walls shall be of not less than two-hour fire-resistive rating.

All plans for electric dumbwaiter installations shall be signed by a registered professional engineer or a registered architect and shall bear his registering stamp certifying that he has examined the plans and finds that the hoistway structure will comply with the contract load plus its tare. The complete dumb-waiter installation shall comply with 524 CMR now in effect.

(3) Where the dumbwaiter either serves only open construction floors or serves only open balcony floors within one story, the walls 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) 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.

(5) Where hoistway enclosures are not required to continue through the roof, the top of the shaftway shall be of fire-resistive construction equivalent to that required for the walls.

(6) More than one dumb-waiter may be installed in the same shaftway.

(7) Emergency stop switches shall be installed in all dumbwaiter pits.

(8) Electric contacts shall be installed on all machine access doors and access panels on all dumbwaiters.

19.02: Machine Sheave Enclosures

(1) Dumb-waiter machines or sheaves shall be enclosed.

(2) Where fire-resistive hoistway enclosures are required, machine room enclosures shall be of solid construction and of not less than two-hour fire-resistive construction. Where fire-resistive hoistway enclosures are not required, machine room enclosures shall be of non-combustible material, either solid or openwork which shall reject a two inch ball.

(3) Enclosures shall be located:
(a) Above the top of the hoistway;

19.02: continued

(b) Below the hoistway;
(c) Adjacent to and on any side of the hoistway;
(d) Within the hoistway itself, in which instance the hoistway may serve as the enclosure.

(4) Dumb-waiter support beams shall be of steel, designed with a factor of safety of not less than five.

(5) Flooring or floor covering within enclosures, where provided, shall be of materials other than wood.

(6) Doors to machine or sheave enclosures shall be of not less than one and one half hour fire-resistive construction and shall be equipped with locks. Swing type doors shall be self-closing.

(7) Loads on overhead beams and their supports shall be computed as follows: The total load on overhead beams shall be equal to the weight of all apparatus resting on the beams plus twice the maximum static load suspended from the beams.

19.03: Venting of Hoistways

(1) General. Hoistways of dumb-waiters serving more than three stories shall be provided with means for venting smoke and hot gases to the outer air in case of fire.
EXCEPTION: 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 noncombustible 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 ½ square foot of each dumb-waiter car, whichever is greater. Of the total vent area described, not less than one-third 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 1/8" thick.

(5) Window and Skylight Frames and Sash. Window and skylight frames and sash shall be of metal.

19.03: continued

(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 dumb-waiter 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 dumb-waiter skylight.

(7) Windows are permitted only in external walls of hoistway enclosures.

(8) All windows and window frames in fire-resistive hoistway enclosures shall be fire windows conforming to local laws and ordinances.

(9) 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 5/8" 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.

19.04: Thoroughfares

If the hoistway of a dumb-waiter does not extend to the lowest floor of a building and the space under the bottom of the car or counterweight is used for any purpose, the following requirements shall be met:

(a) The car and its counterweight shall be provided with a safety device of the instantaneous type, designed and installed to apply and stop the fully loaded car and counterweight without appreciable delay on the breaking of the suspension means, irrespective of the location of the break.

(b) The construction of the hoistway under the car and counterweight shall be sufficiently strong to withstand, without failure the impact of the fully loaded car and of the counterweight descending at 125% of contract speed.

(c) Where calculations, based on good engineering practice demonstrate that the structure under the hoistway is capable of withstanding, without failure, the impact of the fully loaded car or its counterweight, falling freely from their upper limits of travel, no safety device shall be required for the car or counterweight.

19.05: Pipes and Wiring

(1) No electrical conduits or cables or any other installation other than those used to furnish or control power, light, heat or signals for the dumb-waiter or hoistway shall, in any way, be located within the hoistway.

(2) Pipes, conduits and armored cables shall be securely fastened in the hoistway construction.

(3) Pressure in steam pipes shall not exceed 15 lbs. above atmospheric pressure.

(4) No part of any electric circuit having a rated system or circuit voltage in excess of 250 volts shall be used either for any operating circuit or for any control circuit on any equipment which is located in the hoistway, on the car, on the landing doors, or at the landing openings.

(5) All wiring for electricity shall be done in accordance with the best practice. In case any question arises as to what is the best practice, work done according to the requirements of 527 CMR 12.00: *Massachusetts Electrical Code* shall be the standard.

19.06: Dumb-Waiter Hoistway Doors

(1) All landing openings in dumb-waiter fire-resistive shaftways shall be provided with doors, panels or fronts of not less than one and one half hour fire-resistive construction. Where fire-resistive hoistway enclosures are not required, doors may be of open metal construction which will reject a ball two inches in diameter.

(2) The landing door opening shall not exceed the width and height of the car and in no case shall the height exceed four feet provided that one landing door may be of a larger size to permit installing or removing the car.

(3) Hoistway landing doors of power driven dumb-waiters, other than where hoistway type interlocks are used, shall be of the vertical sliding type and shall be provided with hoistway unit-system type contacts and mechanical locks which are arranged so that the car cannot be operated unless each hoistway landing door is in the closed position.

(4) Mechanical locks, where used, shall be of a double hook or multiple hook type arranged to lock the door after the car departs from the landing zone.

(5) Landing doors in shaftways for hand-powered dumb-waiters shall be of the self-closing type, or shall be equipped to close automatically in case of fire.

19.07: Car Construction

(1) Dumb-waiter cars shall be of rigid construction and designed to sustain the contract load.

(2) Cars shall be made of wood or metal.

(3) Cars for power dumb-waiters shall be reinforced with metal from the bottom of the car to the point of suspension.

(4) Metal cars shall be of metal sections rigidly riveted, welded or bolted together.

(5) Cars may be provided with hinged or removable shelves.

(6) Dumb-waiter cars shall be capable of sustaining the loads given in 524 CMR, 19.07: *Table 1* with factors of safety not less than six for steel and nine for cast iron or other materials. The motive power need not be sufficient to raise the structural-capacity load.

524 CMR 19.07, TABLE 1.

Effective Platform Area (Sq. ft.)	Minimum Deign Capacity (lbs.)
4	100
5	150
6.25	300
9	500

(7) A metal capacity plate shall be provided which shall be fastened in a conspicuous place and shall bear the following information in not less than one quarter inch letters or figures, stamped, etched, or raised on the surface of the plate:

CONTRACT LOAD _____ POUNDS

19.08: Hydraulic Driving Machines

Hydraulic driving machines shall be of the direct plunger type and shall conform to 524 CMR 17.23(1).

19.09: Power Dumb-waiter Machines

(1) Dumb-waiter machines shall be securely fastened to their supports. The factors of safety, based upon the ultimate strength of the materials and the contract load, plus the weight of the car, ropes, counterweights, to be used in the design of dumb-waiter machines shall be not less than six for steel, and nine for cast iron or other materials.

(2) Sheaves or idlers shall not be suspended in cast iron stirrups from the under side of the supporting beam.

(3) Belts and chains may be used as the driving means between motors and driving sheaves or drums of power dumb-waiters subject only to the following restrictions:
(a) When flat belts are used, the contract speed shall not exceed 50 F.P.M.
(b) Where multiple "V" belts are used, the contract speed shall not exceed 150 F.P.M.

19.10: Terminal Stopping and Machine Safety Devices

(1) Power dumb-waiters shall be provided at each terminal with means independent of manual operation to stop the car automatically within the limits of overtravel.

(2) Power dumb-waiters, other than hydraulic dumb-waiters, shall be equipped with brakes which are automatically applied when the power is cut off the motor.

(3) Power dumb-waiters operated by winding-drum machines shall be provided with a slack-rope device.

19.11: Suspension Means

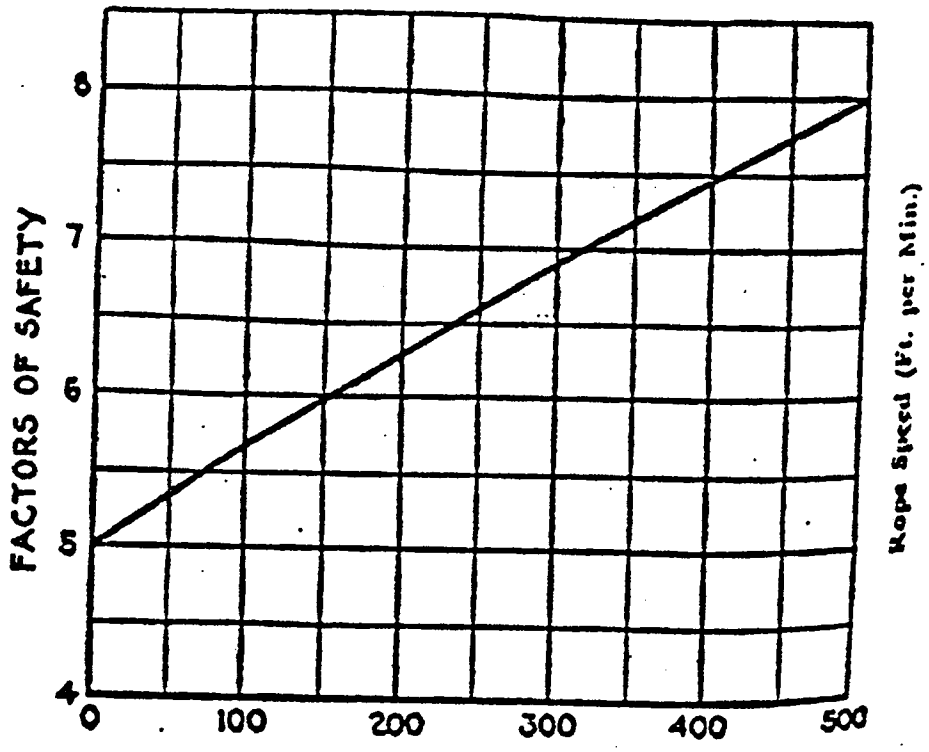
(1) Power dumb-waiters other than those of the direct plunger type shall be provided with one or more iron or steel hoisting ropes or chains. No covering shall be permitted on ropes other than where liability to excessive corrosion or other hazards exists, in which case Marline covering may be used. Chains, when used, shall be of the roller or block type.

(2) Steel wire hoisting ropes or chains secured to the car or counterweight or rope hitch shall be babbitted sockets or rope clamps.

(3) The factor of safety for car and counterweight ropes based on static loads and ultimate strength of the rope shall be not less than the values given in 524 CMR 19.11 Figure 1, below, corresponding to the contract speed of the car. For chains the factor of safety shall be not less than 25% greater than given in 524 CMR 19.11: *Figure 1.*

19.11: continued

FIGURE 1.
FACTORS OF SAFETY FOR HOISTING ROPES FOR DUMB-WAITERS



REGULATORY AUTHORITY

524 CMR 19.00: M.G.L. c. 143, § 69.

524 CMR 20.00: SIDEWALK ELEVATORS AND MANLIFTS

Section

20.00 Sidewalk Elevators and Manlifts

20.00: Sidewalk Elevators and Manlifts

The installation of sidewalk elevators was prohibited prior to 1989. The installation of manlifts are prohibited.

REGULATORY AUTHORITY

524 CMR 20.00: M.G.L. c. 143, § 69.

NON-TEXT PAGE

(524 CMR 21.00: RESERVED)

(PAGES 147 THROUGH 154 ARE RESERVED FOR FUTURE USE.)

524 CMR 22.00: MOVING STAIRWAYS (FOR INSTALLATIONS MADE PRIOR TO JULY 1,1989)

Section

22.01: Construction: Protection of Floor Openings
22.02: Angle of Inclination
22.03: Width
22.04: Balustrading and Hand Rails
22.05: Step Frames and Treads
22.06: Design of Trusses or Girders
22.07: Track Arrangement
22.08: Capacity and Loading
22.09: Factors of Safety
22.10: Safety Requirements
22.11: Tests

22.01: Construction: Protection of Floor Openings

(1) Floor openings for moving stairways not constituting required means of egress shall be protected as follows:

(2) Floor openings shall be provided with enclosures as required for stairways, or

(3) In buildings completely protected by an approved automatic sprinkler system, each moving stairway floor opening shall be protected against the passage of fire, smoke and gases to the story above by one of the following alternative methods of protection: Sprinkler-Vent method (524 CMR 22.01(4)); Rolling Shutter method 524 CMR 22.01(5)); or Spray Nozzle method (524 CMR 22.01(6)); and, in addition to the manual controls specified, each moving stairway shall be provided with an automatic stopping device which will stop the unit when any one of the protective methods specified functions.

(4) Sprinkler-Vent method -- a combination of an automatic water curtain meeting the following requirements:

(a) The exhaust system shall be of such capacity as to create a downdraft, through the moving stairway floor opening, having an average velocity of not less than 300 feet per minute under normal conditions for a period of not less than 30 minutes.

NOTE: This requirement can be met by the provision of an air intake from the outside of the building above the floor opening. The test of the system under "normal" conditions requires that the velocity of the downdraft be developed when windows or doors normally used for ventilation are open. The size of the exhaust fan and exhaust ducts must be sufficient to meet such ventilation conditions. Experience indicates that fan capacity should be based on a rating of not less than 500 cfm per square foot of moving stairway opening to obtain the 300 FPM required. If the building is provided with an air-conditioning system arranged to be automatically shut down in the event of fire, the test conditions should be met with the air-conditioning system shut down. The 300 FPM downdraft through the opening provides for the testing of the exhaust system without requiring an expansion of air present under actual fire conditions.

(b) Operation of the exhaust system for any floor opening shall be initiated by an approved thermostatic device in the story involved and shall also result from the functioning of other required automatic fire detection devices within the building or section of the building. There shall also be provided a manual means of operating and testing the system.

NOTE: Supervised smoke detection devices ordinarily provide earlier detection of fire than automatic sprinkler systems and if used to actuate the exhaust system automatically should provide an added life-safety advantage.

(c) To assure reliability of the electrical supply to all parts of the exhaust system and control devices, the circuits shall be supplied directly from the bus bars of the main switchboard, or by a main connected to the bus bars of the main switchboard but not used for any other purpose.

22.01: continued

(d) Fans and ducts used in connection with automatic exhaust systems shall be constructed and installed in accordance with the best engineering practice.

(e) Periodic tests, at least quarterly, shall be made of the automatic exhaust system to maintain the system and the various control devices in good working order.

(f) The water curtain shall be formed by open sprinklers or spray nozzles so located as to form a complete water barrier along all exposed sides of the door opening and reaching from the ceiling to the floor.

(5) Rolling Shutter method -- an automatic self-closing rolling shutter which will completely enclose the top of each moving stairway opening above the street floor, meeting the following requirements:

(a) The shutter shall close off the wellway opening immediately upon the automatic detection, by an approved device, of either fire or smoke in the vicinity of the moving stairway, and in addition there shall be provided a manual means of operating and testing the operation of the shutter.

(b) The shutter assembly shall be capable of supporting a weight of 100 lbs. on any one square foot of area, and not less resistant to fire or heat than 24 gauge steel.

(c) The shutter shall operate at a speed of not greater than 30' per minute and shall be equipped with a sensitive leading edge. The leading edge shall arrest the progress of the moving shutter and cause it to retract a distance of approximately six inches upon the application of a force of at least 20 lbs. applied on the surface of the leading edge. The shutter, following retraction, shall continue to closure immediately.

(d) To assure reliability of the electrical supply to the control devices for, and for actuation of, the automatic rolling shutter, the circuits shall be supplied directly from the bus bars of the main switchboard, or by a main connected to the bus bars of the main switchboard but not used for any other purpose.

(6) Spray Nozzle method -- a combination of an automatic smoke or fire detection system and a system of high velocity water spray nozzles, meeting the following requirements:

(a) Spray nozzles shall be of the open type and shall have a solid conical spray pattern. The number of nozzles, discharge angles and location shall be such that the moving stairway floor opening will be completely covered by a dense spray upon the operation of the system.

(b) The number and size of nozzles and water supply shall be sufficient to deliver a discharge of two and one half gallons of water per square foot per minute through the floor opening.

(c) Spray nozzles shall be located near the top of the wellway housing and so positioned that the center line of discharge is at an angle not less than 60° with the plane of the opening to be protected.

(d) Spray nozzles shall be provided with a water supply, separate from the water supply system for automatic sprinklers, at a minimum flowing pressure of at least 25 lbs. per square inch. Oversize piping shall be used to minimize friction loss.

(e) Control valves shall be readily accessible to minimize water damage. Thermal control valves may be used, if piping is arranged and sized so that any one control valve can supply simultaneously all the spray nozzles intended for the protection of the moving stairway floor opening.

(f) A noncombustible draft curtain, extending 20" to 30" below and around the opening and a solid non-combustible wellway housing above the floor shall be provided at each moving stairway floor opening. Spray nozzles shall be protected by sheet metal deflectors against mechanical injury.

(g) Means of manual operation of the spray nozzle system for any floor opening shall be provided, and the system shall also be actuated by approved smoke detection or thermostatic devices in the story in which fire may occur. Supervised smoke detection devices located in or near the moving stairway floor opening may be used to meet this requirement. Thermostatic fire detection devices, such as rate-of-rise or fixed temperature systems, used to initiate the operation of the spray nozzle system shall be so located as to assure the operation of the system in advance of the passage of smoke through the moving stairway floor opening.

22.02: Angle of Inclination

The angle of inclination of a moving stairway shall not exceed 30° from the horizontal.

22.03: Width

The width between moving stairway balustrade shall be at least 22" and not more than 48", measured on the incline at a height of 27" vertically above the nose line of the steps. In no case shall such width exceed the width of the steps by more than 13".

22.04: Balustrading and Hand Rails

(1) Moving stairways shall be provided on each side with solid balustrading. On the step side, the balustrading shall be smooth, without depressed or raised paneling or molding. Necessary protective molding parallel to the run of the steps and vertical molding not more than ¼" and properly beveled may be used to cover joints of panels.

(2) Where glass panels are used in balustrading, they shall be of laminated type glass.

(3) The clearance between the step treads and the balustrading curtain guard shall not exceed ⅛".

(4) There shall be no abrupt change in the width between the balustrades. Any change shall be not more than 8% of the greatest width. In changing from the greater to the smaller width, the change in the direction of the balustrading shall be not more than 15° from the line of travel.

(5) Each balustrading shall be equipped with a moving handrail traveling at substantially the same speed and in the same direction as the travel of the steps. Each moving handrail shall extend at normal handrail height not less than 12" beyond the line of the comb-plate teeth at the upper and lower landing.

