

ELEVATOR CODE

FOR THE

STATE OF WISCONSIN

Effective September 8, 1944



Issued by
INDUSTRIAL COMMISSION OF WISCONSIN
MADISON

TABLE OF CONTENTS

	Order No.	Page
Introduction -----		5
PART I. DEFINITIONS		
Section I. Definitions		
Definitions -----	400	10
PART II. SCOPE OF THE ELEVATOR CODE		
Section I. Scope of the Elevator Code		
General Scope -----	401	22
Renewing of Elevators, Dumbwaiters and Escalators -----	402	22
Exemptions -----	403	22
PART III. PLANS, INSPECTIONS AND TESTS		
Section I. Plants		
Plans -----	404	23
Section II. Inspections		
Inspection by Insurance Companies -----	405	23
Inspection by Cities -----	406	24
Inspection Fees -----	407	24
Section III. Tests		
Tests and Inspections -----	408	25
PART IV. GENERAL REQUIREMENTS		
Section I. Hoistway Construction		
Hoistway Enclosures -----	410	26
Guarding Hoistway of Elevators -----	412	29
Combined Stairways and Elevator Hoistway Enclosures -----	413	30
Guards for Outside Windows in Hoistways -----	414	30
Guards for Projections in Hoistways -----	415	31
Car Clearances -----	416	32
Depth of Pit and Overhead Clearance -----	417	33
Construction of Pits -----	418	37
Buffers -----	419	37
Hoistways, Penthouses, Machine Rooms and Pits Unobstructed -----	420	39
Machine Rooms, Penthouses—Where Required -----	421	40
Construction of Machine Rooms and Penthouses -----	422	40
Overhead Floors and Machinery Supports -----	423	42
Floors or Screens Under Sheaves -----	424	43
Guards for Counterweight Runways -----	425	44
Spreader Brackets and Counterweight Stops -----	426	44
Section II. Cars		
Construction of Cars -----	427	45
Section II-A. Passenger Elevator—Car Enclosure		
Passenger Elevator—Car Enclosure -----	428	46
Passenger Elevator—Car Furnishings -----	429	48
Passenger Elevator—Car Door or Gate -----	430	48

	Order No.	Page
Section II—B. Passenger Elevator—Hoistway Land- ing Doors		
Passenger Elevator—Hoistway Landing Doors ..	431	50
Passenger Elevator—Hoistway Landing Door In- terlocks	432	53
Passenger Elevator Landings	433	56
Section III: Freight Elevator—Car Enclosure		
Freight Elevator—Car Enclosure	434	56
Freight Elevator—Car Entrances	435	57
Freight Elevator—Car Doors or Gates	436	58
Section III—A. Freight Elevator Hoistway Landing Doors or Gates		
Freight Elevator Hoistway Landing Doors or Gates	437	59
Freight Elevator Hoistway Landing Doors or Gates; Construction	438	65
Freight Elevator Landings	439	66
Power Freight Elevator Hoistway Landing Doors and Gates; Locking Devices	440	66
Section IV. Cables		
Factors of Safety for Cables	441	67
Cable Data	442	67
Renewing of Cables	443	68
Number and Size of Cables Required	444	68
Cable Guards for Sheaves and Idlers	445	69
Cable Terminal Fastenings and Turns Required on Drums	446	69
Governor Cable	447	70
Section V. Counterweights		
Drum and Car Counterweights	448	71
Counterweight Cables	449	71
Protection of Counterweight Cables	450	72
Bolting of Counterweights	451	72
Section VI. Loads and Stresses		
Capacities and Loadings for Passenger Elevators	452	72
Capacity Plates	453	73
Stresses Allowed in Design	454	74
Section VII. Guide Rails		
Guide Rails. General Requirements	455	76
Size and Construction of Guide Rails	456	77
Fastening of Guide Rails	457	80
Section VIII. Machines and Safety Devices		
Minimum Sizes of Drums and Sheaves	458	81
Machinery. General Requirements	459	81
Prohibited Installations	460	82
Power Attachments to Hand Elevators	461	84
Slack Cable Devices	462	84
Limit Stops	463	85
Car Safety Devices and Speed Governors	464	86
Brakes	465	94
Stop Balls for Hand Ropes	466	94
Guards for Hand Cable Sheaves and Idlers	467	95
Center Ropes	468	95
Warning Chains	469	95

	Order No.	Page
Section IX. Control and Protection		
Control Mechanism -----	470	95
Automatic and Continuous Pressure Operation Elevators -----	471	98
Electrical Protection -----	472	99
Switches and Wiring -----	473	100
Grounding -----	474	105
Signal Systems -----	475	105
Section X. Lighting		
Lighting -----	476	105
Section XI. Operation, Maintenance and Use		
Operation of Elevators -----	477	106
Maintenance -----	478	106
PART V. DUMBWAITERS, SPECIAL TYPE OF ELEVATORS AND ESCALATORS		
Section I. Dumbwaiters		
Dumbwaiters -----	479	108
Section II. Sidewalk Elevators		
Sidewalk Elevators -----	480	111
Freight Elevators of the Sidewalk Type -----	481	113
Section III. Hand Elevators, Hand Hospital Ele- vators and Hand Invalid Lifts		
Special Requirements -----	482	114
Section IV. Stage Elevators		
Stage Elevators -----	483	114
Section V. Hydraulic Elevators		
Construction and General Requirements -----	485	115
Safety Equipment -----	486	116
Plunger Type Elevators -----	487	117
Maintenance -----	488	118
Recabing Hydraulic Elevators -----	489	118
Section VI. Escalators		
Construction of Escalators -----	490	118
Safety Requirements for Escalators -----	491	119
Escalator Tests -----	492	121

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ELEVATOR CODE

INTRODUCTION

The present Wisconsin Elevator Code is a complete revision of the 1926 elevator code, including the supplement containing amendments to the 1926 revision of the elevator code issued October, 1930, and has been adopted by the Industrial Commission under authority of Sections 101.01 to 101.28, inclusive, of the Statutes of Wisconsin. It supplements the requirements of Section 101.01 to the effect that "every employer and every owner of a place of employment, or a public building, shall be subject to the orders contained in this code, for the construction, inspection, maintenance, and operation of elevators, dumbwaiters and escalators and their hoistways, and shall provide and use safety devices to safeguard the life, limb and health of employes and frequenters in such places of employment or public buildings".

The terms "owner", "employer", "place of employment" and "public buildings" are herein used as defined in the statutes.

The term "owner" includes "every person, firm, corporation, state, county, town, city, village, manager, representative, officer, or other person having ownership, control, or custody of any place of employment or public building, or of the construction, repair, or maintenance of any public building, or who prepares plans for the construction of any place of employment or public building".

By "employer" is meant "every person, firm or corporation, agent, manager, representative or other person having control or custody of any employment, place of employment, or any employe".

By "place of employment" is meant "every place where, either temporarily or permanently, any industry, trade, or business is carried on, or where any person is directly or indirectly employed by another for direct or indirect gain or profit, but not including private domestic service or agricultural pursuits which do not involve the use of mechanical power".

The term "public building" is defined to include "any structure used in whole or in part as a place of resort, assemblage, lodging, trade, traffic, occupancy, or use by the public, or by three or more tenants".

The original elevator code became effective February 20, 1913 and was prepared by the Industrial Commission and drafted by the then existing committee on safety and sanitation composed of the following persons:

Representing Wisconsin State Federation of Labor:

George Mutter, Machinist, Milwaukee.

Fred French, Patternmaker, Milwaukee.

Representing Milwaukee Merchants and Manufacturers' Association:

Charles P. Bossert, Pfister and Vogel Leather Company.

Edward J. Kearney, Kearney & Trecker Company, Chairman.

Representing Milwaukee Health Department:

Joseph Derfus, Chief Sanitary Inspector.

Representing Wisconsin Manufacturers' Association:

Thomas McNeill, Sheboygan Chair Company, Sheboygan.

H. W. Bolens, Gilson Manufacturing Company, Port Washington.

Representing Employers' Mutual Liability Insurance Company of Wausau:

W. C. Landon, Wausau.

Representing Industrial Commission of Wisconsin:

John W. Mapel, Pfister and Vogel Leather Company.

Fred W. McKee, Fairbanks, Morse Company, Beloit.

C. W. Price, Assistant to the Industrial Commission
and Secretary of the committee.

The following sub-committee assisted the main committee
on safety and sanitation in drafting the orders:

C. F. Ringer, former Inspector of Buildings, Milwaukee.

P. Jermain, Otis Elevator Company.

George Mueller, Inspector of Elevators, Milwaukee.

Otto Fischer, Inspector of Elevators, Milwaukee.

G. N. Chapman, Inspector of Safety, Travelers' Insurance
Company.

C. W. Price, Assistant to Industrial Commission.

In addition to the original code, other revised elevator
codes have been issued from time to time, with effective
dates as follows: Jan. 10, 1918, April 20, 1920, August 12,
1926, amended supplement August 24, 1927, and October 20,
1930.