(6) Hand or finger guards shall be provided at the point where the handrail enters the balustrading.

(7) Where the intersection of the outside balustrade or deck board and the ceiling or soffit is within 24" of the centerline of the handrail, a vertical guard plate of solid construction shall be installed in the apex of the intersecting angle. The vertical face of the guard shall project at least 14" measured horizontally from the apex of the angle. Where glass plates are used, they shall be of shatterproof glass. Vertical end of the guard plate shall be rounded to eliminate a shear hazard.

22.05: Step Frames and Treads

(1) Step frames and treads shall be of noncombustible material. Step treads shall be horizontal and of a material and design affording a secure foothold.

(2) The depth of any step tread in the direction of travel shall not be less than 15¾", and the rise between treads shall not exceed 8½". In no case shall the width of a step tread be less than 16".

(3) The maximum clearance between treads on the horizontal run shall be ⅛".

(4) The tread surface of each step shall be slotted in a direction parallel to the travel of the steps. Each slot shall be not more than ¼" wide and not less than ⅜" deep, and the distance from center to center of adjoining slots shall be not more than ⅜".

(5) There shall be a comb-plate at the entrance and exit of every moving stairway. The comb-plate teeth shall be meshed with and set into the slots in the surface of the tread, so that the points of the comb teeth are always below the top surface of the treads.

22.05: continued

(6) Comb-plates shall be adjustable in both the horizontal and vertical directions.

(7) Sections forming the comb-plate teeth shall be so arranged as to be readily replaceable.

22.06: Design of Trusses or Girders

The truss or girder shall be so designed that it will safely sustain the steps and running gear in case of failure of the track system to retain the running gear in its guides.

22.07: Track Arrangement

The track arrangement shall be designed to prevent displacement of the steps and running gear if a step chain breaks.

22.08: Capacity and Loading

The contract load, in pounds, shall be computed by the following formula:

Contract load = 4.6 W A

In this formula, W is the width in inches between the moving stairway balustrades measured 30" vertically above the nose line of the steps, and A the horizontally projected distance in feet between the upper and lower comb-plate teeth.

22.09: Factors of Safety

The factors of safety to be used in the design of moving stairways shall be at least the following, based on the static loads:

(1) For trusses and all structural members, including tracks, five.

(2) For moving stairway driving machines -- for wrought iron or wrought steel, eight; for cast iron, cast steel, or other materials, ten.

(3) For power transmission members, ten, other than step chains composed of cast steel links which shall be thoroughly annealed, in which case the factor of safety shall be at least 20.

22.10: Safety Requirements

(1) Limits of Speed. The rate of travel of the steps measured along the angle of inclination shall not exceed 125 feet per minute.

(2) Application of Power.
(a) Each moving stairway shall be driven by an individual motor.
(b) The driving machine shall be connected to the main drive shaft by tooth gearing, a coupling, or chain.
(c) Where a means other than a solid shaft, coupling, or tooth gearing connects the motor to the gear reducer, the electrically released, mechanically applied brake must be located on the gear reducer or main drive shaft.
(d) If the drive motor is attached to a gear reducer by means other than a solid shaft, coupling or tooth gearing, a device shall be provided that will cause the application of the electrically released, mechanically applied brake if the motor becomes disconnected from the gear reducer or if escalator overspeeds or underspeeds.

(3) Safety Devices. The following safety devices shall be provided:
(a) All existing escalators shall have emergency stop buttons conforming to the requirements of Rule 805.3a (1) (Reference A17.1-1996). Existing escalators shall be compliant by January 1, 2003. The new emergency stop buttons shall not be combined with key operated start switches and shall be mounted on the right side facing the escalator.

22.10: continued

(b) Starting buttons or switches shall be located within sight of the moving stairway and shall be of the key-operated type.
(c) Each moving stairway shall be provided with a speed governor which will cause the interruption of power to the moving stairway in case the speed exceeds a pre-determined value which shall be not more than 40% in excess of the normal running speed. The speed governor is not required where an alternating current squirrel cage induction motor is used.
(d) Each moving stairway shall be provided with a broken step switch and broken chain switch which will cause interruption of power to the moving stair and shall be of the manual reset type. Where no automatic chain tension device is provided, this device shall also function in case excessive sag occurs in either step chain.
(e) Where a moving stairway is equipped with tightening devices operated by means of tension weights, provision shall be made to retain these weights in the moving stairway-truss or frame in case the weights should fail.
(f) Each moving stairway shall be provided with an electrically released, mechanically applied brake of sufficient power to stop it when fully loaded.
This brake shall automatically stop the moving stairway when operating or tending to operate in the descending direction in case any of the safety devices function.
(g) Where the drive machine is connected to the main drive-shaft by a chain, a device shall be provided which will cause the application of a brake on the main drive-shaft in case the drive chain parts.
(h) Skirt Obstruction Device. Wherever the basic design of the panels will permit its addition, means shall be provided to cause the opening of the power circuit to the moving stair driving machine motor and brake, should an object become wedged between the step and the skirt panel as the step approaches the upper and lower combplates.
(i) Upthrust track switches shall be provided and shall be of the manual reset type.
(j) Handrail brush switches shall be installed.

(4) Lights and Access.
(a) There shall be an electric light (ten candlepower) and a 110 volt outlet in every moving stairway machine room and pit access area which can be lit without passing over or reaching over any part of the machinery.
(b) Free access to the moving stairway, machine room, pit access areas and inspection doors shall be provided for inspection and maintenance and shall be electrically contacted.

22.11: Tests

All escalators will be tested in accordance with 524 CMR 8.01 (10), (11) and (12).

(1) Speed Test. The application of the over speed safety device shall be obtained by causing the moving stairway to travel at governor tripping speed.

(2) Broken Step Chain. The broken step chain device shall be tested by operating the actuating device by hand.

(3) Broken Drive Chain. The broken drive chain device, where a drive chain is provided, shall be tested by operating the actuating device by hand.

(4) Stop Buttons. The emergency stop buttons shall be tested by operating these buttons when the moving stairway is operated in each direction of travel.

(5) Stop Switches in Machinery Spaces. A stop switch shall be provided in each machinery space where means of access to the space is provided. The switch, when open, shall cause the electric power to be removed from the moving stairway driving machine motor and brake. The stop switch shall:

22.11: continued

(a) be of the manually opened type
(b) be conspicuously and permanently marked "STOP"
(c) be positively opened mechanically and the opening shall not be solely dependent on springs.

(6) Reverse Phase Relays. Each power driven moving stairway driven by a polyphase alternating current motor shall be provided with a device which will prevent starting the motor if:

(a) the phase rotation is in the wrong direction, OR
(b) if there is a failure in any phase.

NOTE: 524 CMR 22.00 does not apply to AC motors used to drive motor generator sets.

(7) Disconnect Means. An enclosed fused disconnect switch or circuit breaker arranged to disconnect the power supply to the moving stairway shall be installed in the space where the controller is located or shall be mounted on the controller. Disconnect switches or circuit breakers shall be of the manually closed multi-voltage type.

REGULATORY AUTHORITY

524 CMR 22.00: M.G.L. c. 143, § 69.

524 CMR 23.00: PRIVATE RESIDENCE ELEVATOR CODE (FOR INSTALLATIONS MADE PRIOR TO JUNE 7, 1991)

Section

23.01: Scope
23.02: Hoistways
23.03: Hoistway Guards
23.04: Landings
23.05: Counterweights
23.06: Safeties
23.07: Machines
23.08: Suspension Means
23.09: Emergency Signal

23.01: Scope

524 CMR 23.00 applies only to power passenger elevators serving only a single family, installed in a single residential building and having a contract load not in excess of 700 lbs. the contract speed not in excess of 50 fpm and a clear platform area not in excess of 12 sq. ft. and a rise not in excess of 50'. All installations shall comply with local laws and ordinances.

For requirements governing hand-elevators, refer to the appropriate sections of 524 CMR 15.00 through 33.00.

23.02: Hoistways

(1) Enclosure. The hoistway shall be solidly enclosed and be of one hour fire-rated construction throughout.

(2) Contract Speed.

(a) If the contract speed is 30 fpm or less, the enclosure may be omitted in the lowest story served if there is no pit and if the car platform is equipped with a device which, when obstructed in its downward travel by a force not to exceed 4 lbs. applied anywhere at its lower surface, will open an electric contact in the control circuit and thus stop down travel of the car within the range of the free suspension of the device and not exceeding three inches.

(b) If the contract speed is 30 fpm or less, the hoistway landing door or doors at the lower landing may be omitted on elevators located in existing open stairway areas or other existing open areas if the car platform is equipped with a device which will meet the requirements of 524 CMR 23.02(2)(a), and stop the car when it is obstructed in its downward travel, and provided that the unused sides of the hoistway are protected.

(3) Car Clearances.

(a) There shall be a clearance of not less than ¾" between the car and the hoistway enclosure and between the car and its counterweight.

(b) The clearance between the car platform and the landing threshold shall be not less than ½" nor more than one inch.

(4) Pits and Overtravel.

(a) The structure at bottom of hoistway shall be sufficiently strong to withstand without failure the impact of the car with contract load, also the impact of the counterweight, when either is descending at contract speed, or at governor tripping speed if governor-operated safety is used. (See 524 CMR 17.16.)

(b) A pit is not required at the bottom of the hoistway and the car may stop immediately on or above the bottom landing floor, or a pit may be provided to permit the car floor to stop flush with the landing floor, if equipped with a device that will meet the requirements of 524 CMR 23.02(2).

(c) A pit shall not be provided when there is no hoistway enclosure at the lowest story served.

(d) At the top landing, there shall be a top clearance of not less than four inches plus one inch for each 3 fpm of speed in excess of 30 fpm.

23.02: continued

(5) Overhead Support.

(a) All machinery and sheaves shall be so supported and secured as effectually to prevent any part becoming loose or displaced.

The supporting beams shall be steel, sound timber or reinforced concrete.

(b) Loads on overhead beams and their supports shall be computed as follows: 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. The load resting on the beams shall include the complete weights of machine sheaves, controller, etc. The load suspended from the beams shall include the sum of the tensions of all ropes suspended from the beams.

NOTE: The object in doubling the suspended load is to allow for impact, acceleration stresses, *etc.*

(c) No elevator machinery or sheaves shall be fastened to the underside of the supporting beams at the top of the hoistway.

Other Than: The idler or deflecting sheaves with their guards and frames.

Supporting members for sheaves and other elevator machinery hung underneath beams shall not depend solely on cast iron in tension.

(d) The factor of safety for overhead beams and their supports shall be:

For steel.....5

For timber and reinforced concrete.....6

(6) Pipes and Wiring.

(a) All electric wiring shall be in accordance with the rules and regulations made in accordance with the provisions of M.G.L. c. 143, § 3L, as most recently amended.

(b) 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.

(c) No electric circuit having a nominal voltage in excess of 250 volts, shall be used for the operation, control or motor circuit.

(d) All live parts of electrical apparatus in the hoistway shall be suitably enclosed to protect against accidental contact.

23.03: Hoistway Guards

(1) Counterweight Runway.

(a) Where the counterweight runway comes down to a floor or passes a floor or stairs, it shall be enclosed at least seven feet above the floor or stairs by an enclosure which is either solid or with openings not exceeding ⅜" square.

(b) Access shall be provided for inspection, maintenance and repair of counterweight and ropes. The door to the counterweight runway enclosure shall be self-closing.

(2) Protection of Hoist Ropes.

(a) Where hoist ropes pass through a floor or stairs outside the hoistway enclosure, they shall be solidly enclosed to a height of not less than seven feet above the floor or the stair tread. The floor openings shall not be greater than necessary for free passage of the ropes.

(b) Hoist ropes immediately adjacent to stairs shall be guarded with solid or grille panel on the stair side to a height of not less than seven feet above the stair treads. Enclosures shall be solid, or open work with openings not exceeding 3/8" square.

23.04: Landings

(1) Hoistway Doors.

(a) Landing openings shall be protected by swing or horizontal sliding doors. Hoistway doors shall be of solid wood core or its equivalent and shall be not less than six feet six inches high.

(b) The clearance between the hoistway enclosure door and the hoistway edge of the landing sill shall not exceed three inches and the distance between the hoistway face of the landing door and the car door or gate shall not exceed four inches.

23.04: continued

(c) The hoistway face of the landing door shall not project into the hoistway beyond the landing sill. No hardware, except that required for locks, contacts, or signals shall project into the hoistway beyond the line of the landing sill.
(d) Hoistway doors shall be provided with locking devices and electric contacts conforming to the following: "The locking device shall either be of a type which will prevent starting the car unless the door is locked in the closed position, or it may permit the car to start with the door in the closed position and not locked, provided the device will stop the car if the door fails to lock, before the car has moved more than 12" away from the landing. The device shall also prevent opening any hoistway door unless the car is within 12" of that landing."
(e) No means shall be provided which will open any landing door from the landing side when the car is not in the landing zone.
(f) Hoistway doors shall be so arranged that it will not be necessary to reach back of any panel, jamb or sash to operate them.
(g) Means shall be provided to prevent hangers for sliding hoistway doors from jumping the track. Stops will be provided to prevent the hanger carriage from leaving either end of the track, or suitable stops shall be provided on the door.

(2) Light in Car. There shall be an electric light to illuminate the car, with its switch place near the car entrance within easy reach of a person before entering the car.
Other Than: Elevators in unenclosed hoistways.

(3) Guide Rail Construction.
(a) Car and counterweight guide rails shall be of steel.
(b) Guide rails shall be securely fastened.
Guide rails and their fastenings shall not deflect more than ¼" under normal operation.
Joints of guide rails shall be well fitted and strongly secured.
Guide rails and their joints and fastenings shall withstand the application of the "SAFETY" when stopping the fully loaded car.
(c) The guide rails shall extend from the bottom of the hoistway to a height above the top landing sufficient to prevent the guide shoe from running off the guides when the car or counterweight are at the extreme upper position.

23.05: Counterweight

(1) (a) Counterweights, where used, shall run in guides.
(b) If a car counterweight is used, it shall not be of sufficient weight to cause undue slackening of any car hoist rope at start or stop of the car.
(c) The counterweight sections, whether or not carried in a frame, shall be fastened together to prevent rattle and displacement.
(d) There shall be no gas lines under the car or counterweight runways.
(e) Counterweights requiring a safety shall operate by a speed governor and shall be of the instantaneous type at a maximum tripping speed of 75 feet per minute.

(2) Car Construction.
(a) Elevator cars shall have metal or combination metal and wood suspension frames and platforms with safety factor of not less than five based on the contract load.
(b) Cast iron shall not be used in the construction of any member of the car frame or platform other than for guide shoes and guide shoe brackets.
(c) No glass shall be used in a residence elevator car except for car light and appliances necessary for the operation of the car.
(d) The car shall have but one compartment.
(e) No elevator shall have more than two openings.

(3) Car Enclosure.
(a) Other than at the entrance the car shall be enclosed at sides and top. The enclosure at the sides shall be solid or of open work which will reject a three eight inch diameter ball.
(b) The car enclosure shall be secured in such manner that it cannot work loose or become displaced in regular service.

23.05: continued

(4) Car Gate.

(a) A car door or gate shall be provided at each entrance to the car. This door or gate shall, when closed, guard the opening to a height of at least six feet six inches and if on an electric or electrically controlled hydraulic elevator, shall be provided with an electric contact which will prevent operation of the elevator unless the car door or gate is within two inches of full closure.

(b) The car door or gate may be manually operated, power operated, or may be closed by a weight or spring. Collapsible gates shall not be power-opened more than nine inch from full closure.

(c) Car gates shall be of a design that when fully expanded will reject a three inch diameter ball.

(d) When the hoistway enclosure is omitted at the bottom landing the car gate shall be provided with a mechanical lock which will lock it in the closed position when the car is more than six inches away from any landing. Car door release shall be provided to permit the door or gate to be opened at any point of car travel.

(e) Car door or gate contacts shall be positively opened by a lever or other device attached to and operated by the door or gate.

(f) Car door or gate contacts shall be maintained in the open position by the action of gravity or a restrained compression spring or both, or by means of a positive linkage.

23.06: Safeties

(1) Safety Construction and Operation.

(a) Elevator cars suspended by wire ropes or chains shall be provided with a car safety capable of stopping and sustaining the car with contract load.

(b) The car safety shall operate by a speed governor and be of the instantaneous type at a maximum tripping speed of 75 fpm.

(c) If speed governor is used, it shall be located where it cannot be struck by the car or counterweight in case of over-travel and where there is sufficient space for full movement of the governor parts.

(d) The motor-control circuit and the break control circuit shall be opened before or at the same time the safety applies.

(e) The governor ropes shall be of iron, steel Monel metal or phosphor bronze not less than ¼" in diameter. Tiller rope construction shall not be used for governor ropes.

(f) Elevators of the winding drum type with rope suspension shall be provided with a slack rope device of the manually reset type which will cut off the power and stop the elevator machine if the car is obstructed in its descent and the hoist ropes slacken. Elevators with roller chain suspension shall be provided with a slack chain device which will cut off the power and stop the elevator machine if the car is obstructed in its descent and the hoist chains slacken. This device need not be of the manually reset type if the chain sprockets are guarded to prevent the chain from jumping off the sprockets.

(g) No safety device which depends upon the completion and maintenance of an electric circuit for the application of the safety shall be used. Car safeties shall be applied mechanically.

Cast iron shall not be used in the construction of a car safety where its breakage might result in the failure of the safety to function to sustain the car.

(2) Tests. Test of the car safety with contract load in the car shall be made before the elevator is put into service. Governor operation of instantaneous type safeties shall be tested at contract speed by tripping the governor by hand. Safeties operated as the result of the breaking of the hoist ropes shall be tested by obtaining the necessary slack rope to cause them to function.

(3) Capacity Plate. A metal plate shall be fastened in a conspicuous place in the car stating the contract load in pounds, in letters and figures not less than ¼" high.

(4) Limitations of Load, Speed and Platform Area. Where the contract load exceeds 700 lbs. or the contract speed exceeds 50 fpm, or the net inside car platform area exceeds 12 sq. ft., the elevator shall not be considered a "Private Residence Elevator" and shall conform to all requirements for "Power Elevators".

23.07: Machines

(1) Machines.

(a) Winding drums, traction sheaves and overhead and deflecting sheaves shall be of cast iron, or steel, of diameter not less than 30 times the diameter of the wire hoist ropes. The rope grooves shall be machined.

Where 8 x 19 plow steel ropes are used, the diameter of drums and sheaves may be reduced to 20 times the diameter of the rope.

(b) The factor of safety based on the static load (the contract load plus the weight of car, ropes, counterweights, *etc.*) to be used in the design of residence elevator hoisting machines shall not be less than:

1. Eight for wrought iron and steel.
2. Ten for cast iron, cast steel and other material.

(c) Set-screw fastenings shall not be used in lieu of keys or pins at a connection subject to torque or tension.

(d) No friction gearing or clutch mechanism shall be used for connecting the hoist drum or sheaves to the main driving gear.

(e) Gearing that have cast iron teeth shall not be used.

(f) Electric elevator machines shall be equipped with electrically-released spring-applied brakes.

(g) No single ground, short circuit, countervoltage or motor field discharge shall prevent the brake magnet from allowing the brake to set in the intended manner during normal operation.

(h) Electric elevator machine shall be arranged for manual operation by a crank in case of power failure and a suitable crank shall be provided and kept near the machine.

(2) Limit Switches. Upper and lower normal stopping devices shall be provided, set to stop the car at the upper and lower terminal landings. Final stopping devices shall be provided, set to operate if the car passes the terminal landings and stop the car before it strikes the overhead or pit bottom.

Where no hoistway enclosure is provided at the lower landing the final stopping device may be omitted at this landing.

The final terminal stopping device shall act to prevent movement of the car in both directions of travel.

The normal and final terminal stopping devices shall not control the same switches on the controller unless two or more separate and independent switches are provided, two of which shall be closed to complete the motor and brake circuit in each direction of travel.

(3) Operation.

(a) The following methods of operation are permitted:

1. Continuous pressure operation.
2. Momentary pressure operation with up-down buttons or switches in the car and up-buttons or switches, or call buttons, at each landing. It is not required that the operation be selective.
3. Single automatic operation.

(b) A stop switch shall be provided on or adjacent to the operating panel. Stop switches shall be of the manually opened and closed type and shall be conspicuously marked "stop".

(c) No control system shall be used which depends upon the completion or maintenance of an electric circuit for:

1. Interruption of the power and application of the electro-mechanical brake at the terminals.
2. Operation of the car safeties, or
3. Stopping in response to the opening of the emergency stop switch.

(d) Hand-rope operation shall not be used.

(e) The sticking or freezing of any single electrically-operated switch, relay or contractor, or the occurrence of a single accidental ground, shall not permit the car to start if any hoistway or car door or gate is in the open position, and shall not permit the car to move more than 12" away from a floor with the hoistway door unlocked.

23.08: Suspension Means

(1) Suspension means shall be wire ropes or steel roller-type chains.

(2) There shall not be less than two such ropes or chains.

(3) Steel tapes as suspension means are prohibited.

(4) On elevators having a contract load of less than 450 lbs. and operating at a contract speed of less than 30 fpm, ropes shall not be less than ¼" in diameter. Where the contract load exceeds 450 lbs. or the contract speed exceeds 30 fpm, ropes shall not be less than three-eighths inch in diameter.

(5) The factor of safety of the suspension means shall not be less than seven.

(6) When the car and counterweight are suspended by steel ropes and the driving means between the machine and the counterweight is an endless steel roller-type chain drive, the factor of safety of such chain with rated load on the car shall not be less than eight.

(7) The arc of contact of a wire rope on attraction sheave shall be sufficient to produce adequate traction under all load conditions. The arc of contact of a chain on a driving sprocket shall not be less than 140°.

(8) All wire ropes anchored to a winding drum shall have not less than one full turn of rope on the drum when the car or counterweight has reached its extreme limit of possible over-travel.

(9) No car or counterweight wire rope shall be lengthened or repaired by splicing. Broken or worn suspension chains may be repaired but the entire chain shall comply with 524 CMR 23.08(6).

(10) The winding drum ends of car and counterweight wire ropes shall be secured by clamps on the inside of the drum or by one of the methods specified in 524 CMR 23.08(11) below for fastening wire ropes to car or counterweight.

(11) The car or counterweight ends of wire ropes shall be fastened by return loop, spliced eyes, or individual tapered babbitted sockets or by properly attached fittings.

23.09: Emergency Signal

An emergency signal shall be provided operative from the car. This signal shall be audible outside the hoistway and may be a telephone connected to a central exchange.

REGULATORY AUTHORY

524 CMR 23.00: M.G.L. c. 143, § 69.

(524 CMR 24.00: RESERVED)

(PAGES 169 THROUGH 174 ARE RESERVED FOR FUTURE USE.)

524 CMR 25.00: BUILDERS' ELEVATORS

Section

25.01: Definition
25.02: Supporting Structures
25.03: Protection of Openings
25.04: Car Construction
25.05: Ropes
25.06: Signals
25.07: Inspection
25.08: Riders

25.01: Definition

The term builders' elevators shall mean elevators which have been erected for temporary use and built in or adjoining a building under construction or alterations.

25.02: Supporting Structures

(1) The supporting structures of builders' elevators shall be enclosed the entire height with heavy mesh wire except at loading or unloading platforms or landings. The wire enclosure shall have not greater than two inch mesh, and shall be securely fastened to the shaftway cross-bracing and struts.

(2) Guide rails shall be securely fastened in position and of such strength and design that the guides and their fastenings shall not deflect between their supports to cause the guide rails to spread causing failure of the safety dogs when applied to retard the car.

(3) No belt or chain driving machine shall be used to drive any power elevator.

25.03: Protection of Openings

(1) Inside landing openings of all such elevators shall be protected to a height of five feet and full width of the opening by a door or gate either solid or perforated; and if perforated it shall reject a ball two inches in diameter.

(2) The outside landing opening shall be protected to its full height and width by a gate or door, either solid or slatted, and if slatted it must reject a ball two inches in diameter. The lower bar shall be not more than two inches above the landing sill.

(3) An electric contact shall be installed on each movable bar or gate which will act as a signal to the operator when the bar or gate is open. All contacts shall be kept in good operating conditions.

25.04: Car Construction

(1) The car frame or sling of all such elevators shall be constructed and designed to adequately and safely sustain the maximum load to be imposed upon it. Where wood is used for the car floor, it shall be sound and at least two inches in thickness and shall be securely fastened and braced to the stiles. It likewise shall be capable of sustaining the maximum load imposed upon it. If the floors of cars are covered with metal they shall have a non-slip surface.

(2) Builders' elevators shall be equipped with a car safety device which shall bring the car to rest if the hoisting ropes become slack or break. If any part of the car of such elevators, including the car frame, sling or floor, is of other than steel construction, the elevator shall be equipped with undercar safeties.

25.05: Ropes

(1) Ropes for builders' elevators shall not be less than ½" in diameter. They shall be of steel and shall possess a factor of safety of at least eight. A metal tag shall be placed on each rope, at a point readily accessible to inspectors, showing the size and material of the rope, including the maximum safe load and the date of installation.

(2) The ends of hoist and counterweight ropes shall be fastened by spliced eyes, individual tapered sockets, open type wire rope clips, open wedge type sockets, or drop forged safety clips. Where spliced eyes are used, a thimble connection shall be installed in the eye. Where tapered sockets are used, the ends of each strand shall be filled with zinc or babbitt. Where clips are used the fastenings shall consist of not less than three approved clips spaced six rope diameters apart on each rope. "U" bolt type clips shall be installed with the "U" bolt on the dead end of the rope. Splicing of ropes is prohibited. "U" bolt type clips shall not be used to fasten spare ropes stored to permit extended travel of the car.
NOTE: Drop forged safety clips having two halves that are identical and providing a bearing surface for both the live and dead ends of the rope and providing a full bearing surface against the rope and securely fastened shall be used to fasten the spare rope for extended travel.

(a) Wire enclosure for builders' elevators installed outside a building or structure where specified shall not be required to be enclosed unless a staging is installed or located within ten feet of the elevator hoistway. The car shall be totally enclosed on all unused sides and top and each car opening shall be provided with a gate or door equipped with an electric contact provided the elevator is operated by electric power. Where the elevator is operated by other than electric power, the gate or door contact may be omitted. The hoistway shall be totally enclosed with a solid enclosure not less than seven feet high at the bottom terminal landing.

(b) The car gates are to be not less than six feet high and shall guard the full width and height of the opening.

(3) Ropes and fastenings shall be maintained in safe operating conditions.

(4) Ropes shall be prevented from "overriding" on the drum by use of a swivel "snatch block" or deflector sheave, which will permit proper wrapping of the rope on the drum. All "snatch blocks" or deflector sheaves shall be securely fastened to the legs or base of the supporting structure.

25.06: Signals

An audible, manually operated signal system, which can be operated from each floor landing, shall be used on all builders' elevators. The system shall include and be connected to a gong which shall be not less than six inches in diameter and shall be located in the machine room. The system shall be kept in good operating condition.

25.07: Inspection

(1) Builders' elevators shall not be put in use until written approval has been received from the department or inspector having jurisdiction. The approval shall be posted in a conspicuous place in the enclosure housing the hoisting mechanism.

(2) A contract-load test shall be made by a licensed elevator mechanic and witnessed by a state, city, or town authorized inspector of every builders' elevator before the elevator is placed in regular service. This test shall be made with contract load in the car. The brakes, limit switches, buffers, car safety, and speed governor shall be caused to function in each test, and approval of any elevator shall be granted only upon satisfactory completion of such test.

A safety test shall be made by a licensed elevator mechanic and witnessed by a state, city, or town authorized Inspector after each extension of travel before the elevator is again placed in regular service.

25.08: Riders

No person shall be allowed to ride on builders' elevators.

REGULATORY AUTHORITY

524 CMR 25.00: M.G.L. c. 143, § 69.

NON-TEXT PAGE

524 CMR 26.00: CERTAIN ELEVATOR EQUIPMENT USED AS AUTOMOBILE PARKING DEVICES

Section

26.01: Reasons for Special Regulations for So-Called Automatic Parking Devices
26.02: Reference to Safety Codes
26.03: Scope and Classification
26.04: Definitions
26.05: Construction of Hoistways and Hoistway Enclosures
26.06: Hoistway Gates in Non-Fire-Resistive Hoistways
26.07: Protection at Other Levels
26.08: Guide Rails, Guide Rail Supports and Fastenings
26.09: Car and Counterweight Buffers
26.10: Car Frames and Platforms: Design Requirements
26.11: Car Enclosures and Car Gates
26.12: Car and Counterweight Safeties and Speed Governors
26.13: Driving Machines
26.14: Roped Hydraulic Elevators
26.15: Requirements for Capacity and Loading
26.16: Terminal-Stopping Devices and Operating and Control Devices
26.17: Requirements for Suspension Means
26.18: Inspection, Tests, Maintenance and Alterations
26.19: Members of the Public Not Allowed Above Receiving Level
26.20: Operators to be Licensed

26.01: Reasons for Special Regulations for So-Called Automatic Parking Devices

524 CMR 26.00 has been developed in response to demands for a separate section of 524 CMR to cover the installation of certain elevator equipment in buildings or structures used exclusively for the parking of motor vehicles. It was felt that in many such installations, particularly where no person rides the elevator during the parking process, reasonable safety does not require that the elevators meet all of the requirements of 524 CMR (The Massachusetts Elevator Code) for conventional elevator installations.

26.02: Reference to Safety Codes

Installations shall be in accordance with accepted standards of engineering practice and, except as provided herein, shall conform to the minimum requirements of 524 CMR 17.00. In case any question arises as to what is the best engineering practice, design, installation and tests conforming to the REQUIREMENTS FOR ELEVATORS, DUMB-WAITERS, ESCALATORS AND MOVING WALKS, ANSI/ASME A17.1 shall be considered as conforming thereto.

26.03: Scope and Classification

(1) Scope.

(a) 524 CMR 26.00 applies only to: Elevators used exclusively for the parking of automobiles where, during the parking process, each automobile is moved either under its own power, or by means of a power-driven parking device onto and off the elevator directly into parking spaces or cubicles in line with the elevator, where no persons are normally employed or stationed in the parking areas.

Also, devices used exclusively for the raising of automobiles above, or lowering them below, the point of loading automobiles on the device for the purpose of storing them on the device itself.

(b) 524 CMR 26.00 does not apply to: The design of the structure, of a crane or similar device on which the elevator may be mounted, or the design of any automobile parking dolly or mechanism, except the interlocking of the control of such device with the elevator control.

(2) Classification. Elevator equipment subject to 524 CMR 26.00 shall be classified as follows:

26.03: continued

Class I. Elevators on which, during the parking process, one attendant rides for the purpose of operating the elevator and for the purpose of operating a power-driven parking device or dolly to move the automobile onto and off the elevator, but is not required to get off the elevator.

Class II. Elevators on which, during the parking process, one attendant rides for the purpose of operating the elevator and driving the automobile, under its own power, onto and off the elevator.

Class III. Elevators operated from a central dispatching station or stations and on which the garage attendants do not ride during the parking process, and the operation of the elevators and the entire process of parking the automobile is automatically controlled.

26.04: Definitions

Definitions in 524 CMR 3.00, shall apply to 524 CMR 26.00 installations unless otherwise modified herein.

26.05: Construction of Hoistways and Hoistway Enclosures

(1) Hoistway Enclosures at Levels Where Patrons Deliver or Receive Motor Vehicles. Hoistway enclosures for Class I, II and III elevators shall be provided as follows:

At all floors at which the customer delivers or receives his motor vehicle, hoistway enclosures shall be provided at portions of the hoistway accessible to the public.

Enclosures may be perforated for their entire height and need not be higher than six feet.

(2) Hoistway Opening Protection at Floors Where Patrons Deliver or Receive Motor Vehicles. Hoistway gates conforming to 524 CMR 26.06 shall be provided at each hoistway opening accessible to the public.

26.06: Hoistway Gates in Non-Fire-Resistive Hoistways

(1) Operation of Hoistway Gates. Gates shall be power-operated, or they may be power-opened and may close by gravity if means are provided to limit the closing speed. Power opening and closing devices shall conform to the requirements of 524 CMR 17.00.

(2) Design and Construction of Hoistway Gates. Gates may be perforated for their entire height, and need not be higher than six feet.

(3) Hoistway Gate Locking Devices. Hoistway gates on Class I, II and III elevators shall be provided with interlocks, mechanical locks and contacts, or separate mechanical locks.
EXCEPTION: Locking devices are not required on vertically-sliding gates whose unbalanced weight is 65 lbs. or more when the car is not at the landing.

(4) Devices for Preventing Movement of Car Unless Gate is Closed. Means shall be provided to prevent movement of the car in either the vertical or horizontal direction away from a landing unless the gate at that landing is in the closed position.
EXCEPTION: The means provided may permit horizontal movement of the car with the gate open in a zone of not more than two feet in either direction, provided that protective guards not less than six feet high and the width of the zone are installed on each side of the tower.

For cars having more than one hoistway or runway opening at a given loading position, a separate closing means shall be provided for each car door or gate and its corresponding hoistway or runway door or gate.

(5) Clearance Beneath Hoistway Gate. The vertical clearance beneath the lower edge of the gate and the landing shall be not more than eight inches.

26.07: Protection at Other Levels

At levels other than floors where patrons deliver or receive motor vehicles, hoistway opening protection shall conform to the following:

26.07: continued

(1) Adequate means shall be provided to retain the automobiles in the parking cubicles against the force of the wind or of gravity.

(2) Ropes or other dividers not less than 42" high shall be provided between the parking cubicles.

26.08: Guide Rails, Guide Rail Supports and Fastenings

Guide rails, guide rail supports and fastenings shall conform to 524 CMR 17.00.

26.09: Car and Counterweight Buffers

(1) Car and counterweight buffers shall conform to the following:

(a) Class I and II Elevators. Car and counterweight buffers shall be installed in accordance with the requirements of 524 CMR 17.00.

EXCEPTION: Spring buffers may be used under the following conditions:

1. For electric elevators whose rated speed is not more than 300' per minute.
2. For hydraulic elevators whose maximum speed in the down direction with rated load is not more than 300' per minute.
3. The stroke of spring buffers for car speeds exceeding 200' per minute shall be equal to or greater than the following:
   201 - 250 ft. per min. - 6¼"
   251 - 300 ft. per min. - nine inches

(b) Class III Elevators. Car and counterweight buffers shall be required only where there are occupied spaces or passageways underneath the hoistway, in which case both car and counterweight buffers shall be installed in accordance with the requirements of 524 CMR 17.00 provided that such buffers may be located at each side of the car frame.

(2) Counterweights. Counterweights, where provided, shall conform to ASME A17.1, Section 202.

26.10: Car Frames and Platforms: Design Requirements

Car frames, car platforms and their guiding members of Class I, II and III elevators shall conform to the requirements of 524 CMR 17.00.

EXCEPTIONS:

(a) The flooring may be perforated provided the openings will reject a ball having a diameter of two inches or more.

(b) Where a parking dolly is used the portion of the floor where the dolly travels may be depressed.

(c) Four corner suspension roped hydraulic elevators are not required to have car crossheads.

26.11: Car Enclosures and Car Gates

(1) Car Enclosures. Cars shall be enclosed on all sides not used for entrance and exit, with enclosures conforming to 524 CMR 17.00 provided that the enclosure need be only six feet high, may be of openwork construction for its entire height, and no car top shall be required.

EXCEPTIONS:

(a) For Class I and II Elevators the enclosures may be omitted provided:

1. The car can be operated from the car only and the car-operating device is permanently located and is of a type which will return automatically to the stop position when the hand of the operator is removed.
2. The operator's station is protected on the outside with an openwork metal enclosure at least six feet high which will reject a ball 1½" in diameter and where no car gate is provided is located not less than four feet from the nearer end of the platform.
3. A metal railing at least 42" high is provided, on the sides of the car not used for entrance and exit.

26.11: continued

(b) For Class III Elevators -- The enclosure specified may be omitted if a metal railing at least 42" high is provided on the sides of the car not used for entrance and exit.

(2) Car Gates. A car gate shall be provided at each car entrance and shall be equipped with means to prevent the movement of the car in either the vertical or horizontal direction away from a landing unless the gate is in the closed position.

EXCEPTIONS:

(a) The means provided to prevent movement of the car may permit horizontal movement of the car with the gate open in a zone of not more than two feet in either direction provided protective guards not less than six feet high and the width of the zone are installed on each side of the tower.