This edition of the elevator code is a complete revision
of the requirements as applied to construction, inspection,
maintenance and operation of elevators, dumbwaiters, and
escalators, and their hoistways in Wisconsin and includes
the repeal of certain of the present requirements and the
addition of new orders effective September 8, 1944. This
revision has been accomplished with the advice and assist-
ance of the following advisory committee:

Representing City of Milwaukee Elevator Inspection
Department:

*Garrett Soulen, Milwaukee, (Chairman).

Representing State Association of Wisconsin
Architects:

A. C. Eschweiler, Jr., Milwaukee.

Representing International Union of Elevator
Constructors:

Otto Butzlaff, Milwaukee.

* Deceased, succeeded by Clarence Haeberle, Elevator Inspection
Department, Milwaukee.

Representing Wisconsin Compensation Rating and
Inspection Bureau:

Charles G. Gluth, Milwaukee.

Representing Industrial Commission of Wisconsin:

R. McA. Keown, Engineer, Madison, (Secretary).

G. M. Lex, Elevator Inspector, Milwaukee.

Geo. A. Leysen, Elevator Inspector, Madison.

Representing F. Rosenberg Elevator Company:

W. A. Rosenberg, Milwaukee. (Succeeded Garrett
Soulen as Chairman)

Representing S. Heller Elevator Company:

L. W. Glueckstein, Milwaukee.

Representing A. Kieckhefer Elevator Company:

H. J. Kieckhefer, Milwaukee.

Representing Otis Elevator Company:

**Harry P. Jermain, Milwaukee.

Administration

The elevator code is enforced by the Industrial Commission in cooperation with municipal and other local officials who are required by law to enforce all orders of the Commission which are germane to their respective duties (Wisconsin Statutes, Section 101.28) and in cooperation with inspectors and insurance companies. This elevator code contains minimum standards and requirements which apply to cities and the state generally, and no local ordinance or code may be less stringent.

Appeal

Any person who considers any part of the elevator code, or any official's interpretation of the code to be unreasonable, may appeal to the Commission to interpret, modify, or suspend the same. (Wisconsin Statutes, Sections 101.15 to 101.17).

Note: Blank forms for petition for modification of an order may be secured from the Industrial Commission.

** Resigned, succeeded by N. B. Nelson, Otis Elevator Company, Milwaukee.

Penalties for Violation of Code Requirements

Section 101.28. Penalty for violations. If any employer, employe, owner, or other person shall violate any provisions of sections 101.01 to 101.13, inclusive, of the statutes, or shall do any act prohibited in sections 101.01 to 101.29, inclusive, or shall fail or refuse to perform any duty lawfully enjoined, within the time prescribed by the Commission, for which no penalty has been specifically provided, or shall fail, neglect or refuse to obey any lawful order given or made by the Commission, or any judgment, or decree made by any court in connection with the provisions of sections 101.01 to 101.29, inclusive, for each such violation, failure or refusal, such employer, employe, owner or other person shall forfeit and pay into the state treasury a sum not less than ten dollars nor more than one hundred dollars for each such offense. It shall be the duty of all officers of the state, the counties and municipalities, upon request of the Industrial Commission, to enforce in their respective departments, all lawful orders of the Industrial Commission, insofar as the same may be applicable and consistent with the general duties of such officers.

Section 101.18. Per diem unit of violations. Every day during which any person, persons, corporation or any officer, agent or employe thereof, shall fail to observe and comply with any order of the Commission or to perform any duty enjoined by sections 101.01 to 101.29, inclusive, shall constitute a separate and distinct violation of such order, or of said sections as the case may be.

PART I

DEFINITIONS

SECTION I. DEFINITIONS.

Order 400.—Definitions.

1. **Approved:** Means approved by the Industrial Commission.

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

3. **Basement:** A basement is a story, the floor line of which is below the grade at any entrance or exit, and the ceiling of which is not more than 5 feet above such grade at any exit or entrance. The number of stories of a building includes all stories except the basement.

Note: An elevator exit at the lowest landing cannot be considered as a required standard exit or entrance to the building.

4. **Buffer:** A buffer is a device designed to absorb the impact of the car or counterweight at the extreme lower limits of travel.

Capacity: See Contract Load.

5. **Car, Elevator:** An elevator car is the load carrying unit including its platform, car frame, and enclosure, if any.

6. **Car Door or Gate:** A car door or gate is the door or gate in or on the elevator car ordinarily used for entrance and exit.

7. **Car Gate, Collapsing:** A collapsing gate is one that is distorted in opening and closing.

8. **Car Door or Gate Electric Contact:** A car door or gate electric contact is a device, the purpose of which is to open the control circuit or an auxiliary circuit unless the car door or gate is in the closed position and thus prevent

operation of the elevator by the operating device in a direction to move the car away from the landing.

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

10. Car Frame: A car frame (sling) is the supporting frame to which the car platform, upper and lower sets of guide shoes, and the hoisting cables, are usually attached.

11. Car Platform: The car platform is the structure, including the floor of the car, which directly supports the load.

12. Clearance, Bottom: Bottom clearance of the elevator car is the vertical distance between any obstruction in the pit, exclusive of the compensating device, buffers, and buffer supports, and the lowest point on the understructure of the elevator car exclusive of the safeties, car-frame channels, and guide shoes, when the car floor is level with the lower terminal landing. (See Overtravel, Bottom).

13. Clearance, Overhead. Overhead 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. (See Overtravel, Top).

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.

14. Contract Load: Contract load is the load specified in the contract for the purchase of the elevator or in the application for permit.

15. Contract Speed: Contract speed is the speed specified in the purchase contract and in the application for permit to be attained by the elevator in the up direction with contract load in the car.

16. 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.

17. **Cable Lock:** A cable lock is a device installed and maintained so that the operating cable can be locked at any landing.

18. **Centering Rope:** A centering rope is used in connection with hand cable control which, when pulled, will throw the operating device to the stop position.

19. **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 and/or close the hoistway door and/or car door or gate by power other than by hand, gravity, springs, or the movement of the car.

Doors: See Hoistway Doors and Gates (Definition 33).

20. **Dumbwaiter:** A dumbwaiter 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 9 square feet, whose internal compartment height does not exceed 4 feet, the capacity of which does not exceed 500 pounds, and which is used exclusively for carrying freight.

21. **Dumbwaiter, Electric:** An electric dumbwaiter is one in which the motion of the car is obtained through an electric motor directly applied to the dumbwaiter machinery.

22. **Elevator:** An elevator is an elevating and lowering device, other than a dumbwaiter, provided with a car which moves in guides in a substantially vertically direction and is designed or used to carry persons or materials.

(a) **Elevator, Passenger:** A passenger elevator is an elevator used chiefly for carrying persons.

(b) **Elevator, Freight:** A freight elevator is an elevator used chiefly for carrying materials.

(c) **Elevator, Hand:** A hand elevator is an elevator that is operated by manual power only.

(d) **Elevator, 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.

(e) **Elevator, 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.

(f) **Elevator, Electro-hydraulic:** An electro-hydraulic elevator is one in which the lifting of the car is obtained by means of an electric motor driven pump, which pumps directly into the cylinder.

(g) **Elevator, Carriage:** A carriage type elevator is an elevator which is supported by cables attached to the platform at four or more points in such a manner that the supporting cables are relied upon to maintain the platform substantially level.

(h) **Elevator, Sidewalk:** A sidewalk elevator is a freight elevator, the 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.

(i) **Elevator, Hydraulic:** A hydraulic elevator is an elevator in which the motion of the car is obtained from liquid under pressure.

(j) **Elevator, Plunger:** A plunger elevator is a hydraulic elevator having a ram or plunger directly attached to the under side of the car platform.

23. **Elevator, Existing Installations:** Existing installations or elevators include all those elevators or parts of elevators installed before the effective date of this code.

24. **Elevator, New Installations:** By new installation, or elevator hereafter installed, is meant:

(a) Every elevator for which the contract was let after the effective date of this code.

(b) Every elevator which, after the effective date of this code, is moved to a new location.

(c) Any complete part of an existing installation which is materially altered or replaced with new after the effective date of this code.

(d) Every elevator that is changed from freight to passenger service, or from passenger to freight service, or from hand to power, after the effective date of this code.

(e) Every elevator hoistway which is enlarged or extended.

Note: Ordinary repairs necessary to maintain elevators in safe condition are not considered material alterations.

25. Escalator: An escalator is a moving, inclined, continuous stairway, or runway, used for raising or lowering persons.

26. 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.

27. Emergency Stop Switch: An emergency stop switch (safety switch) is a device in the car used to cut off the power from the elevator machine independently of the operating devices.

28. Fire-Resistive Wall Construction: Refer to Building Code Order 5105.

Other materials, assemblies and thicknesses of necessary strength and durability for the use intended, and which have successfully performed under tests made by a recognized laboratory in accordance with the requirements of the "Standard Specifications for Fire Tests of Building Construction and Materials" (C19-33) of the American Society for Testing Materials, shall be accepted for specific ratings in addition to those prescribed in Order 5105 of the Building Code.