(b) The car gate may be omitted provided the following conditions are conformed with:

1. Where a dolly is used, means are provided to prevent operation of the elevator unless the dolly is properly positioned on the car platform.

2. When the motor vehicle is on the car platform means are provided to prevent operation of the elevator, unless the motor car is properly centered on the platform so that no portion of the vehicle projects beyond the platform.

3. For Class I and II elevators where the elevator can be operated from the car only by means of a permanently located operating device of a type which will return automatically to the stop position when the hand of the operator is removed.

26.12: Car and Counterweight Safeties and Speed Governors

(1) Car Safeties. Car safeties conforming to 524 CMR 17.00 shall be provided. All operating parts of the safety shall be protected from the elements.

EXCEPTIONS:

(a) Car safeties may be omitted on:

1. Direct plunger elevators.

2. On Class III elevators where there is no occupied space or passageway underneath the hoistway.

(b) The car safety device may be located in the upper part of the car frame instead of beneath the platform provided the car frame, car platform, car safety and the guide rails and their supports are designed to withstand the forces from loading and unloading and from application of the car safety at governor tripping speed with rated load on the platform within the stresses and deflections permitted by 524 CMR 17.00.

(2) Counterweight Safeties. Counterweight safeties shall be provided where there is an occupied space or passage underneath the hoistway.

(3) Speed Governors. Car or counterweight safeties, where required or used, shall be operated by speed governors conforming to 524 CMR 17.00.

EXCEPTIONS: The tripping speed of speed governors for roped hydraulic elevators shall be based on the maximum speed attained by the elevator car in the down direction with rated load on the platform instead of on rated speed.

26.13: Driving Machines

(1) Electric Driving Machines. Electric driving machines shall conform to the requirements of 524 CMR 17.22.

(2) Hydraulic Driving Machines, Valves, Piping, Connections and Tanks. Hydraulic driving machines, valves, piping, connections and tanks shall conform to the requirements of 524 CMR 17.23.

EXCEPTION: Roped hydraulic driving machines may be used provided they conform to the applicable requirements of 524 CMR 26.14.

26.14: Roped Hydraulic Elevators

(1) Piston Rod Stops. Piston rods of roped hydraulic elevators shall be so constructed and so roped that the piston shall be stopped before the car can be drawn into the overhead structure. Travel-limiting stops of ample strength shall be provided in the cylinder to bring the piston to rest under full pressure without damage to the cylinder assembly or hydraulic system. Such stops shall be of the solid metal-to-metal type.

(2) Traveling Sheaves. Traveling sheaves of roped hydraulic elevators shall be guided in metal guides. Sheave frames, where used, shall be of structural or forged steel having an elongation of not less than 14% in a length of two inches and shall be designed and constructed with a factor of safety of at least eight. A single continuous strap shall not be used for the sheave frame.

(3) Cylinders, Valves, Piping, Connections and Tanks. Cylinders, valves, piping, connections and tanks shall conform to the requirements of 524 CMR 17.23.

(4) Piston Rods. Piston rods of roped hydraulic elevators shall conform to the following:

(a) Piston rods in compression shall be designed and constructed in accordance with the applicable formula for plungers.

(b) Piston rods in tension shall be designed and constructed in accordance with the following formula:

$$W = 7500A$$

Where: W =Allowable gross load, pounds applied to piston rod
A = Net cross-sectional area at root of threads in square inches.

(c) Means shall be provided to prevent eccentric loading on piston rods and to equalize loading on piston rods where two or more are used.

26.15: Requirements for Capacity and Loading

The capacity and loading requirements of 524 CMR 17.00 shall be conformed with, provided that the minimum rated load shall be based on the maximum weight of the motor vehicles to be parked and shall in no case be less than 5,000 lbs. per vehicle to be carried.

In addition to the information required by 524 CMR 17.00 the crosshead data plate or a separate plate attached to the crosshead shall indicate the maximum speed of the car in the down direction with rated load on the platform for which the elevator is designed.

26.16: Terminal-Stopping Devices and Operating and Control Devices

(1) Terminal-Stopping Devices. Terminal-stopping devices shall conform to the requirements of 524 CMR 17.00 for hydraulic elevators, provided that for roped hydraulic elevators there shall be installed, in addition to the terminal-stopping devices therein specified, a separate automatic stop valve independent of the normal control valve and mechanically operated directly by the movement of the car.

(2) Operating and Control Devices. Operating and control devices shall conform to the requirements of 524 CMR 17.00 for electric elevators and for hydraulic elevators.

(a) Roped hydraulic elevators may have lever type operating devices provided they are self centering when released by the operator.

(b) The following electrical protective devices shall not be required:

1. Top of car operating device.
2. Stop switch on top of a car.
3. Hoistway door interlocks or electric contacts. (See 524 CMR 26.06(3)).
4. Car door or gate electric contacts. (See 524 CMR 26.11(2)).
5. Stop switch in pit.
6. Car emergency stop switch for roped hydraulic elevators with lever type operating devices.

26.16: continued

Class III elevator cars shall be provided with a constant pressure operating device for operating the car for inspection, maintenance, and during emergencies, which shall be operative only when the operating device at the control dispatching station is inoperative. Means shall be provided at the central dispatching station for disconnecting the normal operating device and for making the constant pressure operating device in the car operative.

26.17: Requirements for Suspension Means

The suspension means for electric and hydraulic elevators shall conform to 524 CMR 17.00. Car platforms may be suspended by wire ropes attached to each corner of the platform, subject to the following:

(1) A center car frame conforming in all respects to 524 CMR 17.00 shall be provided except that the car crosshead may be omitted, providing:

(a) The car frame stiles extend partly above and partly below the car platform so that the vertical distance between the top and bottom guide shoes on the car frame is not less than 40% of the distance between guide rails or of the length of the car platform, whichever is greater.

(b) Guiding members or rope connections are so designed and installed as to prevent binding of the car frame in the guide rails when the car is raised and lowered.

(2) The car safety required by 524 CMR 26.12 is mounted on the center car frame located as required in 524 CMR 17.00.

(3) The car safety shall be operated by a speed governor.

26.18: Inspection, Tests, Maintenance and Alterations

Inspections, tests, maintenance and alterations shall conform to the requirements of 524 CMR 17.00 and of M.G.L. c. 143, § 64.

26.19: Members of the Public Not Allowed Above Receiving Level

No person other than those whose services are necessary for the operation, maintenance, or safety of the premises shall be permitted on an elevator or on any level other than the receiving level.

26.20: Operators to Be Licensed

No person shall operate, and no owner, lessee, employer or his agent shall cause or permit any elevator to be operated except by a person duly licensed for such service by the Commissioner of Public Safety.

EXCEPTION: An operator's license shall not be required of an elevator contractor or of a qualified licensed mechanic engaged in the construction, maintenance, or repair of elevators or elevator hoistways, or of an inspector having authority to inspect elevators.

(1) Granting of Licenses

(a) Whoever desires to act as an operator of elevators herein required to be operated by a licensed person shall make application to the Commissioner on blanks to be furnished by the Department of Public Safety. A license shall not be granted to a person less than 18 years of age.

(b) The applicant shall be given a practical examination as to his knowledge of the operation of elevators, and if found competent shall be granted a license by the Commissioner.

(c) Special licenses shall be issued for Class I, Class II, and Class III elevators respectively. No license shall be valid except for the class elevator for which it has been issued. Licenses shall be for the term of one year from the date thereof, and may be renewed yearly by the department. If a license has not been renewed within three years from the date of issuance, a re-examination shall be required.

26.20: continued

(2) Display of Licenses. A licensed operator shall at all times when operating an elevator be prepared to display his license on demand of the owner or tenant of the building, or of any person authorized to inspect the elevator, or of any police officer.

(3) Revocation and Suspension of Licenses.

(a) A willful falsification in the matter of a statement in an application shall be deemed sufficient cause for the revocation at any time of a license granted on said application.

(b) A license may be suspended or revoked by the Commissioner, if the holder is incompetent or untrustworthy or fails to comply with 524 CMR 26.00.

REGULATORY AUTHORITY

524 CMR 26.00: M.G.L. c. 143, § 69.

NON-TEXT PAGE

524 CMR 27.00: SPECIAL INDUSTRIAL POWER OPERATED SERVICE ELEVATORS

Section

27.01: General
27.02: Hoistway Enclosure
27.03: Car Clearances
27.04: Pits and Overtravel
27.05: Machine and Machinery Supports
27.06: Pipes and Wiring
27.07: Counterweight Runway
27.08: Protection of Hoist Ropes
27.09: Hoistway Doors
27.10: Light in Car
27.11: Guide Rail Construction
27.12: Counterweight
27.13: Car Construction
27.14: Car Enclosure
27.15: Car Gate
27.16: Car Safety Construction and Operation
27.17: Tests
27.18: Capacity Plates
27.19: Limitations of Load, Speed and Platform Area
27.20: Machines and Sheaves
27.21: Limit Switches
27.22: Operation and Operating Devices
27.23: Suspension Means
27.24: Emergency Signal
27.25: Maintenance of Elevators
27.26: Guide Rails
27.27: Car Safety Mechanisms
27.28: Machine and Brake
27.29: Instructions

27.01: General

524 CMR 27.00 applies to elevators installed in broadcasting towers, cement storage towers, and similar structures which are not accessible to the general public, and for the exclusive use of special designated operating and maintenance employees only, where transportation of one and not more than three employees is required to attend or service machinery or other equipment requiring attention.

(1) No persons other than employees as described above shall be permitted to operate or ride thereon. Such elevators shall be removed when the structure is no longer used for the purpose for which it was originally designed.

(2) Elevators must comply with 524 CMR 27.00, and where reference is made to 524 CMR 15.00 through 35.00 inclusive.

(3) In no case shall the following conditions be exceeded:
- (a) Inside area of car nine square feet.
- (b) Speed with load 100' feet per minute.
- (c) Contract load 750 lbs.
- (d) Operation only by means of push buttons.

27.01: continued

(4) Plans and specifications for such elevators shall be filed with the department where the elevators are to be installed and an erection permit secured in accordance with the requirements of M.G.L. c. 143, § 62, governing elevators before any work of installation is started. On completion of such elevators they shall be inspected and tested by the inspector having jurisdiction and shall not be placed in regular operation for the use of the persons for whom they are intended until the department has issued a Certificate of Operation. Such special elevators shall be subject to inspection at least once each year in accordance with M.G.L. c. 143, § 64, governing elevators, and, in addition, all safety devices shall be examined each six months.

27.02: Hoistway Enclosure

The hoistway shall be constructed and enclosed in accordance with the requirements of 524 CMR 17.00, except where building is of open construction throughout, and elevator does not travel through fireproof floors, grille or lattice work enclosure six feet high shall be provided around the hoistway at each floor. An enclosure shall be provided full height on open side or sides of the hoistway when hazards exist, such as stairways, passageways, and similar conditions.

27.03: Car Clearances

(1) There shall be a clearance of not less than ¾" between the car and the hoistway enclosure, and between the car and its counterweight.

(2) The clearance between the car platform and the landing threshold shall be not less than ½", nor more than 1½".

27.04: Pits and Overtravel

(1) The structure at bottom of hoistway shall be sufficiently strong to withstand without failure the impact of the car with contract load, also the impact of the counterweight, when either is descending at contract speed, or at governor tripping speed if governor-operated safety is used.

(2) A pit not less than two feet in depth shall be provided at the lowest story served and a substantial spring bumper shall be located therein set to strike steel safety plank of car. A minimum of one foot clearance shall be provided under the platform when the car rests on the fully compressed bumper.

(3) At the top landings there shall be a clearance between top of car crosshead and machine supports or any other obstruction vertically above the car of not less than two feet when the counterweight rests on its fully compressed buffers and a clearance between the top of the counterweight and any obstruction vertically above it of not less than six inches when the car rests on its fully compressed buffers. Where no counterweight is provided, clearance between the top of the car crosshead and the machines, supports or other obstruction vertically above it when the car is at its uppermost landing shall be not less than two feet six inches.

27.05: Machine and Machinery Supports

(1) All machinery and sheaves shall be supported and secured so as to effectually prevent any part becoming loose or displaced. The supporting beams shall be steel.

(2) Loads on overhead beams and their supports shall be computed as follows: 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. The load resting on the beams shall include the complete weights of machine, sheaves, controller, etc. The load suspended from the beams shall include the sum of the tensions of all ropes suspended from the beams.
NOTE: The object in doubling the suspended load is to allow for impact, acceleration stresses, *etc.*

27.05: continued

(3) No elevator machinery or sheaves shall be fastened to the underside of the supporting beams at the top of the hoistway.
EXCEPTION: The idler or deflecting sheaves with their guards and frames.
Supporting members for sheaves and other elevator machinery underneath beams shall not be of cast iron in tension.

(4) The factor of safety for overhead beams and their supports shall for steel be five.

27.06: Pipes and Wiring

All wiring shall comply with requirements of 524 CMR 17.06.

(1) No pipes conveying steam, gas or liquids, which if discharged into the hoistway would endanger life, shall be installed in the elevator or counterweight hoistway.

(2) Voltage of control circuits shall not be in excess of 250 volts.

(3) All live parts of electrical apparatus in the hoistway shall be suitably enclosed to protect against accidental contact.

27.07: Counterweight Runway

Sides of the counterweight runway exposed to the outside of the hoistway or structure shall be guarded, except where building is of open construction throughout, and elevator does not travel through fireproof floors, grille or lattice work enclosure six feet high shall be provided around the hoistway at each floor. An enclosure shall be provided full height on open sides of the hoistway when hazards exist such as stairways, passageways and similar conditions.

27.08: Protection of Hoist Ropes

All hoist and counterweight ropes shall be located inside the hoistway enclosure.

27.09: Hoistway Doors

(1) Landing openings shall be protected by manually-operated doors or gates of the horizontally swinging or sliding type or vertically sliding type. Grille or lattice type construction shall not be used where fire resistive hoistway enclosures are required. The construction of doors and gates shall conform to 524 CMR 17.07.
EXCEPTION: Where the car operates in open steel towers without designated landing floors or levels.

(2) Where swing type doors are used, the clearance between the hoistway enclosure door or gate and the hoistway edge of the landing sill shall not exceed two inches and the distance between the hoistway face of the landing door and the car door or gate shall not exceed four inches. Where sliding type doors with door closures are used, the clearances specified may be increased to two inches and five inches respectively.

(3) The hoistway face of the landing door or gate shall not project into the hoistway beyond the landing sill. No hardware, except that required for door-operating devices, locks, contacts or signals, shall project into the hoistway beyond the line of the landing sill.

(4) Hoistway doors shall be provided with approved interlocks conforming to 524 CMR 17.10.

(5) No means shall be provided which will open any landing door from the landing side when the car is not in the landing zone.

(6) Hoistway doors shall be so arranged that it will not be necessary to reach back of any panel, jamb or sash to operate them.

27.09: continued

(7) Means shall be provided to prevent hangers for sliding hoistway doors from jumping the track. Stops will be provided to prevent the hanger carriage from leaving either end of the track, or suitable stops shall be provided on the door.

27.10: Light in Car

There shall be an electric light to illuminate the car with its switch placed near the car entrance within easy reach of a person before entering the car.

27.11: Guide Rail Construction

(1) Car and counterweight guide rails shall be of steel.

(2) Guide rails shall be securely fastened in position with brackets, through bolts, ties, clips or backing of such strength, design and spacing that the guide rails and their fastenings shall not deflect between supports more than ¼" under normal operation. Joints of guide rails shall be accurately machined with tongue and groove if tee rails are used, or doweled if other solid shape rails are used, and fastened with splice plates to prevent movement in any direction.

(3) The guide rail shall extend from the bottom of the hoistway to a height above the top landing sufficient to prevent the guide shoes from running off the guides when the car or counterweight is at the extreme upper position.

27.12: Counterweight

Counterweights, where used, shall run in guides located within the elevator hoistway and shall comply with 524 CMR 17.30.

27.13: Car Construction

(1) Elevator cars shall have metal car frames and outside frames of platforms with a safety factor of not less than five based on the rated load.

(2) Cast iron shall not be used in the construction of any member of the car frame or platform other than for guide shoes and guide shoes brackets.

(3) No glass shall be used in an elevator car except for car light and appliances necessary for the operation of the car.

(4) The car shall have but one compartment.

(5) The car shall be so constructed and weighted that it will descend upon failure of the suspension means.

27.14: Car Enclosure

(1) Except at the entrance, the car shall be enclosed at sides and top. The enclosure at the sides shall be solid or of open work which will reject a ½" diameter ball.
EXCEPTION: An aperture not in excess of 30 square inches shall be permissible in the inside of car enclosures of elevators operating in open steel towers. Such apertures shall be located not less than 54" nor more than 60" above the car floor and shall be equipped with a horizontal sliding cover to close the opening when not in use.

(2) The car enclosure shall be secured in such manner that it cannot work loose or become displaced in regular service.

27.15: Car Gate

(1) A car door or gate shall be provided at each entrance to the car. This door or gate shall, when closed, guard the full height of the opening, and if on an electric or electrically controlled hydraulic elevator shall be provided with an electric contact or interlock which will prevent operation of the elevator unless the car door or gate is within two inches of full closure. Car doors or gates may be horizontal or vertical sliding.

(2) The door or gate shall be manually operated.

(3) Car gates shall be of a design that when fully expanded will reject a three inch ball.

(4) Car door or gate contacts shall be positively opened by a lever or other device attached to and operated by the door or gate and shall not be solely dependent on gravity or springs or both for their opening.

(5) Car door or gate contacts shall be maintained in the open position by the action of gravity or a restrained compression spring or both, or by means of a positive linkage.

27.16: Car Safety Construction and Operation

(1) Elevator cars suspended by wire ropes shall be provided with a car safety located beneath the car platform and capable of stopping and sustaining the car with contract load.

(2) The car safety shall be of a type operated as the result of the breaking of the suspension means, or by a speed governor. If of the speed governor type, it must operate to set the safety at a maximum speed of 175 feet per minute, except that on the breaking of the hoist ropes, the safety shall operate without appreciable delay and independently of the governor speed action.

(3) If a speed governor is used, it shall be located where it cannot be struck by the car or counterweight in case of overtravel and where there is sufficient space for full movement of the governor parts.

(4) The motor-control circuit and the brake-control circuit shall be opened before or at the same time the safety applies.

(5) The governor rope shall be iron, steel, Monel metal or phosphor bronze not less than ⅜ inch in diameter. Tiller rope construction shall not be used for governor ropes.

(6) Elevators of the winding drum type with wire ropes suspension shall be provided with a slack rope device of the manually reset type which will cut off the power and stop the elevator machine if the car is obstructed in its descent and the hoist ropes slacken.

(7) No safety device which depends upon the completion and maintenance of an electric circuit for the application of the safety shall be used. Car safeties shall be applied mechanically. Cast iron shall not be used in the construction of a car safety where its breakage might result in the failure of the safety to function to sustain the car.

27.17: Tests

Test of the car safety with contract load in the car shall be made before the elevator is put into service. Governor operation of instantaneous type safeties shall be tested at contract speed by tripping the governor by hand. Safeties operated as the result of the breaking of the hoist ropes shall be tested by obtaining the necessary slack rope to cause them to function.

27.18: Capacity Plates

A metal plate shall be fastened in a conspicuous place in the car stating the contract load in pounds, in letters and figures not less than ¼" high.

27.19: Limitations of Load, Speed and Platform Area

Where conditions do not conform in all respects with the requirements of 524 CMR 27.00, the elevator installation shall conform to all requirements of 524 CMR 35.00.

27.20: Machines and Sheaves

(1) Winding drums, traction sheaves and overhead and deflecting sheaves shall be of cast iron or steel, of diameter not less than 40 times the diameter of the wire hoist ropes. The rope grooves shall be machined.

(2) The factor of safety based on the static load (the contract load plus the weight of car, ropes, counterweights, *etc.*) to be used in the design of these elevator hoisting machines shall not be less than

(a) Eight for wrought iron and steel.
(b) Ten for cast iron, cast steel and other material.

(3) Set-screw fastenings shall not be used in lieu of keys or pins at a connection subject to torque or tension.

(4) No friction gearing or clutch mechanism shall be used for connecting the hoist drum or sheaves to the main driving gear.

(5) Gearing having cast iron teeth shall not be used.

(6) Electric elevator machines shall be equipped with electrically released spring applied brakes which will apply automatically when the operating device or stopping contacts are in the stop position.

(7) No single ground, short-circuit, counter-voltage or motor-field discharge shall prevent the brake magnet from allowing the brake to set when the operating device or stopping contacts are in the stop position.

(8) Electric elevator machines may be arranged for manual operation by crank in case of power failure and a suitable crank should be provided and kept near the machine.

27.21: Limit Switches

Upper and lower normal stopping devices shall be provided, set to stop the car at the upper and lower terminal landings operated by switches and cams attached to the car and hoistway. Final stopping devices shall be provided, set to operate if the car passes the terminal landings and stop the car before it strikes the overhead or pit bottom. The final terminal stopping device shall act to prevent movement of the car in both directions of travel. The normal and final terminal stopping devices shall not control the same switches on the controller unless two or more separate and independent switches are provided, two of which shall be closed to complete the motor and brake circuit in each direction of travel. Drum type machines shall also be provided with automatic machine terminal stop switches.

27.22: Operation and Operating Devices

(1) The following methods of operation are permitted:

(a) Double button control.
(b) Momentary pressure operation with up-down buttons or switches in the car and up-down buttons or switches, or call buttons, at each landing. It is not required that the operation be selective.
(c) Single automatic operation.
(d) Operation may be by remote control.

(2) A stop switch shall be provided on or adjacent to the operating panel. Stop switches shall be of the manually opened and closed type and shall be conspicuously marked "stop" and the operating button or handle shall be of a different color from any other switch in the car. The opening of the switch contacts shall not be solely dependent on springs.

27.22: continued

(3) The control systems shall be designed so that the direction of travel of the elevator can be reversed at any point in the hoistway after stopping the elevator from the stop switch or any other method. No control systems shall be used which depend upon completion of maintenance of an electric circuit for:

(a) Interruption of the power and application of the electro-mechanical brake at the terminals.

(b) Operation of the car safeties, or

(c) Stopping in response to the opening of the emergency stop switch.

(4) Hand-rope operation shall not be used.

(5) The sticking or freezing of any single electrically operated switch, relay, or contractor or the occurrence of a single accidental ground shall not permit the car to start if any hoistway landing door is open or unlocked, or if any car door or gate is not within two inches of full closure.

(6) Each electric power elevator driven by a polyphase alternating current motor shall be provided with a device which will prevent starting the motor if:

(a) the phase rotation is in the wrong direction, or,

(b) there is a failure in any phase.

524 CMR 27.00 does not apply to AC motor used to drive motor-generator sets.

27.23: Suspension Means

(1) Suspension means shall be wire ropes. Tiller rope is not permissible.

(2) There shall be not less than two such ropes.

(3) Steel tapes as suspension means are prohibited.

(4) Ropes shall not be less than ½" in diameter.

(5) The factor of safety of the suspension means shall not be less than 7.

(6) The arc of contact of a wire rope on a traction sheave shall be sufficient to produce adequate traction under all load conditions.

(7) All wire ropes anchored to a winding drum shall have not less than one full turn of rope on the drum when the car or counterweight has reached its extreme limit of possible overtravel.

(8) No car or counterweight wire rope shall be lengthened or repaired by splicing.

(9) The winding drum end of car and counterweight wire ropes shall be secured by clamps on the inside of the drum or by one of the methods specified in 524 CMR 27.23(10) for fastening wire ropes to car or counterweight.

(10) The car or counterweight ends of wire ropes shall be fastened by return loop, by properly made individual tapered babbitted sockets or by spliced eye.

(11) A metal tag shall be placed on all wire rope fastenings, or be permanently fixed on the car frame, upon which shall be stamped the size, material and manufacturer's rated ultimate strength of the rope and the name of person or company installing the ropes and the date of installation or renewal.

27.24: Emergency Signal

An emergency signal shall be provided operative from the car. This signal shall be audible outside the hoistway and may be a telephone connected to a central exchange.

27.25: Maintenance of Elevators

In order to insure the safe operation of elevators installed in broadcasting towers and cement towers subject to extreme weather conditions, and before being placed in service, they shall conform to the following requirements:

Lubrication. All parts of the machinery and equipment requiring lubrication shall be lubricated at regular intervals with lubricants of a grade as recommended by the manufacturer.

27.26: Guide Rails

Except those of elevators equipped with roller or other type guiding members not requiring lubrication, guide rails should be kept well lubricated.

(1) Rails on which a lubricant is used shall be cleaned down at least once a year.

(2) Rust-preventive compounds such as paint mixtures or other anti-rust coatings shall not be used as they may interfere with the proper operation of the car safety.

27.27: Car Safety Mechanisms

All moving parts of car safety mechanisms shall be kept clean and free of rust and dirt and shall be lubricated at frequent intervals. This is especially important where the safety mechanism is exposed to water, corrosive vapors, or freezing conditions, as corrosion or rusting of the parts may prevent operation of the safety.

27.28: Machine and Brake

Machine lubricant subject to freezing conditions shall be specified by the manufacturer. Transformer oil with low pour point and low viscosity shall be used in all brake pots where brake coils and magnets are submerged.

(1) All fulcrum pins operating in brake levers shall be of non-ferrous metal or the liners bushed with non-ferrous bushings.

(2) The heads of all rivets fastening brake linings and all metal in contact shall be sealed to avoid freezing to brake pulley.

27.29: Instructions

Elevator subject to extreme weather conditions should make a trial trip without personnel on the car to make sure the operating mechanism is in good order.

REGULATORY AUTHORITY

524 CMR 27.00: M.G.L. c. 143, § 69.

(524 CMR 28.00: RESERVED)

(PAGES 197 THROUGH 200 ARE RESERVED FOR FUTURE USE.)

524 CMR 29.00: STAGE, ORCHESTRA, AND ORGAN CONSOLE ELEVATORS

Section

29.01: Definitions
29.02: Hoistway Construction
29.03: Clearance and Pits
29.04: Machine Rooms, Sheave Rooms and Secondary Levels
29.05: Hoistway Doors
29.06: Railings and Toe Boards
29.07: Guide Rails
29.08: Door Interlocks
29.09: Lifting Capacity
29.10: Stage Elevators
29.11: Control Apparatus for Orchestra and Organ Console Elevators
29.12: Driving Machines
29.13: Control and Operating Devices and Systems
29.14: Factor of Safety

29.01: Definitions

Car Aprons. Car aprons shall mean an enclosure of solid construction to enclose the space between the top of the hoistway enclosure and the underside of the platform when the platform extends above the top of the hoistway enclosure.

Orchestra Elevator. An orchestra elevator shall mean the platform for raising and lowering musicians of an orchestra in a substantially vertical direction at a speed not exceeding 15 feet per minute.

Organ Console Elevator. An organ console elevator shall mean a platform for raising and lowering an organ console including the organist, in a substantially vertical direction at a speed not exceeding 15 feet per minute.

Stage Elevators. A stage elevator shall mean a platform consisting of a section of the stage arranged to be raised and lowered to or above and below the stage level in a vertical direction at a speed not exceeding 15 feet per minute.

Standard Railing. A standard railing shall mean a railing not less than 42" in height with an additional rail between the top rail and the floor.

Toe Boards. Toe boards shall mean a board not less than six inches in height placed at right angles with floor or platform to prevent objects from falling from the floor or platform to the spaces below.

29.02: Hoistway Construction

The hoistways of Orchestra and Organ console elevators shall be of two hour fire resistive construction immediately below the top landing.

The complete surface of the hoistway within the limits of travel shall be of smooth finish, devoid of surface roughness, and without any projections or recesses except for landing entrances, guides, and guide brackets, vertical slots where required for concealed guides, junction boxes and conduit or wiring. All projections or recesses at landing entrances shall be beveled on the under side or shall be guarded with metal plates. The angle of such bevels or guard plates shall not be less than 75° from the horizontal.

29.03: Clearance and Pits

A pit shall be provided at the bottom of every hoistway of such depth that when the platform is at its lowest limit of travel the distance between the lowest point of the under side of the platform framing shall be in accordance with the following: The clear vertical distance between the under side of the car platform or between the under side of any equipment attached thereto, exclusive of the car frame channels, car safety blocks, guide shoes and any aprons or guards attached to the car sill, and the pit-floor when the car rests on the fully compressed buffer shall not be less than two feet. In measuring this clearance, the depth of any trenches or depressions in the pit shall not be included.

29.04: Machine Rooms, Sheave Rooms and Secondary Levels

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

EXCEPTIONS: Oil hydraulic machine rooms and entrance to machine rooms shall be located not more than ten feet from any side of the hoistway.

29.05: Hoistway Doors

The bottom landing openings of hoistways shall be protected by sliding or swinging doors of 1½ hour fire resistive construction.

29.06: Railings and Toe Boards

Railings and toe boards shall be provided at floor levels of orchestra and organ console elevators.

29.07: Guide Rails

Steel guide rails shall be used for guides of stage and organ console elevators.

29.08: Door Interlocks

All hoistway landing doors shall be equipped with interlocks as described in 524 CMR 17.10(1) through 17.10(9).

29.09: Lifting Capacity

The lifting capacity of an orchestra or console elevator shall be equal to a live load of not less than 25 lbs. per square foot of floor area of the platform. All railings, aprons, wiring conduits, *etc.*, shall be considered as part of moveable platforms.

29.10: Stage Elevators

The lifting capacity of a stage elevator shall be equal to a live load of not less than 75 lbs. per square foot of floor area of that platform.

29.11: Control Apparatus for Orchestra and Organ Console Elevators

Operating switches shall be provided in a suitable location on the platform of orchestra and console elevators.

An emergency stop switch, which will cut off the sources of power, shall be provided in the car adjacent to the operating device for all of the above elevators and shall be identified by the distinctive color of Red.

Emergency stop switches may be operated by buttons or levers but shall be of the manually opened and closed type so installed that when opened gravity will not tend to close the switch.

An emergency stop switch shall be installed in the pit of every orchestra and console elevator.

29.11: continued

A manually operated multiple disconnecting switch shall be installed in the main line of each electric orchestra or console elevator or motor generator set machine.

The disconnect switch shall be located adjacent to and visible from the elevator machine or motor generator set to which it is connected and shall, where practicable, be located in the machine room at the lock jam side of the entrance door.

29.12: Driving Machines

Where elevating screws are used they shall be of the direct connected type, either worm or beveled gears, and all gears shall be enclosed in a protective housing.

Where a stage, orchestra or console elevator is not supported or operated by either screws, plungers or similar means, car safeties shall be provided under the platform capable of stopping and holding the platform with full rated load at any point of its travel.

29.13: Control and Operating Devices and Systems

(1) Motor Controller. A suitable lighted room shall be provided outside of the hoistway for the motor controller and brake unless the motor and controller and brake are located in the pit in which case masonry piers or columns shall be provided of sufficient strength to take the impact of a full loaded car.

(2) Location of Motor and Controller. Where the motor and controller are located in a hoistway pit or in a pit adjacent to the lifting platform, access to same shall be provided by means of a door entirely below the bottom of the platform when the platform is at its lowest limit of travel.

This door shall be of sufficient width and height to make the entrance readily accessible.

(3) Terminal Limit Switches. Enclosed terminal limit switches located in the hoistway shall be provided and arranged to automatically bring the car platform to rest as it approaches either terminal landing.

(4) Final Limit Switches. Enclosed final limit switches shall be provided at the top and bottom of the hoistway arranged to cut off the current and stop the platform if it should travel beyond the terminal limit switch. Electric power elevators having winding drum machines shall have the stopping switches on the machines and also in the hoistway operated by the movement of the car.

29.14: Factor of Safety

(1) Elevator Platform Construction. The platform of stage, orchestra, organ console elevators shall be of steel frame construction designed with a safety factor of not less than six based on the rated load, uniformly distributed.

All other parts of the equipment shall have a safety factor as required by 524 CMR 15.00 through 35.00.

(2) Installations in the Same Hoistway. When orchestra and organ console elevators are installed in the same hoistway the adjacent sides shall be provided with solid dividing wall partitions with not less than ¾ hour fire resistive construction.

When the travel of a stage, orchestra or organ console elevator extends above the top of the hoistway enclosure, aprons of substantial construction shall be provided on the platform of sufficient depth to enclose the space between the top of the hoistway enclosure and the under side of the platform plus three inches when the platform is at its limit of travel.

The lower edge of the aprons shall be beveled at an angle of at least 75° with the horizontal.

REGULATORY AUTHORITY

524 CMR 29.00: M.G.L. c. 143, § 69.

NON-TEXT PAGE

(524 CMR 30.00: RESERVED)

(PAGES 207 THROUGH 210 ARE RESERVED FOR FUTURE USE.)

524 CMR 31.00: CASKET LIFTS INSTALLED IN LICENSED FUNERAL HOMES, MEMORIAL CHAPELS, OR PREPARATION ROOMS.

Section

31.01: Definitions
31.02: Requirements

31.01: Definition

The term casket lift shall mean a car, cage, or platform raised or lowered substantially vertical in permanent guides or rails, including the necessary operating mechanism and used for the purpose of transporting caskets and related materials only. The lift shall be operated only from the landing by continuous pressure key-operated switch. No person shall be permitted to ride on the car.

31.02: Requirements

(1) Hoistway Enclosures.

(a) The hoistway shall be of two hours fire resistive construction. The inside of the hoistway shall be of smooth finish without any projections or recesses except for landing entrances, guides and guide brackets, vertical slots when used for concealed guides, junction boxes and conduits for wiring.

EXCEPTIONS: Where casket lifts serve only one floor not exceeding 15' travel a hinged vertical lifting hoistway cover shall be permitted when the lifting arms on the car will open and close the hoistway cover automatically, and provided the key operated switch is located only at the hoistway cover landing. The hoistway cover shall be installed to automatically close when the car leaves the upper landing opening.

(b) Hoistway covers shall be made of not thinner than seven eighth inch stock strongly battened if of wood or of equally strong and steel metal construction and shall support a load of not less than 1,000 lbs. Hinges shall be of either T or heavy strap hinges secured to the floor with lag screws or otherwise bolted through the hoistway cover.

(c) All projections or recesses at landing shall be beveled on the underside, or shall be guarded with metal plates. The angle of such bevels shall be not less than 60° or more than 75° from the horizontal.

(2) Ventilation. Not compulsory if not required by cities and towns in the Commonwealth.

(3) Pits. A pit shall be provided at the bottom of every hoistway when the car is at the lowest landing, and the distance between the lowest point of the car platform framing and to the floor of the pit shall not be less than five inches. The clearance between the car and the hoistway shall not exceed 1½".

(4) Hoistway Doors. All landing openings shall be protected by swing or horizontal slide doors of solid construction and a fire test of 1½ hours fire rated assembly.

(5) Door Clearance. Landing doors shall be so located that the distance from the face of the doors to the edge of the hoistway shall not be more than four inches from the face of the door section nearest to the car.

(6) Vision Panels. Each door shall be provided with a vision panel not less than 20 square inches and the total area of one or more vision panels in any door shall be not more than 80 square inches. Each clear panel opening shall reject a ball six inches in diameter.

(7) Interlocks. All landing doors shall be equipped with electro-mechanical interlocks.

(8) Car Platform. The car platform size shall not exceed 96" long by 40" deep.

(9) Car Floor. The car floor shall be wood plank or steel plate supported by a steel frame.

(10) Car Enclosure. Casket lifts shall be enclosed with solid sheet steel partitions on the unused sides not less than 42" wide and 42" in height and shall be flush.

31.02: continued

(11) Capacity. The full load capacity shall not exceed 750 lbs.

(12) Speed. The contract speed shall not exceed 25 feet per minute.

(13) Travel. The total travel of lifts serving more than one floor shall not exceed 25'.

(14) Control Operation. The car shall be operated from the landing opening only by key-operated continuous pressure switch.

(15) Guide Rails. Steel guides shall be used on all installations.

(16) Car Safety. Cars suspended by ropes or chains of the winding drum type shall be provided with a car safety located within the car frame. The safety shall be of the instantaneous type.

(17) Machines.
(a) May be of the winding drum type.
(b) May be of the traction type.
(c) May be of the hydraulic type.
(d) The installation of belt-driven and chain drive machines is prohibited.

(18) Hydraulic Electric Systems. The electric system shall be so interlocked that due to electrical power failure, the car platform will remain in the position to the power failure and will move only on the resumption of power when the operating key switch is activated to start operation.