The wired glass in any hoistway enclosure shall have no pane less than $\frac{1}{4}$ inch thick nor greater than 720 square inches and not more than 54 inches vertical and 48 inches horizontal dimension.

29. Fire Doors: See Hoistway Door or Gate, Definition 33. Class B and C Type Doors.

Note: The Underwriters' Laboratories List of Inspected Materials is obtainable from the Fire Insurance Rating Bureau and Fire Insurance Companies.

30. Full-Automatic Door or Gate: 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.

Hand Elevator: See Definition 22(c).

31. Hoistway: A hoistway is any shaftway, hatchway, well hole, or other vertical opening or space in which an elevator or dumbwaiter is designed to operate.

32. Hoistway Enclosure: A hoistway enclosure is any structure which separates the hoistway, either wholly or in part, from the floors or landings through which the hoistway extends.

33. Hoistway 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 car at any landing.

(a) Hoistway Door or Gate Electric Contact: A hoistway door or gate electric contact is a device, the purpose of which is to open the control 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 operation of the elevator in a direction to move the car away from the landing.

(1) Door Unit System is a contact system which meets the requirements of the contact definition above, but does not require all the hoistway doors to be closed.

(2) Hoistway Unit System is a contact system which meets the requirements of the contact definition above, and also requires that all hoistway doors are closed.

(b) Hoistway Bi-Parting Door or Gate: 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.

(c) Hoistway Full Automatic Door or Gate: 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.

(d) **Hoistway Semi-Automatic Door or Gate:** A semi-automatic door or gate is a door or gate which is opened manually, and which closes automatically as the car leaves the landing.

(e) **Hoistway Manually Operated Door or Gate:** A manually operated door or gate is a door or gate which is opened and closed by hand.

(f) **Hoistway Power Operated Door or Gate:** A power operated door or gate is one which is opened and closed by power other than by hand, gravity, springs, or the movement of the car.

(g) **Hoistway 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 when released by the operator is closed by energy stored during the opening operation.

(h) **Hoistway Power Operated Door or Gate, Automatically Opened:** A power operated door or gate, automatically opened, is a door or gate which is opened by power 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.

(i) **Hoistway Power Operated Door or Gate, Manually Controlled:** A power operated door or gate, manually controlled, is a door or gate which is opened and closed by power other than by hand, gravity, springs, or the movement of the car, the door movement in each direction being controlled by the elevator operator.

(j) **Hoistway, Telescoping Gate:** A telescoping door or gate is a door or gate in which the sections slip together without distortion of the section.

(k) **Hoistway Door, Fire-Resistive:** See Definition 29.

34. Hoistway Door or Gate Interlock, Passenger and Freight Elevators:

1. Existing Installations.

(a) Mechanical Interlock. A mechanical interlock for a hoistway landing door or gate is a device, the purposes of which are:

(1) To prevent the normal operation of the elevator machine unless the hoistway landing door or gate opposite which the car is standing is latched within 4 inches of the fully closed position, and

(2) To prevent the opening of a hoistway landing door or gate from the landing side, except by special apparatus unless the car is at the landing.

(b) Electro-Mechanical Interlock. An electro-mechanical interlock for a hoistway landing door or gate is a combination of electrical and mechanical devices, the purposes of which are:

(1) To prevent the operation of the elevator machine by the operating device in a direction to move the car away from the landing unless all hoistway landing doors or gates are latched within 4 inches of the fully closed position; and

(2) To prevent the opening of a hoistway landing door or gate from the landing side except by means of a key or other special apparatus.

2. New Installations.

(a) Hoistway Door Interlock. A hoistway door interlock is a device, the purposes of which are:

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

(2) To prevent the opening of the hoistway door from the landing side except by special key, 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.

(b) Door Unit System is an interlock system which meets the requirements of the interlock definition above, but does not require all the hoistway doors to be locked in the closed position.

(c) Hoistway 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 device unless all hoistway doors are locked in the closed position.

Note: The "closed position" for hoistway landing doors or gates for various types of elevators is specified under Orders 431, 432 and 437.

35. Landing Zone: The car is considered within the meaning of this Code, as being within the landing zone when the car floor is not more than 18 inches above or below the landing.

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

37. Operating Device: The operating device is the car switch, push button, rope, wheel, lever, treadles, etc., employed to enable the operator to actuate the controller.

38. 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.

39. Overtravel, Top: Top overtravel of the elevator car is the distance provided for the car floor to travel above the level of the upper terminal landing until the car is stopped by the normal terminal stopping device.

40. Automatic Operation: Automatic operation is operation by means of buttons or switches at the landings, with

or without buttons or switches in the car, the momentary pressing of which will cause the car to start and automatically stop at the landing corresponding to the button pressed.

41. Non-Selective Collective Automatic Operation: 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.

42. Selective Collective Automatic Operation: 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 travelling in the "Up" direction and all "Down" landing calls are answered when the car is travelling 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.

43. Single Automatic Operation: Single automatic operation is automatic operation by means of one button in the car for each landing level served and one button at 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.

44. Car-Switch Operation: Car-switch operation is operation wherein the movement of the car is directly and solely under the control of the operator by means of a switch in the car.

45. Car-Switch Automatic Floor-Stop Operation: 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.

46. Continuous-Pressure Operation: Continuous-pressure operation is operation by means of push buttons or switches in the car and at landings, any one of which may be used to control the movement of the car so long as the button or switch is manually held in the operating position.

47. Dual Operation: Dual operation is a system of operation whereby the elevator controller is arranged for either automatic operation by means of landing and car buttons or switches, or for manual operation by an operator in the car, who may either use a car switch or the buttons provided in the car. When operated by an operator, upon the throwing of a suitable switch or switches, the car can no longer be started by the landing buttons, which buttons may, however, be used to signal the operator that the car is desired at certain landings.

48. Pre-Register Operation: 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.

49. Signal Operation: 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

those 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.

50. Potential Switch, Elevator: An elevator potential switch is a 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. These switches are of the magnetic type.

51. 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 slackening of the cables.

52. Slack-Cable Switch, Elevator: An elevator slack-cable switch is a device for automatically cutting off the power in case the hoisting cables become slack.

PART II

SCOPE OF THE ELEVATOR CODE

SECTION I. SCOPE OF THE ELEVATOR CODE.

Order 401.—General Scope.

The requirements of this code shall apply to all elevator, dumbwaiter and escalator installations in public buildings and places of employment as defined by the statutes. The requirements apply to both existing installations and those hereafter installed unless otherwise specified.

Order 402.—Renewing of Elevators, Dumbwaiters and Escalators.

Where the part or parts of equipment of an elevator, dumbwaiter or escalator are impaired through ordinary wear, damage, or deterioration by fire or other causes, to less than 50 per cent of the original condition, the equipment shall be repaired or rebuilt in conformance with the requirements for new installations.

Order 403.—Exemptions.

This code does not apply to belt, bucket, scoop, roller, or similar inclined or vertical freight conveyors, portable tiering or piling machines when not passing through a floor unless serving more than the floor on which the portable tiering or piling machine is located, skip hoists, man hoists, mine hoists, lumber lifts, wharf ramps or apparatus in kindred classes, amusement devices, stage curtain hoists or lift bridges, nor to elevators used only for handling building material during the period of building construction and elevators with a travel less than 4 feet.

Note: For regulations relative to the use of elevators, hoists, derricks and similar equipment during the period of construction of a building or any other structure see Orders 3520 to 3538, inclusive, of the General Orders on Safety in Construction issued by the Industrial Commission.

PART III

PLANS, INSPECTIONS AND TESTS

SECTION I. PLANS.

Order 404.—Plans. New Installations.

Before starting work on any new installation of an elevator, power dumbwaiter or escalator, three copies of the plans shall be submitted to the Industrial Commission for approval, with two copies of application, properly filled out, on blank forms furnished by the Commission.

The plans for power elevators shall give the total weight of the complete car, and the total weight of counterweight.

This order shall not apply in cities where elevator permits are issued by the city in a manner approved by the Industrial Commission. Every elevator manufacturer who furnishes an elevator, power dumbwaiter or escalator to be installed by the owner, or an agent of the owner, shall submit plans and file an application in compliance with this order.

Note A: Plans should include (1) sectional plan of car and hoistway; (2) sectional elevation of hoistway, penthouse (showing machinery) and pit; (3) plan of machine and supports showing details of materials, size of beams, etc. If the hoistway has more than one entrance on any floor, all entrances should be clearly shown.

Note B: The elevator manufacturer and the architect should cooperate in preparing plans to avoid discrepancy in design.

SECTION II. INSPECTIONS.

Order 405.—Inspection by Insurance Companies.

The Industrial Commission will accept inspections of insured elevators, dumbwaiters and escalators by inspectors of insurance companies on the following conditions:

(1) Each installation shall be inspected semi-annually, as near as may be, except that in public buildings and places of employment outside the City of Milwaukee which are covered by compensation insurance policies only, an inspection shall be made at least annually.

(2) A detailed report of each inspection shall be filed with the Commission within 14 days after inspection on a printed form approved by the Commission. Such report shall show all respects in which the installation fails to comply with the code requirements. If there are any special conditions which in the inspector's opinion would require modification of any general order, the facts shall be fully stated in the report, with the inspector's recommendation.