(19) Hydraulic Valves. An overload relief valve shall be installed in the hydraulic circuit to prevent operation of the platform if loaded above rated capacity.

(20) Mechanical Stops. Mechanical stops shall be installed to prevent lifting platform from traveling above the predetermined level.

(21) Hydraulic Piping and Connections. Flexible hose and fittings may be installed between the check valve or control valve and cylinder if they comply with the following requirements: Steel wire reinforced rubber covered hose shall have a bursting strength of ten times working pressure and the hose must be replaced at least once every six years.

(22) Ropes and Chains. Car platforms suspended by ropes or chains shall have not less than 2" steel ropes or equivalent number of steel roller or multiple link steel chains. Rope or chain fastenings may be thimbles and clamps or other approved type of fastening.

(23) Safety Factor. Suspension of car platforms by ropes or chains shall be at least six.

(24) Slack - Rope - Chain. A slack rope or slack chain switch shall be installed in connection with all machinery of the winding drum type which will automatically shut off the power and apply the brake and stop the machinery, if the load carrying platform is obstructed in its descent.

(25) Voltage. The maximum system or circuit potential permitted in the hoistway or landing operating devices shall not exceed 240 volts.

(26) Riders. All persons are prohibited from riding on a casket lift.

(27) Signs. A sign shall be provided on the car in a conspicuous location with letters at least one inch reading CAPACITY 750 POUNDS. A sign shall be located on the car reading NO RIDERS with letters one inch high.

(28) Casket Lift Regulations. Casket lift installations are not designed as freight elevators, which require conformity with 524 CMR.

31.02: continued

(29) Inspection and Tests. Upon completion of the work of installations or alterations, the licensed elevator mechanic making the installation or alterations shall make a practical test of the devices in the presence of a qualified licensed elevator inspector. A full report within ten days after the inspection shall be made by the inspector to the Commissioner of Public Safety upon forms furnished by him. The owner or his agent in a building in which a lift is installed or altered shall arrange for an inspection with the authorized division of state, city or town inspection department of not less than one year.

(30) Plans. No casket lift shall be installed or altered until plans and specifications of such installations or proposed alterations shall have been filed by the owner of the premises where the lift is to be installed or altered with the inspector or manufacturer, and a certificate of approval of requirements shall have been issued by him.

(31) Fees. As required by state, city or town requirements.

REGULATORY AUTHORITY

524 CMR 31.00: M.G.L. c. 143, § 69.

NON-TEXT PAGE

(524 CMR 32.00: RESERVED)

(PAGES 217 THROUGH 220 ARE RESERVED FOR FUTURE USE.)

524 CMR 33.00: LOADING CLASSIFICATIONS

Section

33.01: Car Frame Uprights (Stiles)
33.02: Freight Elevator Platform Frames
33.03: Formula Symbols

33.01: Car Frame Uprights (Stiles)

The total stress in each car frame upright, due to tension and bending and the slenderness ratio of each upright and its moment of inertia, shall be determined in accordance with the following formulas:

(1) Stress Due to Bending and Tension.

$$\text{Total Stress} = \frac{KL}{4HZ_u} + \frac{G}{2A}$$

Where $\frac{KL}{4HZ_u}$ is the bending stress in each upright in the plane of the frame due to the live load W on the platform for the class of loading A, B or C for which the elevator is to be used (See Part 2, 524 CMR 33.03). K is determined by the following formulas:

(a) For Class A freight loading or passenger loading: $K = \frac{WE}{8}$

(b) For Class B freight loading: $K = W\left(\frac{E}{2} - 48\right)$ or $K = \frac{WE}{8}$

(c) For Class C freight loading: $K = \frac{WE}{4}$

(2) Slenderness Ratio. The slenderness ratio L/R for uprights subject to compressions other than those resulting from safety and buffer action shall not exceed 120.

(3) Moment of Inertia. The moment of inertia of each upright shall be not less than determined by the following formula:

$$I = \frac{K(L)^3}{18E\,H}$$

33.02: Freight Elevator Platform Frames

The calculation of the stresses in the platform frame at the entrance of freight elevators, due to loading and unloading at the landings, shall be based on the following:

(1) For Class A loading: ¼ of the rated load shall be considered as being concentrated on the mid-point of the frame member.

ILLUSTRATION
Turning Moment Based on Class of Loading

(2) For Class B loading: 75% of the rated load shall be considered as being concentrated on the frame member supported at two points five feet apart, symmetrically located with respect to the mid-point of the member.

(3) For Class C loading: 80% of the rated load shall be considered as being concentrated on the frame member supported at two points two feet six inches apart, symmetrically located with respect to the mid-point of the member.

33.03: Formula Symbols

The symbols used in the formulas in 524 CMR 33.00 shall have the following meanings:

W = Rated load in pounds.
C = Net weight in pounds of complete elevator car.
G = Load in pounds supported by crosshead with rated load in car at rest at top terminal landing.
K = Turning moment in inch-pounds as determined by class of loading.
D = Distance in inches between guide rails.
E = Inside clear width of car in inches.
H = Vertical center distance between upper and lower guide shoes (or rollers) in inches.
L = Free length of uprights in inches (distance from lowest fastening in crosshead to top fastening in plank).
A = Net area of section in (inches)2.
R = Least radius of gyration of section in inches.
I = Moment of inertia of member, gross section in (inches)4.
Z = Combined section module of plank members, gross section, (inches)8.
Z_u = Section modulus of one upright, gross section, $(\text{inches})^3$.

REGULATORY AUTHORITY

524 CMR 33.00: M.G.L. c. 143, § 69.

524 CMR 34.00: VERTICAL WHEELCHAIR LIFTS (FOR INSTALLATIONS MADE PRIOR TO JUNE 7, 1991)

Section

34.01: Definition of Vertical Wheelchair Lift
34.02: Limitations
34.03: Capacity and Rated Load of Vertical Wheelchair Lift
34.04: Rated Speed of Vertical Wheelchair Lift
34.05: Platform and Ramps
34.06: Supports and Mechanism Housing
34.07: Safety Factor
34.08: Guarding
34.09: Controls and Electrical Equipment
34.10: Standards
34.11: Inspection and Tests

34.01: Definition of Vertical Wheelchair Lift

A vertical wheelchair lift is an electrically powered elevating device used to vertically raise and lower a person in a wheelchair from one level to another.

34.02: Limitations

The installation of lifts shall be restricted as follows:

(1) Vertical lift travel shall not exceed 12' from the bottom landing.

(2) Vertical lifts shall not be installed to service more than two floors, and shall not penetrate a floor.

(3) Vertical lifts may be installed adjacent to a porch, stairway, landing or at the end of a ramp or bridge, located indoors or out of doors.

34.03: Capacity and Rated Load of Vertical Wheelchair Lift

The rated load shall not be less than 500 lbs.

34.04: Rated Speed of Vertical Wheelchair Lift

The rated speed of the vertical wheelchair lift shall not exceed 20 feet per minute.

34.05: Platforms and Ramps

(1) The platform shall measure not less than 36" wide and shall have an area of not more than 12 square feet.

(2) The platform surface shall be constructed of material that is relatively smooth and skidproof.

(3) A ramp shall be provided, as required for access to the platform.

(4) A metal guard not less than ⅛" thick and six inches high shall be provided the full width of the platform to prevent a wheelchair from rolling off the lower access end of the platform when in use. The guard must be actuated automatically by movement from the landing and be raised to a minimum angle of 80°.

34.06: Supports and Mechanism Housing

(1) The assembled unit of a device shall be supported and maintained in place so as to prevent any part from becoming loose or displaced.

34.06: continued

(2) Adequate support shall be provided to maintain the platform of the device in a level position at all times.

(3) The framework shall be securely anchored in place to a foundation.

(4) The motor, drive assembly, and all rollers and the tracks and struts they travel in must be totally enclosed by a protective covering.

34.07: Safety Factor

The frame and platform of a device shall be constructed of substantial metal capable of withstanding stresses of five times the rated load of the device. The safety factor of five shall be certified by a registered professional engineer who will affix his signature and seal to the certification.

34.08: Guarding

(1) The platform shall be guarded at the sides not used for entrance or exit to a height of 42" of solid metal construction.

(2) Entrance doors or gates are required for the top terminal landing. The opposite entrance on the platform shall have a car riding gate. These doors and gates shall be self-closing and self-locking and shall be equipped with an electric contact that will stop the device if the gate is opened.

(a) The door/gate at the bottom shall not be less than 42 inches in height.
(b) Maximum pressure required to open the doors or gates shall not exceed eight pounds.
(c) The door or gate may be opened only if the platform is within two inches of that level. If in a private residence, the top landing gate shall have a spring hinge to close the gate and a substantial locking latch.

34.09: Controls and Electrical Equipment

(1) The operating control shall be of the key operated constant pressure type.

(2) An upper and lower terminal stopping switch shall be provided to stop a device at the upper and lower terminal landing.

(3) The platform shall be equipped with a pan type electrical stop switch located under the platform to stop the down travel of the platform if the platform is obstructed in its downward travel by a force not exceeding four pounds.

(4) Platform enclosure shall be equipped with a stop switch and an alarm in public buildings.

34.10: Standards

(1) All hand operated controls whether mounted on machine or in remote locations are to be served by a 24 volt system. Unless otherwise indicated, electrical wiring and components in the vertical wheelchair lift and its installation shall comply with 527 CMR 12.00 (The Massachusetts Electrical Code).

(2) All welding shall be done in accordance with standard industry practices.

34.11: Inspection and Tests

Upon completion of the work of installation or alterations, the licensed elevator mechanic making the installation or alterations shall make a practical test of the devices in the presence of a qualified licensed elevator inspector. A full report within ten days after the inspection shall be made by the inspector to the Commissioner of Public Safety on forms furnished by him. The owner or his agent in a building in which a lift is installed or altered shall arrange for an inspection with the authorized division of state, city or town inspection department every five years thereafter.

REGULATORY AUTHORITY

524 CMR 34.00: M.G.L. c. 143, §§ 68, and 69; c. 22, § 11.

NON-TEXT PAGE

524 CMR 35:00: SAFETY CODE FOR ELEVATORS AND ESCALATORS A17.1-2004 and THE MASSACHUSETTS MODIFICATIONS OF THAT CODE

Massachusetts incorporates by reference ASME A17.1-2004 with the following modifications for new installations. Existing elevators installed after July 1, 1989, shall be inspected in accordance with 524 CMR 35.00 Massachusetts modifications to the A17.1 addition in effect at the time of their installation.

Massachusetts also incorporates by reference ASME A17.1-1996, Parts XX and XXI with modifications as contained in 524 CMR 35.00.

524 CMR 1.00, 3.00, 7.00, 8.00, 9.00, 26.00, 27.00, 29.00, and 31.00, continue to apply to new installations, some provisions of 524 CMR 17.00 apply when referenced to in 524 CMR 35.00.

524 CMR 1.00, 3.00, 7.00, 8.00, 9.00, 10.00, 11.00, 15.00, 17.00, 18.00, 19.00, 20.00, 22.00, 23.00, 25.00, 26.00, 27.00, 29.00, 31.00, 33.00, and 34.00, continue to apply to existing installations.

521 CMR 28.00: *Elevators*, Architectural Access Board Regulations apply to all new installations.

527 CMR 12.00: *The Massachusetts Electrical Code* shall apply in all cases where installation of electrical equipment and wiring is referenced to NFPA 70 or CSA-C22.1.

PART 1
GENERAL

SECTION 1.1 SCOPE

1.1.3 Application of Parts. Add additional sentence as follows: "Where parts of ASME A17.1-2004 applying to existing elevators conflict with sections of 524 CMR, the sections of 524 CMR shall prevail."

PART 2
ELECTRIC ELEVATORS

SECTION 2.1 CONSTRUCTION OF HOISTWAYS AND HOISTWAY ENCLOSURES

2.1.1.2 Non-Fire-Resistive Construction

2.1.1.2.2 (a) Delete: "2000 mm (79 in.)" and Insert: "2100 mm (84 in.)".

2.11.4 Multiple Hoistways Delete: Entire paragraph and Insert: "Not more than four elevators shall be installed in the same hoistway."

2.1.3.5 Area to Be Covered by Floor

2.1.3.5.1 Delete: Entire paragraph and Insert: "Where a floor over a hoistway is required by **2.1.3.1**, the floor shall extend over the entire area of the hoistway and cover the entire machine room."

2.1.4 Control of Smoke and Hot Gases Delete entire section and add: "Ventilation requirements in Massachusetts shall be follows:"

(1) "All passenger, freight, private residence, and limited use/limited access elevators, as well as dumbwaiters, escalators and moving walks, require a means of ventilation to the outer air from enclosed elevator hoistways and machine rooms and shall also conform to the energy conservation requirements of the 780 CMR: *The Massachusetts State Building Code.*

(2) "Pressurizing the elevator hoistway and machine room is an acceptable alternate to ventilation."

(a) "A positive pressure must exist in the hoistway and machine room with the elevator(s) at a floor with the doors open."

(b) "Where air pressurization of the hoistway is utilized as a means of smoke and hot gas control, the air shall not be introduced into the hoistway in such a manner as to cause movement of selector tapes, governor ropes, compensating ropes and other components."

(3) "Area of hoistway vents: The area of the vents shall not be less than 3½% of the area of the hoistway, nor less than three square feet, which ever is greater, for each elevator car."

35.00: continued

(4) "Temperature: The temperature of the elevator machine room shall be maintained at not less than 50°F and not more than 90°F by natural air circulation or by an HVAC system. Make up air supply when needed into a fire rated enclosure must have a fusible link/shutter or other method to close it in case of fire, smoke detector actuation, or power failure. Penetrations of a fire rated assembly for the purpose of makeup-air/exhaust shall be protected in accordance with 780 CMR: *The Massachusetts State Building Code*."

(5) "Ventilation for traction elevators, with machine(s) above the hoistway (at the top of the building) shall be as follows:"

(a) "When hoistway ventilation is below the machine room floor, apply **2.1.4(3)**."

(b) "The bottom of the vent outside the building must be a minimum of three feet above the roof."

(c) "The bottom of the vent shall be not more than two feet below the top of the hoistway."

(d) "The vent shall not be located adjacent to the hoist ropes, governor rope, selector tape, or traveling cable."

(e) "When hoistway ventilation passes through the machine room via floor grilles or ducts and then to the outer air, those grilles and ducts shall conform to **2.1.4(3)** above for size."

(f) "When the ventilation system in **2.1.4(5)(e)** exits the machine room **2.1.4(5)(b)** applies."

(g) "When the hoistway ventilation is located below the machine room floor, the machine room shall also be vented to a minimum or 1% of the area of the machine room or one square foot whichever is greater."

(6) "Ventilation for a traction elevator with a machine room at an intermediate floor level shall be as follows:"

(a) "When the hoistway(s) or machine room(s) does not have an exterior wall, ventilation shall be accomplished with ducts sized by **2.1.4(3)** and fire-rated in accordance with the 780 CMR: *The Massachusetts State Building Code* ."

(b) "If the ducts are horizontal, a blower or exhaust fan shall be used to expel the gases or smoke, which is activated by a fire alarm initiating device."

(c) "If the provisions of **2.1.4(6)(b)** are used normal power as well as emergency or standby power must be automatically available."

(7) "Ventilation for a traction elevator with a machine at the lowest landing shall be as follows:"

(a) "**2.1.4(3)** applies at the top of the hoistway."

(b) "**2.1.4(5)(b)** and **(5)(c)** apply."

(c) "The machine room can be vented to the hoistway or directly to the outer air."

(8) "Ventilation for a hydraulic elevator with the machine room adjacent to the hoistway at the lowest landing shall be as follows:"

(a) "**2.1.4(3)** applies at the top of the hoistway."

(b) "**2.1.4(5)(b)** and **(5)(c)** apply."

(c) "The machine room can be vented to the hoistway via a grille on each side of the penetrated wall at a minimum machine room height of six feet above the floor and a minimum size of 1% of the area of the machine room or one square foot whichever is greater."

(9) "Ventilation for a hydraulic elevator with a remote machine room shall not be more than ten feet away from the hoistway."

(a) "Hoistway ventilation **2.1.4(3)** applies."

(b) "**2.1.4(5)(b)** and **(c)** apply to the hoistway."

(c) "Machine room ventilation can be via an inclined duct fire rated in accordance with 780 CMR: *The Massachusetts State Building Code*, between the machine room and the hoistway, equal to a minimum of 1% of the area of the machine room, or one square foot whichever is greater."

(d) "Machine room ventilation can be directly vented to the outer air or by a duct fire rated in accordance with 780 CMR: *The Massachusetts State Building Code*, in the amount of 1% of the area of the machine room, or one square foot whichever is greater."

35.00: continued

(10) "Ventilation for a private residence elevator shall be as follows:"
(a) "No ventilation is required when there is no fire separation between floors in a single family home."
(b) "When floors are fire separated the hoistway and machine room shall be ventilated at a minimum of 1% of the area of the hoistway or machine room, or one square foot, whichever is greater."
(c) "The hoistway shall be vented if the elevator serves the garage."

(11) "Ventilation for limited use/limited access elevators shall be as follows: Enclosed hoistways and machine rooms shall be ventilated to a minimum of 1% of the area of the hoistway or machine room, or one square foot, whichever is greater."

(12) "Ventilation for dumbwaiters shall be as follows: Units that pass through fire rated floors shall be ventilated to a minimum of 1% or the area of the area of the hoistway or one square foot whichever is greater."

(13) "Ventilation for escalators and moving walks shall be as follows: Escalator and moving walk machine rooms shall be ventilated. Venting need not be to the outside air."

(14) "Energy conservation regulations apply as follows: All open ventilation must be sealed in conformance with 780 CMR: *The Massachusetts State Building Code*."

(15) "If machine room venting of smoke and gases is accomplished by the use of a horizontal duct with the same fire rating as the hoistway and in accordance with 780 CMR: *The Massachusetts State Building Code*. The duct shall contain an exhaust fan powered from a normal and emergency power source activated by a thermostat and the smoke detector in the machine room."

2.1.5 Windows and Skylights. Delete entire section and substitute: "Windows in hoistway walls or elevator cars are prohibited. If the elevator hoistway is completely outside the general outline of the building, the rear wall of the car and the related hoistway wall can be of laminated safety glass with a maximum window frame depth of two inches. Curtain walls or window walls cannot enclose the hoistway. Windows and skylights and their frames and sashes in machine rooms shall conform to the requirements of 780 CMR: *The Massachusetts State Building Code* and 527 CMR: *Fire Prevention Regulations*."