(3) A certificate of inspection on a form approved by the Commission shall be posted by the insurance company in a conspicuous place in the elevator car, dumbwaiter cage, or escalator, as the case may be, and shall show the date of inspection, name of insurance company, name of inspector, safe carrying capacity (see Order 452), and, in the case of an elevator, whether steel cables are used (see Order 441).

(4) The insurance company shall use all reasonable diligence to secure compliance with the Commission's orders. If unsuccessful, it shall so report to the Commission. If it then becomes necessary for the Commission to make an inspection, the statutory fee of two dollars for each elevator inspected will be charged (see Order 407).

(5) The competency of each elevator inspector shall be certified by each insurance company to the Commission in writing prior to making inspections, and inspections will be approved by the Commission only after receipt of acceptable evidence of competency or after a satisfactory examination has been passed.

Order 406.—Inspection by Cities.

In any city which provides a competent inspector, the Industrial Commission will accept inspections by such city, provided the conditions of paragraphs (1), (3), (4) and (5), Order 405, are complied with, substituting "city" for "insurance company".

Order 407.—Inspection Fees.

A charge of two dollars (Sec. 101.10, subsection 12, Revised Statutes) will be made by the Industrial Commission for each inspection of each elevator except that no charge will be made for the inspection of any new installation made within six months following its completion, provided that

notification of the completion of such new installation is given the Industrial Commission prior to the time of placing the installation into regular service.

Note A: The elevator constructor or representative of the elevator company should be present at the time a new installation is first inspected.

Note B: A responsible and competent mechanic should accompany the elevator inspector while a periodic inspection is being made.

SECTION III. TESTS.

Order 408.—Tests and Inspections. New Installations.

A contract load test shall be made of every elevator and power dumbwaiter before being placed into regular service.

Every new installation shall be inspected and tested by a representative of the Industrial Commission to determine whether or not it complies with the requirements of this code before the elevator is placed in service.

The elevator company or party installing the elevator shall give the Industrial Commission reasonable notice in advance of the time when such installation will be ready for inspection.

For test of safety device see Order 464.

For test of escalators see Order 492.

PART IV
GENERAL REQUIREMENTS

SECTION I. HOISTWAY CONSTRUCTION.

Order 410.—Hoistway Enclosures. New Installations.

FACTORY AND MERCANTILE BUILDINGS

(a) The hoistway of every passenger or freight elevator or dumbwaiter hereafter installed in buildings of two stories or less in height, shall have enclosures that comply with the requirements of Order 412, or better.

Note: In all fire-resistive and mill constructed buildings the hoistway shall not be less than two-hour fire-resistive construction, as indicated in Order 410(b)(1).

(b) The hoistway of every passenger or freight elevator or dumbwaiter hereafter installed in buildings three stories or more in height shall consist of not less than one hour fire-resistive construction, and outlined as follows:

Note 1: In all fire-resistive and mill constructed buildings the hoistway shall not be less than two-hour fire resistive construction, as indicated in Order 410(b)(1).

Note 2: See Orders 5520 and 5712-2 of the Building Code for special requirements of fire-resistive construction throughout regardless of travel in theaters, assembly halls, hotels, hospitals, apartment buildings and places of detention.

(1)

Hoistway Landings	Fire-Resistive Buildings	Mill Constructed Buildings	Ordinary Constructed Buildings	Frame Constructed Buildings
asegment to first_____	2 hr. Fire-Resistive Construction	2 hr. Fire-Resistive Construction	See Order 412	See Order 412
irst to second_____	2 hr. Fire-Resistive Construction	2 hr. Fire-Resistive Construction	See Order 412	See Order 412
asegment to second_____	2 hr. Fire-Resistive Construction	2 hr. Fire-Resistive Construction	See Order 412	See Order 412
irst to third_____	2 hr. Fire-Resistive Construction	2 hr. Fire-Resistive Construction	1 hr. Fire-Resistive Construction	1 hr. Fire-Resistive Construction
asegment to third_____	2 hr. Fire-Resistive Construction	2 hr. Fire-Resistive Construction	1 hr. Fire-Resistive Construction	1 hr. Fire-Resistive Construction
irst to fourth_____	2 hr. Fire-Resistive Construction	2 hr. Fire-Resistive Construction	1 hr. Fire-Resistive Construction	1 hr. Fire-Resistive Construction

Note: See Definition 28 for 1, 2, 3, and 4 hour fire-resistive construction.

(2) The type of hoistway enclosure whether extending the full height of the building or not shall be governed by the height of the building and not by the height of the hoistway.

(3) Every hoistway enclosure with no less than two-hour fire-resistive construction shall extend to the roof or ceiling above hoistway.

(c) Where a one-hour fire-resistive constructed hoistway is required, all hoistway landing openings shall be provided with approved Class (C) doors or equal except that wood doors of solid flush type $1\frac{3}{4}$ inches thick may be used.

(d) Where a two-hour fire-resistive constructed hoistway is required, all hoistway landing openings shall be provided with approved Class (B) doors or equal or approved fire shutters.

(e) Where hoistway doors are required and installed, all door openings and passageways must be clear and unobstructed at all times.

(f) All doors or shutters where required to protect the hoistway landing openings shall be self-closing, or equipped to close automatically in case of fire or equipped with a device requiring the doors to be closed before the car can be moved from the landings.

(g) Fire-resistive doors have no time resistance rating established by governmental agencies. It will be the policy of the Industrial Commission to approve, subject to the provisions of this order, any door given a rating by the Underwriters' Laboratories in their "List of Fire Protection Equipment and Materials", listed as Class A, B, C, D and E having varying degrees of resistance, and suitable for various locations.

See definition 29.

For hoistway entrance protection see Orders 431, 432, 437 and 438.

Doors and windows in outside walls of elevator hoistways need not be fireproof except in cases where fire doors are required by the State Building Code.

(h) Every window in such a hoistway enclosure except in outside wall shall be of wired glass and metal frames and sash.

See definition 28.

Order 412.—Guarding Hoistway of Elevators. New and Existing Installations.

(a) The hoistway of every passenger or freight elevator or dumbwaiter where the travel does not exceed two stories shall be guarded with not less than the following requirements:

1. Existing Installations.

(a) The hoistway of every existing passenger or freight elevator or dumbwaiter, where a fire-resistive enclosure is not required and is not provided, shall be enclosed with guards not less than 6 feet in height above each floor.

If the guards are made of wood they shall be solid. If the guards are made of metal they shall be the equivalent in strength, rigidity and protection of wire screen of not less than No. 10 U. S. Standard Gauge with mesh not greater than 1 inch measured along the wires from center to center at points where they cross.

(b) Where a hand cable is operated through the hoistway enclosure, a slot not more than 5 inches wide by not more than 3 feet long with the bottom 30 inches from the floor may be cut in the enclosure. This slot or opening shall be protected with an approved fire shutter, which will be self-closing or which will close automatically in case of fire.

2. New Installations—Existing Buildings.

(a) The hoistway of every passenger or freight elevator or dumbwaiter hereafter installed in an existing building two stories or less in height where a fire-resistive enclosure is not required and is not provided and the building is of ordinary or wood construction, shall be enclosed with guards not less than 6 feet in height above each floor.

If the guards are made of wood they shall be solid. If the guards are made of metal they shall be the equivalent in strength, rigidity and protection of wire screen of not less than No. 10 U. S. Standard Gauge

with mesh not greater than 1 inch measured along the wires from center to center at points where they cross.

Exceptions: (1) Hand elevators. On the side on which the pull rope is located, the enclosure may be arranged so as to permit free operation of the pull rope.

(2) Where material is stored near a hoistway enclosure, the enclosure shall extend from floor to ceiling.

(b) In every elevator installation where the ceiling height is more than 12 feet, the space between the top of the entrance opening and ceiling shall be enclosed with vertical wood or metal bars spaced not more than 2 inches apart or with wire screen of not less than No. 13 U. S. gauge and mesh not larger than 2 inches. This enclosure shall be in a plane not more than 7 inches from the edge of the car, except that in existing installations, 8 inches will be permitted.

(c) On every hand elevator hereafter installed operating in a hoistway outside of a building and which is enclosed only at the ground floor, the hoistway over the outside landing entrance shall be enclosed solid the entire length of the hoistway, not more than 7 inches from the edge of the car. (See Order 436-(h).)

Order 413.—Combined Stairways and Elevator Hoistway Enclosures. New and Existing Installations.

An elevator or dumbwaiter hoistway which is placed in a fire-resistive stair enclosure need not have an additional fire-resistive enclosure, but the elevator hoistway shall be guarded to a height of not less than 6 feet above each floor, and every stairway in the manner described in Order 412-(a), except that incombustible material shall be used throughout.

Order 414.—Guards For Outside Windows in Hoistways. New and Existing Installations.

(a) Every outside window in an elevator hoistway shall be guarded on the outside as outlined in the following items:

Height

- (1) Up to and including the fourth floor.
- (2) Where the window sill is not more than 15 feet above an adjoining roof.
- (3) Up to and including the seventh floor on elevators hereafter installed in cities where the fire departments use aerial ladders.

Material

- (4) Metal bars not less than $\frac{1}{2}$ inch in diameter or equivalent and spaced not more than 10 inches center to center, or
- (5) Wire screen of wire not less than $\frac{1}{4}$ inch in diameter with mesh not greater than 3 inches, measured along the wire from center to center of wires at points where they cross. If any such screen is hinged the fastening shall be on the inside.

Exception: Grain Elevators.

Note: Flat bars not less than 1 inch wide by $\frac{1}{4}$ inch thick, with the ends securely anchored, will be considered the equivalent of $\frac{1}{2}$ inch diameter rods.

(b) Where an open side of an elevator car passes a window in a wall of a hoistway and an approved car gate protection is not provided for such open side a guard consisting of vertical metal bars $\frac{1}{2}$ inch in diameter or equivalent, spaced not more than 2 inches apart, or substantial grating, removable if desired, shall be provided over the inside of the window.

Order 415.—Guards for Projections in Hoistways.

(a) All projections and shearing edges in elevator hoistways such as floors, beams, sills, pipes, bolts and other stationary parts within 4 inches of the edge of the car, unless guarded by the permanent car enclosure, shall be provided with smooth beveled guards fitted directly under such projections.

On new installations these guards shall be of smooth metal not less than $\frac{1}{16}$ inch in thickness and properly braced.

The beveled surface of each guard shall make an angle of not less than 60 degrees with the horizontal.

Exceptions: The requirements of this order need not apply to the tracks of two-speed doors; nor to projections of 1 inch or less on doors and door lintels; nor to the projections into the hoistway on interlocks or other floor lock devices where the guarding of such devices would interfere with their proper operation.

(b) Passenger elevators hereafter installed equipped with car gates of the collapsing type shall have the hoistway provided with fascia plates flush with the landing sill.

Passenger elevators hereafter installed equipped with solid car doors and leveling device, shall have the hoistway provided with vertical toe-guards extending at least 2 inches beyond the leveling zone and beveled at the lower edge as required in paragraph (a) of this order.

(c) On every existing passenger elevator having a leveling device, the hoistway shall be equipped with a vertical toe-guard extending at least 2 inches beyond the leveling zone and beveled at the lower edge as required in paragraph (a) of this order.

(d) Where a leveling device operates the car with the hoistway door open, the under side of the car platform shall be equipped with a vertical toe-guard at least 2 inches longer than the leveling zone.

Order 416.—Car Clearances. New Installations.

(a) The clearance between the car entrance sill and any landing sill shall be not less than $\frac{1}{2}$ inch where steel guide rails are used in side-post construction and not less than $\frac{3}{4}$ inch where wood guide rails or corner-post construction is used.

(1) The clearance between any point of the elevator hoistway wall and the elevator car shall not be less than $\frac{3}{4}$ inch. Every rope, cable, sheave and other similar moving parts shall have a clearance of not less than $\frac{3}{4}$ inch.

(b) The distance from the edge of the hoistway landing sill to the hoistway landing door or gate shall not be more than 4 inches.

(c) For automatic-operation elevators the distance between the hoistway side of the hoistway door opposite the car opening and hoistway edge of the landing threshold shall be not more than the following: (1) for swinging doors $\frac{1}{2}$ inch and (2) for sliding doors $2\frac{1}{4}$ inches. In no case shall the hoistway face of the hoistway door project into the hoistway beyond the edge of the landing sill.

For existing installations of automatic-operation elevators where the clearance exceeds $1\frac{1}{2}$ inches for swinging doors or $2\frac{1}{2}$ inches for sliding doors, the space between the hoistway side of the landing door and the hoistway edge of the landing threshold shall be filled in by suitable means.

If the hoistway door consists of two or more sections, the distance specified in the first and second paragraphs of this order shall be measured from the section of the door nearest to the edge of the hoistway landing sill.

(d) The clearance between the car entrance sill and any landing sill shall not be more than $1\frac{1}{2}$ inches.

(e) The clearance between the hoistway walls and the edge of any car entrance sill shall not be more than 7 inches at any point, except that in existing installations, the distance between the car entrance sill and the wall containing a secondary entrance may be increased if approved in writing by the Industrial Commission.

Order 417.—Depth of Pit and Overhead Clearance. New Installations.

(a) The depth of the pit and the overhead clearance for any power elevator hereafter installed, having a contract speed of 200 feet per minute or less, where spring buffers are required, shall be not less than the number of inches for a given speed and capacity shown in the following table. See Order 419(a).

MINIMUM PIT DEPTH AND OVERHEAD CLEARANCE

Contract Speed Feet per Minute	Contract Load in Pounds		
	0—4000	5000—7000	8000 and over
0— 50	36 inches	42 inches	48 inches
100	42 "	48 "	54 "
200	48 "	54 "	60 "

When vertically sliding bi-parting counterbalanced hoistway landing doors are used or required, the above minimum pit depths shall, in the case of shallow pits, be increased to not less than $\frac{1}{2}$ the door height opening, plus 6 inches.

(1) Where spring buffers are used, the clearance between the bottom of the car platform and the pit floor shall be not less than 15 inches when the car is resting on the fully compressed buffers.

(b) The depth of the pit and the overhead clearance for any power elevator hereafter installed, having a contract speed in excess of 200 feet per minute, where oil or equivalent buffers are required, shall be not less than the number of inches for a given speed shown in the following table. See Order 419(a).

MINIMUM PIT DEPTH AND OVERHEAD CLEARANCE

	Pit Depth	Overhead Clearance
Contract Speed Feet per Minute	Car Depth 18 inches + Run by 3 inches + Extended Buffer	
200	64 inches	48 inches
300	64 "	54 "
400	76 "	60 "
500	92 "	66 "
600	110 "	72 "
700	110 "	78 "
800 or more	140 "	84 "

Note: The above pit depth may not be sufficient for rope compensation.
Note: Where oil buffers are installed, the elevator manufacturer should be consulted to determine if the above pit depths are sufficient for his equipment.

(1) When excessively long oil buffers are provided and where practical, a pocket not over 30 inches deep may be provided below the normal pit floor to accommodate the lower portion of the car oil buffer, provided the pocket is of concrete and waterproofed and has a substantial removable cover or filled with sand to permit the buffer to be removed in case of repair. Such pocket shall be included in the pit depth.

The above gives minimum requirements, but additional pit depth shall be provided as necessary to allow clearance for compensating-rope sheaves and any vertical movement thereof, and to comply with Order 463.

(2) Counterweight oil buffers shall be installed so that when the car is at the top landing, the extended buffer shall be at least 6 inches from its striker block.

(3) When the car is at the top landing, the overhead clearance shall be the clear distance between the top of the car and devices attached thereto and any corresponding point of any obstruction in the hoistway vertically above it.

(c) When the car rests on the fully compressed buffer, there shall be at least 2 feet clearance vertically between

the lowest projection of the under side of the car platform, except guide shoes and aprons attached to the sill, and any obstruction in the pit, exclusive of compensating device, buffer, and buffer support and foundation encroachments hereinafter permitted. The depth of any trenches or depressions permitted by the Industrial Commission shall not be considered in determining this clearance.

Exception: Sidewalk elevators.

The floor of the pit shall be approximately level, except that this requirement may be waived if old foundation footings are encountered in a new installation and it is inadvisable to remove the footing, but the maximum permissible encroachment shall be not more than 15 per cent of the cubic content of the pit. Sufficient pitch may be allowed for drainage. There shall be no trenches or depressions in elevator pits except by permission of the Industrial Commission where difficulties make such trenches or depressions necessary.

Note: The hazard due to an uneven pit should be recognized and precautions taken to minimize this hazard. Screen partitions are recommended for separating pits at different levels.

(d) Power sidewalk elevators shall be provided with not less than 6 inches top overtravel and 3 inches bottom overtravel.

Exception: Plunger elevators.

(e) Every hand elevator hereafter installed shall have a pit at the bottom of the hoistway equal to not less than the thickness of the elevator platform, plus the required clearance for any attachment that may be placed on the bottom of the platform.

(f) All parts of a new elevator installation shall be designed and adjusted to permit safe movement to the limits of travel at the top and bottom of the hoistway, including the depth of the pit and the overtravel at the top of the hoistway.

(g) Provisions shall be made to insure reasonable safety for the work necessary to properly inspect and maintain the equipment on the bottom of the car and in the pit.

Note: On account of the variable conditions of exceptionally deep pits, it is recommended that metal grating or a vertical ladder be provided, depending on the conditions involved.

Order 418—Construction of Pits.

1. New Installations.

(a) The pit for every elevator hereafter installed shall be at least equal in area to the hoistway. The walls and floor of the pit shall be substantially constructed of incombustible material forming a tight enclosure.

2. New and Existing Installations.

(a) Where water cannot be kept out of a pit with ordinary construction, a proper automatic drain shall be installed to keep the pit dry, or a pit tank shall be constructed of boiler plate not less than $\frac{1}{4}$ inch thick, properly braced.