2.1.6 Projections, Recesses, and Setbacks in Hoistway Enclosures
2.1.6.2(b) Delete: "100 mm (4 in.)" and Insert: "50 mm (2 in.)".
2.1.6.2(d) Delete: "100 mm (4 in.)" and Insert: "50 mm (2 in.)".

SECTION 2.2 PITS

2.2.2 Design and Construction of Pits
2.2.2.5 On the third line delete the word "shall" and substitute the word "may".

SECTION 2.7 MACHINE ROOMS AND MACHINERY SPACES

2.7.1.2 Non-Fire-Resistive Construction
2.7.1.2.1 Delete: "2000 mm (79in.)" and Insert: "2100 mm (84 in.)".

2.7.2.1 Equipment in Machine Rooms
Delete entire paragraph and substitute: "No machinery, equipment, water lines, drainage lines, air conditioning units, radio transmitters, antennas, or any piping or wiring for equipment other than elevator equipment shall be located in or pass through the machine room, except as required by modification to **2.8.2**.
All flammable/combustible liquids shall be kept in approved containers and secured in an approved flammable liquids locker. The amount stored shall be regulated by 527 CMR: *Fire Prevention Regulations*.

35.00: continued

2.7.2.2 Maintenance Clearance

2.2.2.2 Delete: Entire paragraph and insert: "A clearance of not less than 450 mm (18 in.) shall be provided on all sides and above the elevator equipment. Basement traction type installations are exempt on the side facing the hoistway. Governors are to be no less than six inches from the adjacent wall or other equipment."

2.7.3.4.1 Add a new (e)

2.7.3.4.1(e) be identified with a sign that will read "ELEVATOR MACHINE ROOM NO STORAGE ALLOWED". The letter size shall be a minimum of ¾ inch high and shall be of a contrasting color with that of the background.

2.7.3.4 Access Doors and Openings

2.7.3.4.3(b) Delete entire paragraph and Insert: "(b) of maximum width of "750 mm (30 in.)" and a maximum height of 750 mm (30in.)."

2.7.5 Lighting, Temperature, and Humidity in Machine Rooms and Machinery Spaces

2.7.5.1 Lighting. Delete the words: "Where practicable". Add new additional sentence: "Motion or heat detecting devices used to turn (on or off) the lights in the machine room, pit, car, or the car top are prohibited."

2.7.5.2 Temperature and Humidity. Add: "A minimum temperature of 50°F, and a maximum temperature of 90°F shall be maintained."

SECTION 2.8 EQUIPMENT IN HOISTWAY AND MACHINE ROOM

2.8.2 Pipes, Ducts, Tanks and Sprinklers

2.8.2.2 Add the following sentence: "The bottom of all ducts shall be not less than 2100 mm (84 in.) above the finished floor."

2.8.4 Air Conditioning

2.8.4.1 Delete entire paragraph and add: "Air conditioning equipment shall not be located directly above or within 600 mm (24 inches) of the footprint (horizontally) of the elevator equipment."

2.8.4.3 Delete entire paragraph and add: "Means shall be provided to collect and drain condensation water from these spaces. Condensation drains shall not be located above or within 600 mm (24 inches) of the footprint (horizontally) of the elevator equipment. Drains connected directly to sewers shall not be installed."

2.8.4.4 Add: "Should access be necessary in or through elevator machine rooms, or machinery spaces, air conditioning maintenance personnel shall be accompanied by a licensed elevator mechanic."

SECTION 2.11 PROTECTION OF HOISTWAY OPENINGS

2.11.1.2 Emergency Doors in Blind Hoistways.

Add paragraph (f) (3) "only be operated with the use of the Massachusetts Fire Fighters 3502 key."

Delete paragraph (h).

2.11.1.4 Access Openings for Cleaning of Car and Hoistway Enclosures.

Delete entire paragraph.

2.11.2 Types of Entrances

2.11.2.1(d) Delete.

2.11.6 Opening of Hoistway Doors

2.11.6.2 Add a new (e) "any exit leading from any elevator hoistway door to the outside of the building."

35.00: continued

SECTION 2.12 HOISTWAY DOOR UNLOCKING DEVICES AND ELECTRIC CONTACTS, AND HOISTWAY ACCESS SWITCHES

2.12.6 Hoistway Door Unlocking Devices

2.12.6.1 General. Delete entire paragraph and substitute: "Hoistway door unlocking devices shall be provided for use by Massachusetts licensed elevator mechanics and trained firefighters at every landing where there is a passenger entrance. The types of hoistway door unlocking devices are subject to prior approval of the Massachusetts Board of Elevator Regulations. The use of unlocking device special tools by anyone other than Massachusetts licensed elevator mechanics and trained firefighters is prohibited."

2.12.6.2.3 Delete.

2.12.6.2.4 Delete entire paragraph.

2.12.7 Hoistway Access Switches

2.12.7.3.6 Delete entire paragraph and substitute: "The movement of the car initiated and maintained by the access switch at the lowest landing, if this landing is the normal means of access to the pit, shall not be limited in the up direction."

SECTION 2.14 CAR ENCLOSURES, CAR DOORS AND GATES, AND CAR ILLUMINATION

2.14.1.10 Side Emergency Exits

2.14.1.10.2(f) Delete last sentence and substitute: "Keys shall be available only to Massachusetts licensed elevator mechanics and inspectors only."

2.14.2.6 Access Panels. Delete entire section.

2.14.3 Freight Car Enclosures

2.14.3.1 Enclosure Material Delete entire section and substitute: "Cab enclosure walls and the car top shall be made of metal without perforations, except for car gate(s) and the area above them."

2.14.4.5 Location

2.14.4.5.1(d) Delete entire section.

2.14.7 Illumination of Cars and Lighting Fixtures

Add a new "**2.14.7.3.7** All passengers and freight elevators shall have battery operated emergency lights."

SECTION 2.16 CAPACITY AND LOADING

2.16.4 Carrying of Passengers on Freight Elevators

2.16.4 Delete entire section and substitute 524 CMR 17.15(4).

2.16.5 Signs Required in Freight Elevator Cabs

Delete section **2.16.5.1.3.**

SECTION 2.26 OPERATING DEVICES AND CONTROL EQUIPMENT

2.26.1.4.4 Machine Room Inspection Operation.

Delete on first line: "When machine room inspection operation is provided, it shall conform to...." and substitute: Machine room inspection operation shall be provided and shall conform to....."

2.26.4 Electrical Equipment and Wiring

2.26.4.1 Add the following:

(a) "The main line disconnect switch or circuit breaker shall be located inside the machine room door on the lock jamb side of that door and not more than 450 mm (18 in.) from the jamb to the operating handle, it shall be at a height of not more than 1700 mm (66 in.) above the finished floor. "In the case of multi-car machine rooms the switches shall be grouped together as close as possible to that location."

35.00: continued

(b) "In the case of a machine room with double swing doors, the doors shall swing out and the switch(s) shall be on the wall adjacent to the hinge side of the active door panel."
(c) "The switches shall be so designed that they may be locked out and tagged in the open position."
(d) "If the fused disconnect switch or circuit breaker is not visible from the elevator machine to which it is connected, a second disconnect switch shall be installed that is visible from the machine."

SECTION 2.27 EMERGENCY OPERATION AND SIGNALING DEVICES

2.27.2 Emergency or Standby Power System

2.27.2.4.5 Add to: "Where an emergency or standby system is required by 780 CMR: *The Massachusetts State Building Code*, it shall operate the elevator or elevators in the event of normal power failure, and the requirements of **2.27.2.1** through **2.27.2.5** shall be complied with. If an emergency or standby system is not required by building code but exists and operates the elevator or elevators, the requirements of **2.27.2.1** through **2.27.2.5** shall be complied with. If less than all cars can be run at the same time, all cars shall be sequenced one or more at a time to the fire recall floor automatically, after which the selector switch located at that floor, can designate a preferred car."

2.27.3.1.1 Add a new "(d) The phase I hall key switch shall be marked with the off position vertical and in the center. The key shall be inserted with the cut side facing up."

2.27.3.1.6 Delete (j) and insert a new "(j) When an elevator(s) has gone to the alternate level due to the activation of a fire alarm initiating device at the designated level, the manual activation of the fire-recall switch at the designated level shall cause the car to recall to that level."

2.27.3.3 Phase II Emergency In-car Operation. Delete first sentence of the second paragraph and substitute: "The key shall be removable in each position. The hold position in the center shall be vertical. The key shall be inserted with the cut side facing up."

2.27.8 Switch Keys

Delete entire section and substitute: "Fire service shall only be activated with the use of the 3502 key and cylinder. The possession of the Massachusetts Fire Fighters Key number 3502 shall be limited to fire department personnel, licensed elevator mechanics and elevator inspectors only.

This key shall not operate any other switch unless specifically described in these regulations and shall not be a part of a building master key system."

2.27.9 Fire Emergency Hall Buttons Signs

Add a new **2.27.9** as follows: "Signs shall be securely fastened to the wall over every hall button station. Sign shall be as described in 524 CMR 17.39 (3). This information may be engraved on the hall station faceplate."

2.27.10 Medical Emergency Elevators

"All new buildings, or complete new additions to existing buildings in which an elevator is being installed, shall be provided with medical emergency elevators as described in 524 CMR 17.40. Complete new additions to existing buildings shall mean a hoistway constructed outside the confines or footprint of the existing building."

SECTION 2.28 LAYOUT DRAWINGS

2.28.1 Information Required on Layout Drawings

Add: "Applications and elevator layouts must be filed and approved before any work can begin."

After **2.28.1**(i), add additional information as follows:

(j) "all plans for elevator installations shall be signed by a registered professional engineer or a registered architect and shall bear his registering stamp certifying that he has examined the plans and finds that the building will structurally support the elevator contract load plus its tare as they are shown on the elevator drawing. The architect or engineer shall not be responsible for any material on the elevator drawing. The complete installation shall comply with 524 CMR: *Massachusetts Elevator Code* at the time of filing;

35.00: continued

(k) type of hoistway material to be used;
(l) height of hoistway in regard to roof of building. Fire rating of building roof;
(m) location of hoistway and machine room vents, size of vents;
(n) location of machine room;
(o) type of hoistway doors, fire rating of doors must be shown on the layout, filling around hoistway door frames and headers for proper fire rating, grouting of landing sills;
(p) type of approved interlock;
(q) buffers, type and rating;
(r) governor, type and name plate data depicting tripping speed of the governor and that of the overspeed switch, construction of material of governor rope and size;
(s) hoist rope, size, number of, and breaking strength;
(t) type of safeties and location;
(u) type of drive machine, speed and capacity;
(v) type of control. Voltage and amperes."

PART 3
HYDRAULIC ELEVATORS

SECTION 3.1 CONSTRUCTION OF HOISTWAYS AND HOISTWAY ENCLOSURES

Under **SCOPE,** Add in the first sentence: "as modified by 524 CMR 35.00."

SECTION 3.2 PITS

Delete first sentence and add: "Pits shall conform to section **2.2**, including Massachusetts modification to **2.2.2.5**."

NON-TEXT PAGE

35.00: continued

SECTION 3.7 MACHINE ROOMS AND MACHINERY SPACES

3.7.1 Location of Machine Rooms

After the last paragraph add a new paragraph as follows:

"When it is not possible to locate the machine room adjacent to the hoistway, in addition to all normal requirements, the following provisions shall apply:

(a) "The oil pipeline shall have a minimum of schedule 80."

(b) "The pipe shall have no fittings, bends or welding in it from the hoistway to the machine room."

(c) "The distance from the hoistway to the machine room shall not exceed three meters (ten ft.)."

(d) "The oil line pipe shall be visible for inspection after installation."

(e) "A over speed (rupture) valve shall be installed on the jack casing."

(f) "Two-way voice communication shall be installed between the car and the machine room."

(g) "If machine room ventilation is accomplished by the used of a horizontal duct, the duct shall have the same fire-rating as the hoistway, and contain an exhaust fan powered from a normal and an emergency source activated by a thermostat or fire alarm initiating device in the machine room. Make-up air supply when needed shall be as described in 524 CMR 35.00 **2.1.4** (4)."

Add a new **3.7.2 Clearance Around Hydraulic Machines**

Hydraulic elevator power units shall have a minimum of two feet clearance on at least two sides of the unit; the other two sides shall be a minimum of two inches from the machine room walls or other units. If this cannot be obtained, an oil cooling system shall be installed."

SECTION 3.8 ELECTRICAL EQUIPMENT, WIRING, PIPES, AND DUCTS IN HOISTWAY AND MACHINE ROOMS

Delete sentence and add: "Electrical equipment, wiring, pipes and ducts shall conform to **2.8** with Massachusetts modifications to **2.8.2** and **2.8.4**."

SECTION 3.11 PROTECTION OF HOISTWAY-LANDING OPENINGS

Delete first sentence and add: "Protection of hoistway-landing openings shall conform to **2.11** with Massachusetts modifications to **2.11.2**, **2.11.6**."

SECTION 3.14 CAR ENCLOSURES, CAR DOORS AND GATES, AND ILLUMINATION

Add to the first sentence the words: as modified by 524 CMR 35.00:

SECTION 3.16 CAPACITY AND LOADING

3.16.4 Carrying of Passengers on Freight Elevators

3.16.4 Delete entire sentence and substitute: "The requirements of 524 CMR 17.15(4) shall apply."

3.16.5 Signs Required in Freight Elevator Cabs

3.16.5 Delete entire sentence and substitute: "The requirements of **2.16.5** shall apply except 2.16.5.13"

SECTION 3.17 CAR AND COUNTERWEIGHT SAFETIES

3.17.1 Car Safeties Add an additional sentence in the first paragraph as follows: "On roped hydraulic elevators with governor-operated safeties, access to the governor may be omitted if the governor is self-resetting, releases when the car is raised, and can be electrically tripped from the machine room. Governor operation of roped hydraulic safeties may be omitted if a safety valve is installed at the jack casing. The safeties will continue to function as broken rope safeties."

35.00: continued

SECTION 3.18 HYDRAULIC JACKS

3.18.3.8.3 Delete (a), (c) and (d) and add to (b): "All new cylinders installed below ground shall be provided with schedule 40 or greater PVC liner surrounding it for corrosion protection as described by **3.18.3.8**."

SECTION 3.19 VALVES, PRESSURE PIPING, AND FITTINGS

3.19.3.3 Flexible Hydraulic Connections

Delete entire section including **3.19.3.3.1** and **3.19.3.3.2.** and substitute: "Flexible connections between the jack and the power unit are prohibited in Massachusetts."

3.19.4.7 Overspeed Valves

Delete the first sentence and substitute: "Unless the hydraulic elevator is installed with a governor-operated safety, an overspeed (rupture) valve shall be provided and their connections and attachments shall conform to **3.19.4.7.1** through **3.19.4.7.6**, with modification to **3.19.4.7.3**."

3.19.4.7.3 Installation of Overspeed Valves

At the end of the section add a new sentence: "The piping between the overspeed valve and the hydraulic jack shall be welded or threaded."

SECTION 3.26 OPERATING DEVICES AND CONTROL EQUIPMENT

3.26.4 Electrical Protective Devices

Add the following:

(a) "The main line disconnect switch or circuit breaker shall be located inside the machine room door on the lock jamb side of that door and not more than 450 mm (18 in.) from the jamb to the operating handle, which shall be at a height of not more than 1700 mm (66 in.) above the finished floor. "In the case of multi-car machine rooms the switches shall be grouped together as close as possible to that location."

(b) "In the case of a machine room with double swing doors, the doors shall swing out and the switch(s) shall be on the wall adjacent to the hinge side of the active door panel."

(c) "The switches shall be so designed that they may be locked out and tagged in the open position."

3.26.10.3 Add: "The door open button shall remain operative."

SECTION 3.27 EMERGENCY OPERATION AND SIGNALING DEVICES

Add a second paragraph as follows: "Massachusetts modifications **2.27.3.1.1** (d), **2.27.3.1.6** (n), **2.27.3.3**, **2.27.8**, **2.27.9**, and **2.27.10** shall apply to all hydraulic elevators."

SECTION 3.28 LAYOUT DATA

3.28.1 Information Required on Layout Drawing

Add: "Applications and elevator layouts must be filed and approved before any work can begin."

After **3.28.1**(o), add additional information as follows:

(p) all plans for elevator installations shall be signed by a registered professional engineer or a registered architect and shall bear his registering stamp certifying that he has examined the plans and finds that the building will structurally support the elevator contract load plus its tare as they are shown on the elevator drawing. The architect or engineer shall not be responsible for any material on the elevator drawing. The complete installation shall comply with 524 CMR: *Massachusetts Elevator Code* at the time of filing;

(q) type of hoistway material to be used;

(r) height of hoistway in regard to roof of building. Fire rating of building roof;

(s) location of hoistway and machine room vents, size of vents;

35.00: continued

(t) location of machine room, relative to the hoistway;
(u) type of hoistway doors, fire rating of doors must be shown on the layout, filling around hoistway door frames and headers for proper fire rating, grouting of landing sills;
(v) type of approved interlock;
(w) buffers, type and rating;
(x) governor, type if any and nameplate data depicting tripping speed of the governor and that of the over-speed switch, construction of material of governor rope and size;
(y) hoist rope, size, number of, and breaking strength;
(z) type of safeties and location;
(aa) type of valve unit, pressure relief setting, piston size and travel;
(bb) capacity and speed, voltage and current."

PART 5
SPECIAL APPLICATION ELEVATORS

SECTION 5.2 LIMITED-USE/LIMITED-APPLICATION ELEVATORS

All Limited use/Limited Application Elevators in Massachusetts are required to comply with the provisions of 521 CMR 28.1 through 28.13.5 (Architectural Access Board Regulations).

5.2.1.1 Construction of Hoistway and Hoistway Enclosures.
Add new sentence as follows: "All hoistways and machine rooms shall be ventilated not less than 1% of both areas with a minimum of one square foot."

5.2.1.1.2 (a). Delete entire paragraph.

5.2.1.4.2 Alternate to Bottom Car Clearance Requirements. Delete entire section and comply with **2.4.1**.

5.2.1.7 Machine Rooms and Machinery Spaces. Delete entire paragraph and add: "Machine rooms and machinery spaces shall conform to the requirements of section **2.7** except as modified by 524 CMR 35.00."