Order 419.—Buffers. New Installations.

(a) Oil or spring buffers shall be provided for every power elevator car and every set of counterweights hereafter installed, and shall rest on a solid foundation in the pit, except that on the counterweight side, oil buffers may be attached to and mounted below the counterweight. The function of the buffers shall be to absorb the energy of the rated contract load and the counterweight descending at governor tripping speed. For a contract speed of 200 feet per minute, or less, oil or spring buffers may be used. For a contract speed exceeding 200 feet per minute, oil buffers shall be used with provisions and requirements as outlined as follows:

(1) The minimum total stroke of oil buffers shall be based on an average retardation of 32.2 feet per second per second, based on governor tripping speed, and the maximum retardation based on governor tripping speed shall be not in excess of 80.5 feet per second per second ($2\frac{1}{2}$ times gravity retardation).

Exception: The required buffer stroke specified above may be reduced subject to the approval of the Industrial Commission provided speed-retarding devices as specified below are installed for retarding the car and/or counterweight to a definite reduced speed before the buffer is engaged. In such cases the required buffer stroke

shall not be less than the distance corresponding to gravity retardation from 120 per cent of such reduced speed rather than from governor tripping speed, provided that for contract speeds in excess of 500 feet per minute the buffer stroke shall be not less than 18 inches.

If special speed-control or retarding devices are installed in connection with reduced stroke buffers as provided in the above exception, such devices shall:

- (x) Be independent of the normal and final stop switches.
- (y) Provide a retardation of the ascending car not in excess of gravity.
- (z) Provide a stopping distance for the descending car not less than that shown in tables 1, 2 and 3 in Order 464(m).

(2) Each type and size of oil buffer used shall be tested to prove satisfactory results.

Note: The specifications of buffer tests as outlined in the American Standard Safety Code for elevators, or made by, or under the supervision of a recognized testing laboratory may be considered as satisfactory, and approved by the Industrial Commission.

Exception: For the duration of the war and for a period of one year thereafter, or until testing facilities are available, the provisions of this requirement will be met if the buffer passes field tests approved by the Industrial Commission.

Note: The field tests as outlined in the Inspectors Manual of the American Standard Safety Code for Elevators will be in general acceptable.

(3) Buffers shall be marked by the manufacturer with range of speed and load for which they have been approved.

(4) Buffers shall be provided with a gauge to determine the amount of oil. Pipe plugs in casting not accepted.

(5) Buffers shall be tested in the field by running on to them with contract load at not less than one half contract speed with the final limit switch operative;

when the load is lifted the buffer shall return to the fully extended position within 90 seconds.

(6) Buffers for car or counterweight of the spring return type shall be provided with a switch, operated by the buffer in case it is compressed more than 3 inches and so connected in the control circuit that the speed of the descending car or counterweight shall not exceed one half the contract speed unless the buffer plunger when released returns to within 3 inches of its normal position.

(7) If spring-return buffers are precompressed they shall be so installed that when the car is level with a terminal landing the remaining buffer stroke shall not be less than 50 per cent of the gravity stopping distance corresponding to the governor-tripping speed used.

Order 420.—Hoistways, Penthouses, Machine Rooms and Pits Unobstructed. New and Existing Installations.

(a) (1) No elevator machine or other machinery shall be located in the elevator pit except equipment used in connection with sidewalk or hydraulic elevators.

(2) No ropes, wires or pipes shall be installed in any elevator hoistway except those needed to serve the elevator equipment including heating and lighting the car or hoistway and branch sprinkler lines.

Other electric conduits or cable may in exceptional cases be installed in the elevator hoistway only if approved in writing by the Industrial Commission provided that no opening, terminal, outlet or junction is within the hoistway and shall be continuous between outlets or terminals entirely outside the hoistway.

Exception: In existing installations pipes in a hoistway may remain unless carrying noxious gases, or steam with a pressure exceeding 15 pounds, and wires may remain if placed in conduit in compliance with the provisions of this order.

(b) No elevator hoistway or pit shall be designed or used as a passageway, or for the storage of material.

(1) There shall be no thoroughfare under the hoistway of an elevator or counterweight unless all the requirements are complied with outlined as follows:

(1) Buffers (See Order 419).

(2) Car and counterweight safety devices (See Order 464).

(3) 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 when either is descending at contract speed or at governor tripping speed where a governor-operated safety is used.

(c) No machinery or other apparatus not a part of the elevator shall be installed within 3 feet of elevator equipment.

**Order 421.—Machine Rooms, Penthouses—Where Required.
New Installations.**

Above every power elevator hereafter installed, there shall be a machine room or working space with at least 6 feet average headroom above the screen or floor required by Orders 423 and 424. Penthouses shall be large enough to provide the necessary clearances between various parts of the equipment. (See Order 473-(n).)

Where a new elevator is installed, which terminates below an occupied floor or below a roof in which a penthouse cannot readily be provided, the required headroom may be decreased if approved in writing by the Industrial Commission.

Order 422.—Construction of Machine Rooms and Penthouses.

(a) The construction of walls, ceilings or roofs and openings of all machine rooms and penthouses shall be of equivalent construction as required for hoistway enclosures. Where exposed walls and roofs are of non-fire-resistive con-

struction, the penthouse shall in all cases be covered with incombustible material, or no less than 1 hour fire-resistive construction.

(b) On every elevator hereafter installed, provisions shall be made for adequate ventilation of all machine rooms. Where possible, this shall consist of properly weather-proofed windows or ventilating skylights. In all other cases, ventilation shall consist of adequate supply and exhaust grilles or ducts.

(c) In every elevator installation access to the machine room or penthouse shall be horizontal and shall be made safe and easy from outside the hoistway by means of a stairway (with handrail), or stairway type ladder (with handrail), inclined not more than 75 degrees with the horizontal. Openings through the roof to serve the machine room or penthouse shall be completely protected from the weather, and shall have a horizontal entrance door, not less than 6 feet in height. Access to the machine room or penthouse may be under the same roof.

One such stairway or ladder may serve a group of adjoining machine rooms or penthouses on the same roof. Exception: Scuttle openings through the roof on existing installations for access to the machine room or penthouse, will be accepted, provided the arrangement is reasonably safe and easy.

(d) All stairways or ladders to the roof of the building, and all stairways or stairway type ladders having a rise of more than 6 feet above the roof, shall be protected from the weather. All stairways and stairway type ladders which are not so protected, shall be of standard fire escape construction of the Building Code.

(1) Where access to the machine room or penthouse is from the roof and its entrance door opens outward, a platform shall be provided not more than 8 inches below the entrance door sill. The platform shall be not less than 2 feet wide and shall project not less than 2 feet beyond the "lock" jamb of the door. A guard rail shall be provided at the edge of this platform, except where the ladder or stairs join the platform.

(2) Elevator penthouses shall not be used as public thoroughfares. Doors to elevator penthouses shall be fitted with locks which permit the door to be opened from the inside without a key.

(3) In every elevator hereafter installed where a scuttle opening is provided in the floor over the hoistway, the opening shall be equipped with a substantial cover so arranged that the opening cannot be conveniently used as an entrance to the penthouse.

Order 423.—Overhead Floors and Machinery Supports. New and Existing Installations.

(a) There shall be a floor not less than 2 inches thick, or a steel plate of equivalent strength, immediately under the machinery at the top of the hoistway of every power elevator. See Order 424-(a).

(1) If the elevator machine is placed at the top of the hoistway, the floor shall cover the entire hoistway, shall be fire-resistive or mill construction, and shall be built and supported for a safe concentrated load of not less than 300 pounds at any 4 square inches in addition to the machinery load.

See Building Code, Orders 5100 and 5101.

(b) The overhead beams and structural supports of every elevator hereafter installed shall be of steel or reinforced concrete and shall be designed and constructed to carry the total load, including the weight of the floor slab, if any, and as outlined as follows:

(1) Total weight of all apparatus resting on the beams including the complete weight of the machine, sheaves, controller, etc.

(2) Plus *twice* the load suspended from the beams, including the sum of the tensions of all suspended cables.

Note: The object in doubling the suspended load is to allow for impact, acceleration stresses, etc.

See Building Code, Chapter 5.

(c) The openings in floors, through which cables, ropes or transmission lines are passed, shall be fitted with suitable guards at least 2 inches high to prevent any loose material from coming in contact with such cables, ropes or transmission lines, and also to prevent any loose parts from dropping through the openings.

(d) Every overhead platform on which elevator machinery or equipment is placed and which does not cover the entire area of the hoistway shall be equipped on the open side with standard guard rails and toe-boards.

Order 424.—Floors or Screens Under Sheaves. New and Existing Installations.

(a) If the overhead machinery consists only of sheaves and governor and/or signal or other auxiliary equipment, the floor, if of wood, shall be solid and not less than 2 inches thick, or not less than $\frac{7}{8}$ inch thick if supported by 2 x 10 joists spaced not more than 16 inches center to center. If such floor is a metal grating, there shall be no opening greater than 1 inch in width. It shall be built and supported to carry a safe concentrated load of not less than 300 pounds at any 4 square inches.

The floor shall cover the hoistway if the area of the hoistway does not exceed 50 square feet and if the average headroom above such floor is not less than 5 feet; if the area is larger than 50 square feet, or the average headroom is less than 5 feet, such floor shall extend at least 2 feet outside of all sheaves and machinery that must be reached for oiling and inspection. In such cases there shall be a toe-board not less than 6 inches in height at the edge of the floor, and where the space between the floor and the wall of the hoistway exceeds 12 inches, a handrail shall be provided 36 inches above the floor. This order shall also apply to hand elevators having no screens or other approved covers over the cars, excepting existing installations where there is not room for such floors.

(b) On existing power elevators where there is sufficient clearance, there shall be a suitable guard provided under every overhead deflecting or secondary sheave to prevent broken parts or material from falling into the hoistway.

Order 425.—Guards For Counterweight Runways. New and Existing Installations.

(a) Where a counterweight runway is located in the elevator hoistway the outside (the side away from the elevator), if exposed to contact, shall be protected the full height with a solid guard and, if there is no other means provided for inspection of the counterweight stack, a removable panel at least 12 inches longer than the counterweight stack shall be provided at the bottom.

(b) The hoistway side of every counterweight runway shall be enclosed with a solid guard from a point not more than 18 inches above the bottom of the pit to a height of 90 inches, except for

- (1) Hand elevators;
- (2) Existing power elevators where there is not room for such guards;
- (3) Elevators whose counterweights are equipped with compensating devices connected to the counterweights.

Note: Guards in hoistways should be made of metal of not less than 16 gauge.

(c) Where a counterweight runway is located outside the elevator hoistway, the runway shall be solidly enclosed on all sides but a removable panel 12 inches longer than the counterweight stack shall be provided on the outside at the bottom.

Order 426.—Spreader Brackets and Counterweight Stops.

(a) The counterweight guide rails of every power drum type elevator hereafter installed, shall be strongly fastened together every 4 feet from the top of the guide rails, to a point opposite the bottom of the counterweight stack when it is at the upper limit of normal travel.

This requirement shall also apply to every existing installation in which the travel is more than 35 feet if the counterweight runway is not properly fastened together or guarded at the top.

(b) In every power drum type elevator hereafter installed an I-beam or other obstruction shall be strongly

secured at the upper limit of travel of the counterweights so that they cannot be drawn out of the runway. Such obstruction shall be so arranged that the counterweights will be stopped squarely, without distortion.

(c) In every hand elevator which does not have a limit stop at the top, a solid footing shall be provided on which the counterweight will rest when the car is not more than 6 inches above the highest landing.

SECTION II. CARS.

Order 427.—Construction of Cars. New Installations.

(a) Every power freight elevator platform hereafter installed shall have a metal outside frame and shall be designed and constructed to support the contract load but in no case less than 30 pounds per square foot of net inside floor area.

Every elevator carrying automobiles shall have a car platform of sufficient strength to support safely 70 per cent of the total live load assumed to be concentrated equally on two front or rear automobile wheels located at any distance from the entrance sill.

(b) Every power passenger elevator car platform hereafter installed shall have a metal outside frame and shall be designed and constructed to support the contract load but in no case less than the number of pounds per square foot of platform area specified in Order 452.

(c) Every power elevator hereafter installed shall have a metal sling designed in accordance with the stresses specified in Order 454 and based on the contract load uniformly distributed.

Exception: This requirement need not apply to elevators of the plunger type that are not provided with counterweights.

(d) Every hand elevator hereafter installed shall have a metal sling or sound seasoned wood and designed with a factor of safety of not less than 4 for metal and 6 for wood based on the contract load uniformly distributed.

Note: See Order 460-(j) for capacity limit for a hand elevator.

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

(f) If there is a railroad track on an elevator car, the tops of the rails shall be flush with the car floor.

(g) The car frame members of every elevator car shall be securely welded, bolted and/or riveted and braced. Welding, where used, shall meet the requirements of the Industrial Commission.

SECTION II-A. PASSENGER ELEVATOR—CAR ENCLOSURE.

Order 428.—Passenger Elevator—Car Enclosure.

(a) Every existing passenger elevator car shall be enclosed on all sides, excepting the entrance opening. This enclosure shall be solid from floor to car ceiling in front of the counterweight runway, and openings in other sections shall not be greater than $1\frac{3}{4}$ inches square; or if greater than $1\frac{3}{4}$ inches, not wider than 1 inch. If wire mesh is used, the wire shall be not less than No. 10 U. S. Standard Gauge, with mesh not greater than $1\frac{3}{4}$ inches, measured along the wire from center to center of wires at points where they cross.

Note: On an existing elevator where the openings in the grille work are greater than specified in this order, a screen may be stretched around the outside of the car.

Exception: On an existing installation where a regular operator is stationed on the car, existing grille work will be accepted unless an especially hazardous condition exists.

(b) The car enclosure of every passenger elevator hereafter installed shall be constructed of solid incombustible panels on an incombustible frame to the full height of the car, except that louvers may be used, and provided with open grille or bars which shall reject a ball $\frac{1}{2}$ inch in diameter and placed within 6 inches of the floor or above the 6-foot level. If louvers are placed in front of the counterweight runway, a guard shall be provided to protect the full opening.

Note: For passenger elevator car entrances see Order 460-1-(c).

Wood or wood veneer panels may be used if covered on the outside with sheet metal of not less than No. 27 U. S. Gauge.

The floor covering shall be constructed and maintained so that persons will not readily slip thereon.

(c) The roof of every passenger car shall be constructed of solid material.

Top emergency exits shall be provided and shall be not less than 16 inches wide and not less than 320 square inches in unobstructed area. Top exit panels shall be mounted so that they can be readily opened from both the inside and outside of the car.

(d) Side emergency exits shall be provided on elevators hereafter installed where two or more passenger elevators run in adjacent hoistways, without intervening partition, hinged or removable panels may be used and shall comply with the following requirements:

(1) Exit panel shall not open outward.

(2) The removable type of panel shall be equipped with an electric contact, and shall be held securely in place by not less than 4 fastenings arranged so that they can be operated by hand from both the inside and outside of the car and so designed that they cannot readily be removed from the panel. Removable type of panel shall not be installed on automatic operated elevators.

(3) The hinged type of panel shall be equipped with an electric contact, and shall be provided with a lock arranged so that it may be operated from the inside of the car by means of a removable key and from the outside of the car by means of a non-removable handle. The key shall be placed in the break-glass receptacle provided for the emergency key at the main entrance landing.

(4) Side exits shall have a clear width of not less than 16 inches and shall extend to the floor or kick plate to the soffit molding frame, but in no case shall be less than 5 feet in height, and shall be located so that they are not obstructed by car frame members, traveling cables or other hoistway equipment.

(e) No passenger elevator car enclosure shall deflect more than 1 inch when subjected to a force of 75 pounds when applied horizontally at any point, nor with such deflection shall the actual running clearance be less than $\frac{3}{4}$ inch as specified in Order 416 (a) (1).

Note: For car door or gate requirements see Order 430.

Order 429.—Passenger Elevator—Car Furnishings. New and Existing Installations.

(a) No glass shall be used in elevator cars except to cover certificates, lighting fixtures, and appliances necessary for the operation of the cars.

No piece of glass, unless laminated, or otherwise shatterproof, shall exceed 1 square foot in area.

Mirrors, other than hall view mirrors, will not be permitted.

(b) A metal handrail not less than 1 inch in diameter, or equivalent, and approximately $3\frac{1}{2}$ feet above the floor, shall be placed on each side, except the entrance side, or sides, of every passenger car.

(c) No seats, except one for the operator, and except for elevators installed to carry invalids, shall be placed in any elevator.

(d) No signs or advertisements shall be posted in any elevator car, other than those required for the operation of the elevator and/or the certificate of inspection required in Order 405.

Order 430.—Passenger Elevator—Car Door or Gate.

(a) A car door or gate shall be provided at each entrance to power passenger elevator cars hereafter installed. This 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.

This requirement for a car door or gate electric contact shall also apply to existing installations that are required to have a car gate prior to the time this order becomes effective, and to all existing installations where

new cabs are installed, except that cable control hydraulic elevators are not required to have car gates contacted.

Note: The above requirement includes all elevators installed after August 12, 1926 where the speed is in excess of 150 feet per minute and the state registration number is 7,000 or over.

Every existing automatic push button controlled elevator shall be provided with a car door or gate at each entrance, so arranged that the elevator cannot be operated unless the car door or gate is closed.

(b) Car gates used for passenger elevators shall be of such design that when fully expanded they will reject a ball 3 inches in diameter. Car gates of the scissors or pantograph type shall not be power-opened.

(c) Sliding car doors for passenger elevators may be solid; may be equipped with glass vision panels, but in no case shall the panels exceed 144 square inches in area, or may be provided with open grille or bars which will reject a ball 1½ inches in diameter.

Exception: Glass panels in excess of 144 square inches in area shall be laminated or otherwise shatterproof.