Delete the following sections: **5.2.1.7.1, 5.2.1.7.2, 5.2.1.7.3, 5.2.1.7.4, 5.2.1.7.5, 5.2.1.7.6, 5.2.1.7.7, 5.2.1.7.10, 5.2.1.7.11, and 5.2.1.7.12.**

5.2.1.11 Protection of Hoistway Landing Openings.
Add a new **5.2.1.11**(f) "Landing door panels must be a minimum of 915 mm (36 in.) wide. Note: A tolerance of 16 mm (⅝ in.) is permitted."

Add a new **5.2.1.11**(g) "Landing doors shall be set no more than the following dimensions from the hoistway edge of the landing sill, and shall be rated in conformance with the Massachusetts State Building Code 780 CMR."
(1) For swing doors – 19 mm (¾ in.).
(2) For horizontal sliding doors – 57 mm (2¼ in.), and shall have sight guards."

Add a new **5.2.1.11** "(h) Vision panels shall be installed in all swing doors per **2.11.7.1**, except **2.11.7.1.6**. The inside face of the glass must be substantially flush with the inside face of the door. If laminated safety glass is used the Z97.1 marking on each piece of glass must be visible after installation."

5.2.1.13 Power Operation of Hoistway Doors and Car Doors and Gates. Delete **5.2.1.13** and substitute: "Power operation shall be as described in 521 CMR 28.12.3 (Architectural Access Board Regulation)."

5.2.1.14 Car Enclosures, Car Doors, and Car Illumination.
5.2.14 (f) Delete on the second and third line the words: "accordion, or bifold type"

Add a new **5.2.1.14** "(o) Emergency battery operated lighting shall be provided in all Limited-use/Limited-application elevators in accordance with 524 CMR 18.18(7)."

35.00: continued

5.2.1.27 Emergency Operations and Signaling Devices. Delete entire paragraph and substitute: "Emergency operation and signaling devices shall conform to **2.27.1** and **2.27.2** except **2.27.1.2.** All Limited use/Limited application elevators shall be provided with a means of two-way conversation between the car and a point outside the hoistway or building attended 24 hours a day."

5.2.2.8 Valves, Pressure piping and Fittings. Delete sentence and substitute: "Valves, pressure piping, and fittings shall conform to **3.19** except **3.19.3.3 Flexible Hydraulic Connections.** Flexible hose is prohibited between the power and unit and the jack."

5.2.2.14. Emergency Operations and Signaling Devices. Delete entire paragraph and substitute: "Emergency Operations and Signaling Devices shall conform to **5.2.1.27** as modified in 524 CMR 35.00."

5.2.2.16 Governor Operated Safeties with use of a Safety Valve. Add new **5.2.2.16.** "When a roped hydraulic unit is installed that requires a governor-operated safety, the governor operation of the safeties may be omitted if a safety valve is installed at the hydraulic cylinder, the safeties will continue to operate as a broken rope device. This valve shall stop the flow of oil at no less than 110% of the car speed and must be sealable after adjustment. This provision does not apply to dual jack installations."

SECTION 5.3 PRIVATE RESIDENCE ELEVATORS

5.3.1.1 Construction of Hoistway and Hoistway Enclosure. Delete entire section **5.3.1.1** and substitute: "Hoistways and machine rooms shall conform to **2.1.1.1** and **2.7.1.1.**"

Add new **5.3.1.1.1.** "Machine rooms shall be enclosed with materials of the same fire rating as that required for the hoistway in the building in which they are installed; said machine rooms shall be kept locked at all times."

Add new **5.3.1.1.2.** "When the hoistway is enclosed and the elevator services a garage or penetrates any fire separated floors, the hoistway must be ventilated to the atmosphere not less than one percent of the area of the hoistway with a minimum of one square foot."

5.3.1.7 Protection of Hoistway Openings.

5.3.1.7.2 Clearance Between Hoistway Doors or Gates and Landing Sills and Car Doors or Gates. Delete: "shall not exceed 75 mm (three in.)." and substitute: "19 mm (3/4 in.)." Also delete: "shall not exceed 125 mm (five in.) and substitute: "75 mm (three in.)."

5.3.1.7.4 Locking Devices for Hoistway Doors and Gates. Delete **5.3.1.7.4** and substitute: "Landing doors shall be provided with UL listed hoistway door interlocks."

5.3.1.8.3 Light in Car. Add a new sentence: "Emergency battery operated car lighting shall be provided in all private residence elevators as described in 524 CMR 17.18(7)."

5.3.2.2 Driving Machines, Sheaves and Supports for Direct Plunger and Roped Hydraulic Driving Machines. Add a new **5.3.2.2.3**: "Flexible hose shall not be installed between the power unit (pump) and the jack."

SECTION 5.10 ELEVATORS USED FOR CONSTRUCTION

Add the following:
"Devices included under the requirements of **SECTION 5.10**

(1) Workman's Hoists and other similar equipment shall be considered temporary workman's elevators and shall be installed by a person holding a Commonwealth of Massachusetts license for the construction, maintenance and repair of elevators. Either a licensed Massachusetts elevator mechanic or a licensed Massachusetts hoisting engineer only, shall operate them.

35.00: continued

(2) Overhead Protection: There shall be installed on all workman's hoists or similar devices including open platforms used for the installation of elevators under construction or modernization, a roof to protect the workers from falling objects. The roof shall be constructed of solid material. Debris netting or similar overhead protection may be used up to three floors or 30 feet, whichever is greater.

(3) Workman's Hoists and other similar devices must equipped with one the following safety devices:

(a) a safety device, which acts on a wire rope, which is supported independently from the rigging used to support and hoist the working platform;

(b) a safety device, which grabs the wire rope, used to support and hoist the working platform;

(c) instantaneous safeties.

(4) Workman's Hoists and other similar devices must be provided with a 42" guard rail completely around the platform area and a 12" kick-plate completely around the platform area.

(5) Inspection and Load Tests: There shall be a load and safety test performed on such devices prior to their use on each job site, at 3 month intervals, and at other times the Massachusetts licensed elevator inspector employed by the Department of Public Safety deems necessary."

(6) Inspection and Load Test is not required by the State on open platforms used for the installation of elevators under construction or modernization.

PART 6
ESCALATORS AND MOVING WALKS

SECTION 6.1 ESCALATORS

6.1.2.1 Protection Required Add: "See Massachusetts Modification **2.1.4** (13)."

6.1.7.4 Electrical Equipment and Wiring

6.1.7.4.1 Add additional sentence: "A fused disconnect switch or circuit breaker shall be installed and connected into the power supply line of each escalator. Disconnect switches or circuit breakers shall be of the manually closed multi-pole type and be located with the upper machinery space of the escalator. Where circuit breakers are used a disconnecting means, they shall not be of the instantaneous type and shall not be opened automatically by a fire alarm system."

6.1.7 Lighting, Access and Electrical Work

6.1.7.3.3 Add:

"(a) All access doors shall be electrically contacted and render the escalator inoperative when open."

"(b) The key to side access panels shall be restricted to licensed elevator mechanics only."

SECTION 6.2 MOVING WALKS

6.1.2.1 Protection Required Add: "See Massachusetts Modification **2.1.4**(13)."

6.1.7.4 Electrical Equipment and Wiring

6.1.7.4.1 Add additional sentence: "A fused disconnect switch or circuit breaker shall be installed and connected into the power supply line of each moving walk. Disconnect switches or circuit breakers shall be of the manually closed multi-pole type and be located with the entrance space of the moving walk. Where circuit breakers are used a disconnecting means, they shall not be of the instantaneous type and shall not be opened automatically by a fire alarm system."

NON-TEXT PAGE

35.00: continued

6.2.7 Lighting, Access and Electrical Work

6.2.7.3.3 Delete the last sentence and add:

"(a) All access doors shall be electrically contacted and render the moving walk inoperative when open."

"(b) The key to side access panels shall be kept in a location accessible only to licensed elevator mechanics."

PART 8
GENERAL REQUIREMENTS

SECTION 8.1 SECURITY

8.1.1 General

Delete (c) in its entirety.

8.1.2 Group 1: Restricted

Add: "Group 1 keys shall be restricted to Massachusetts licensed elevator mechanics or "inspectors only."

8.1.3 Group 3: Emergency Operation

Add: 2.27.8, fire-recall switch, 2.27.8, fire operation switch, 2.11.1.2(i), emergency door in blind hoistway, and 8.4.4.1.1, top emergency exits shall be operated by the Massachusetts firefighter's 3502 key."

SECTION 8.4 ELEVATOR SAFETY REQIREMENTS FOR SEISMIC RISK ZONE 2 OR GREATER

Add the following paragraphs: "All new elevator installations in Massachusetts shall meet as a minimum the requirements of seismic risk zone 2."

"All new installations in existing buildings and material changes per 524 CMR 15.01 shall meet the following seismic requirements:

(1) On electric traction units:

(a) machine rope retainers (**8.4.3.1**).

(b) at snag points, protect traveling cables, hoist and governor ropes from rail brackets, vanes, switches, *etc.* (**8.4.3.2**).

(c) install a counterweight displacement switch with controls for elevator operation as described in **8.4.10**.

(d) install counterweight spreader brackets.

(e) if cab is replaced, car top exit must comply with **8.4.4.1** and **8.4.4.1.2**.

(2) On hydraulic units:

(a) a safety valve must be installed at cylinder (**8.4.11.2**).

(b) the tank must be secured to floor (**8.4.11.6**).

(c) install oil pipeline support brackets per table (**8.4.11.3**).

(d) at snag points, protect traveling cables, hoist and governor ropes from rail brackets, vanes, switches, *etc.* (**8.4.3.2**).

(e) rope retainers are required on roped hydraulic elevators (**8.4.3.1**).

If other components are replaced the appropriate code requirement shall be followed."

8.4.4.1 Top Emergency Exits

Delete the last paragraph of **8.4.4.1.1** in its entirety and substitute: "The key and cylinder required to open the top emergency exit in all elevators shall be a Massachusetts 3502 key as described in 524 CMR 17.39(2)."

35.00: continued

SECTION 8.5 ESCALATOR AND MOVING WALK SAFETY REQUIREMENTS FOR SEISMIC RISK ZONE 2 OR GREATER

Add the following paragraph: "All new escalator or moving walk installations in Massachusetts shall meet as a minimum the requirements for seismic risk zone 2 as described in ASME A17.1-2004."

SECTION 8.6 MAINTENANCE, REPAIR AND REPLACEMENT

8.6.1.1.2 Delete (c) and substitute: "524 CMR applies to installations made prior to 1989."

8.6.1.2.1 Delete (b) and substitute: "Annual inspection must be performed in accordance with 524 CMR."

8.6.4.10 Refastening or Resocketing of Car-Hoisting Ropes on Winding-Drum Machines. Delete entire section and substitute: "Both car-hoisting and counterweight-hoisting ropes shall be resocketed or refastened in accordance with 524 CMR 17.26."

8.6.8 Maintenance of Escalator and Moving Walks
Add: "See 524 CMR for Escalator and Moving Walk installations made prior to the adoption of A17.1-2004."

8.6.10.3 Cleaning Inside the Hoistway
Delete entire section.

SECTION 8.7 ALTERATIONS

8.7.1.1 Delete (c) and substitute: "524 CMR."

SECTION 8.10 ACCEPTANCE INSPECTIONS AND TESTS

8.10.1.1 Persons Authorized to Make Acceptance Inspections and Tests
Delete entire section and substitute: "The acceptance inspection shall be conducted by licensed elevator mechanics witnessed by an inspector employed by the Massachusetts Department of Public Safety."
8.10.1.1.3 Delete entire paragraph.

8.10.1.2 Application of Inspection and Test Requirements. Delete (a) and substitute: "524 CMR."

SECTION 8.11 PERIODIC INSPECTIONS AND TESTS

8.11.1.1 Persons Authorized to Make Periodic Inspections and Tests.
Delete in its entirety and substitute: "Periodic inspections shall be made by licensed elevator mechanics witnessed by an inspector employed by the Massachusetts Department of Public Safety."

8.11.1.2 Applicability of Inspection and Test Requirements.
Delete (c) and substitute: "524 CMR."

8.11.2.2.2 Safeties
In section (b)(1) delete the words: "slowest operating speed" and substitute the words:: "rated or contract speed".

8.11.1.3 Periodic Inspection and Test Frequency.
Add: "See 524 CMR 8.01."

8.11.4.2.19 Step/Skirt Performance Index
Add before (a): "The following procedure shall be followed during the acceptance test of the unit, and the result shall be in conformance with same. This procedure shall also be followed during the periodic/annual test of units installed under these regulations, previous ASME codes, and under 524 CMR 22.00 (see 22.11) and the result shall be in conformance with same."

35.00: continued

The following modifications apply to A17.1-1996, Parts XX and XXI:

PART XX
INCLINED STAIRWAY CHAIRLIFTS & INCLINED VERTICAL WHEELCHAIR LIFTS

2000.1a Runway Enclosure Provided

Add to 2000.1a (1)

"Landing door panels on the front and rear of a car (narrow side) shall be 36". Doors on the side entrance shall be a minimum of 42". The car platform shall not have more than two openings."

Delete on line 8 of 2000.1a (2), the words: "combination mechanical lock and electric contract", and insert the words:

"Hoistway doors or car doors/gates shall be installed with interlocks approved by the Board or a recognized testing laboratory who have conducted their tests of the lock in accordance with the procedures found in UL 104.

The interlock must insure the closed and locked condition of the door before the car moves more than two inches away from the landing.

The contact that indicated the closed condition of the door or gate shall not be of a type that can be made manually without the use of special tools.

If any mechanical operated roller or arms of the hoistway door lock protrudes into the hoistway, they shall not be within six inches of the car platform or the car walls, horizontally."

Add on line 20 of 2000.1a (2), after the word (surface) the following:

"flush with the hoistway edge of the sill and the wall below it."

Delete on line 8 of 2000.1a (3), the words "combination mechanical lock and contact" and insert the words:

"Conditions found in 2000.1a(2)."

Add on line 7 of 2000.1a (4), after the word "surface", the following:

"flush with the hoistway sill and the wall above the door and frame."

2000.1b Runway Enclosure Not Provided

Delete on line 8 of 2000.1b (2) the words: "combination mechanical lock and contact" and insert:

"Conditions found in 2000.1b (2)."

Add on line 20 of 2000.1b (2), after the word "surface", the words:

"flush with the hoistway door landing sill and the wall below it."

2000.1c Attendant Operated Lifts

Delete on line 3 of 2000.1c (2), the words: "combination mechanical lock and contact" and insert:

"Conditions found in 2000.1a (2)."

2000.1f Electrical Equipment and Wiring

Delete 2000.1f (1) and (2) and insert:

"All electrical equipment and wiring shall conform to the requirements of 527 CMR 12.00: *2002 Massachusetts Electrical Code* (Amendments)"

35.00: continued

2000.7a Limitations of Load Speed and Travel

Delete on line 7 of 2000.7a, the words: "nor penetrate a floor", and add the following:

"The lift may penetrate a floor when the hoistway meets the fire rating requirements of the building code and fire rated landing doors are installed set flush with the hoistway edge of the landing sill and the wall above and below same. This enclosure must extend to the ceiling or the roof above it and be ventilated. The inside surface of the enclosure will be smooth and flush throughout its height. A key switch shall be provided on the platform, that when placed in the on position, control from the landing shall be inoperative."

2000.13 Intermediate Landing Stop

Add new rule 2000.13 as follows:

2000.13 (1) When an intermediate landing door is installed, that door shall not be unlocked as the platform passes the landing.

2000.13 (2) When a wheelchair lift is enclosed in a hoistway, a manually operated emergency-lowering device operated from outside the hoistway shall be installed. An emergency door opening device shall be installed on the lowest landing door when there is no pit provided."

2001.1f Electrical Equipment and Wiring

Delete 2001.1f (1) and (2) and insert:

"All equipment and wiring shall conform to the requirements of 527 CMR *12.00: 2002 Massachusetts Electrical Code* (Amendments)."

2001.10g Electrical Equipment and Wiring

Delete 2001.10g (1) and (2) and insert:

"All equipment and wiring shall conform to the requirements of 527 CMR 12.00: *2002 Massachusetts Electrical Code* (Amendments)."

Add to 2001.6c (2), a new (d):

"Barrier arms shall surround a passenger during the travel and be located at a minimum height of 34 inches and a maximum height of 36 inches to the top of the arm from the platform."

2001.13 Operation and Signals

Add new rule 2001.13 as follows:

2001.13 (1) "When the lift can be operated from the platform, an audio and visual signal must be activated whenever the platform is moving. This signal can be located on the lift or on each landing where a turn in the stairway exists.

2001.13 (2) When the unit is called from any landing call station, the audio and visual signal must be activated prior to any motion, and the lift must be in folded position.

2001.13 (3) Attendant call buttons shall be located at each landing call station in the sight of the operator and connected to a location that can send assistance."

PART XX1
PRIVATE RESIDENCE INCLINED STAIRWAY CHAIRLIFTS & INCLINED & VERTICAL WHEELCHAIR LIFTS

Add to 2100.1a (1)

"Landing door panels on the front and rear (narrow side) shall be 35". Doors on the side entrance shall be a minimum of 42". The car platform shall not have more than two openings."

35.00: continued

2100.7a Capacity, Speed, and Travel

Delete on line 9 of 2100.7a, after the words, "nor penetrate a floor", and add the following:

"The lift may penetrate a floor when a fire-rated hoistway equal to the fire-rating of the building as required by Massachusetts State Building Code encloses the wheelchair lift through its height and fire-rated landing doors are set flush with the hoistway edge of the landing sill and the wall above an below same. This enclosure must extend to the ceiling or the roof above it and be ventilated. The inside surface of the enclosure will be smooth and flush throughout its height. A key switch shall be provided on the platform, that when placed in the on position, control from the landings shall be inoperative.

2100.10i Electrical Equipment and Wiring

Delete 2100.10i (1) and (2) and insert:

"All equipment and wiring shall conform to the requirements of 527 CMR 12.00: *2002 Massachusetts Electrical Code* (Amendments)."

2101.10f Electrical Equipment and Wiring

Delete 2102.10f (1) and (2) and insert

"All equipment and wiring shall conform to the requirements of 527 CMR 12.00: *2002 Massachusetts Electrical Code* (Amendments)."

REGULATORY AUTHORITY

524 CMR 35.00: M.G.L. 143, § 69.

NON-TEXT PAGE