(d) A car door or gate shall be considered in the closed position when the clear open space between the edge of the door or gate and the nearest face of the jamb does not exceed 2 inches; except that where the car door or gate is provided with a door closer and the requirements specified in Order 432.2(d) are fully met, the electric contact on the car door or gate may permit the starting of the car when the clear open space does not exceed 4 inches.

(e) The functioning of a car door or gate electric contact on elevators hereafter installed to prevent the movement of the car shall not be dependent solely on the action of a spring or springs, nor solely upon gravity, nor shall it be dependent on the closing of an electric circuit.

Car door or gate electric contacts hereafter installed shall be positively opened by a lever or other device attached to and operated by the door or gate.

(f) For automatic-operation passenger elevators hereafter installed, having power-closed or automatically re-

leased, self-closing doors or gates and manually closed or self-closing hoistway doors, the closing of the car gate shall be prevented unless the hoistway door is in the closed position.

For automatic-operation passenger elevators hereafter installed, the car door or gate shall be so located that the distance from the face of the hoistway door to the face of the car door or gate shall be not more than the following: (1) for swinging hoistway door if a car gate is used, 4 inches; (2) for swinging hoistway door if a car door is used, 5½ inches; (3) for sliding hoistway door and car door or gate, 5½ inches.

Exception: The opening of the car door or gate electric contact shall not prevent the operation of the car when the emergency release is in temporary use or where the car is being moved by a car leveling device.

SECTION II-B. PASSENGER ELEVATOR—HOISTWAY LANDING DOORS.

Order 431.—Passenger Elevator—Hoistway Landing Doors.

(a) In every passenger elevator hereafter installed, the hoistway shall be equipped at each landing with a horizontally sliding door, or doors, which shall entirely fill the opening to the hoistway. Every such door shall be an approved fire-resistive door and shall be solid to a height of not less than 12 inches above the floor level. Upper sections of such doors may be solid metal, or of wired glass, provided the glass pane dimension complies with the requirement as outlined in definition 28. Every landing door shall be of sufficient strength to resist a lateral pressure of 100 pounds applied at the center. (See Order 410)

Exceptions: (1) In cases where the doors in outside walls of elevator hoistway enclosures are not required by the Building Code to be fire-resistive, the phrase in the preceding paragraph reading "every such door shall be an approved fire-resistive door" does not apply.

(2) Vertically sliding or doors of the bi-parting type may be used to protect landing openings not used for passenger exit of elevators.

If vertically sliding or counterbalanced doors are used the car gate and the hoistway doors shall be so interlocked that the car gate or door cannot open more than 24 inches until the hoistway door is locked in its fully opened position and so that the landing door cannot start to close until the car gate or door is closed to within 24 inches of full closure, except doors used exclusively for freight.

(b) Doors shall not swing on vertical axis except on automatic push button elevators and except where approved in writing by the Industrial Commission because restricted spaces will not permit the use of sliding doors. (See Orders 432-2 and 471).

(c) Existing wood doors in an existing hoistway will be accepted, but if such doors contain grille work or screen, the openings shall not be larger than described in Order 428(a).

(d) On existing installations, solid metal or metal screen on substantial door framing will be accepted. The screen shall be the equivalent in strength, rigidity and protection of wire screen described in Order 428(a).

Exceptions: (1) On existing doors where the openings in the grillework are larger than specified in Order 428(a), a screen may be stretched across the inner face of the door.

(2) On existing installations where a regular operator is stationed on the car, existing grillework will be accepted unless an especially hazardous condition exists.

(e) For an elevator hereafter installed operating in a blind hoistway, the first hoistway door above the blind portion of the hoistway shall be so arranged that it can be opened from the landing side by the emergency key specified in Order 432-2(f), irrespective of the position of the elevator car.

(f) If an elevator is hereafter installed in a single hoistway, the emergency key shall open all hoistway doors, and if the elevator is installed in a single blind hoistway, then provision shall be made for emergency hoistway doors at every third floor, but not more than 36 feet apart, to permit access to the elevator in the blind portion of the hoistway.

(g) Emergency hoistway doors hereafter installed shall be at least 30 inches wide, 6 feet 6 inches high (clear opening), and shall be easily accessible and free from fixed obstructions. Such doors shall be self-closing, self-locking and provided with door electric contacts. They shall not be openable from the hoistway side, unless provided with interlocks. The emergency key required in Order 432-2(f) shall open all such emergency hoistway doors.

(h) Vision panels shall be provided in all hoistway landing doors of every automatic and continuous pressure operation elevators hereafter installed, except at landings where a hall position indicator is provided or where car and landing doors are power operated. All swing-type hoistway doors shall be provided with vision panels. Where required or used, vision panels shall comply with the following requirements:

(1) The area of any single panel shall be not 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.

(2) Each clear panel opening shall reject a ball 6 inches in diameter.

(3) Where mullions or division strips are used between panels, they shall be of fire-resistant material and of substantial construction.

(4) Panels shall be of clear wired glass.

(5) The center of a panel shall be not less than 54 inches nor more than 66 inches, above the elevator landing.

(6) The panel preferably should be located so that an operator in the car can see through it from the normal operating position.

(7) 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.

Order 432.—Passenger Elevator—Hoistway Landing Door Interlocks.

1. Existing Installations.

(a) Interlocks, either mechanical or electro-mechanical as outlined in definition No. 34-1, shall be provided on the hoistway landing doors of every passenger elevator installation.

(b) No hoistway landing door interlock shall be constructed or installed so that its functioning is dependent upon the action of a spring (or springs) in tension, or upon the closure of an electric contact.

(c) Hoistway door contacts shall be designed so that they are positively opened by the locking bar or by a lever or other device attached to and operated by the door or gate.

(d) The functioning of a hoistway door contact to prevent the movement of the car shall not be dependent solely on the action of the spring or springs, nor solely upon gravity, nor shall it be dependent on the closing of an electric circuit.

(e) On every passenger elevator installation, provisions shall be made for opening of the lower terminal landing door from the landing side by means of a key or other approved device which cannot be easily duplicated.

(f) A service key shall be provided to open the hoistway door from the landing side at the landing where the car is normally parked out of service. This key shall open this door only when the car is within the landing zone and shall open no other hoistway door.

Exception: Automatic operation elevators, and elevators normally parked out of service at the lowest landing, provided the pit depth does not exceed the requirement in Order 417.

2. *New Installations.*

(a) Interlocks shall be provided on hoistway landing doors hereafter installed and shall comply with one of the following:

(1) The Door Unit System in which the interlock prevents the operation of the elevator machine by the operating device in a direction to move the car away from the landing unless the hoistway door at that landing at which the car is stopping, or is at rest, is locked in the closed position.

(2) The Hoistway Unit System in which the interlock prevents the operation of the elevator machine in a direction to move the car away from the landing unless all hoistway doors are locked in the closed position.

Exception: The interlock is not required to prevent the operation of the car with the hoistway door in the open position when the car is being moved by a car leveling device.

In both of the above interlock systems the interlock shall 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.

For Exception see Order 432-2-(f).

(b) The Door Unit Interlock System may be used only where there is a regular operator in the car and where the elevator can be operated only from inside the car.

(c) For automatic operation elevators or for power driven elevators where the hoistway door is not equipped with a door closer, the hoistway door shall be considered in the closed position only when the door is within $\frac{3}{8}$ inch of the nearest face of the door jamb, or in the case of bi-parting doors only when the doors are within $\frac{3}{8}$ inch of contact with each other.

(d) 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

4 inches of the nearest face of the jamb (or in the case of a bi-parting door when the sections are within 4 inches of contact with each other), if at this position and any other up to full closure, as defined in paragraph (c) above, the door cannot be opened from the landing side more than 4 inches from the jamb (or the sections more than 4 inches from each other in case of a bi-parting door) provided that the door closer is of a type which will eventually close the door to the fully closed position as defined in paragraph (c) above and lock it in this position.

(e) The interlock for all hoistway doors shall be so designed that the door is locked in the closed position as defined in (c) and (d) before the car can be operated.

Note: Attention is called to the fact that 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 this code.

(f) A service key shall be provided to open the hoistway door from the landing slide at the landing where the car is normally parked out of service, except for automatic operation elevators. This key shall open this door only when the car is within the landing zone and shall open no other hoistway door.

An emergency key shall be provided which will, irrespective of the position of the car, open from the landing side the hoistway door at the landing where the car is normally parked, the lowest landing, and such other hoistway doors and emergency doors as are specified in Order 431-(e), (f) and (g). It shall open no other hoistway door. Such emergency key in a break-glass receptacle clearly marked "Elevator Door Key for Fire Department and Emergency Use Only" shall be placed at the landing of each elevator or group of elevators that is nearest the main entrance to the structure.

Emergency keys shall be especially designed to prevent easy duplication.

Note: Hoistway landing door interlocks that are the equivalent of those listed by the Underwriters' Laboratories and on the basis of engineering tests outlined by the Safety Code for Elevators Approved by the American Standards Association will be approved by the Industrial Commission.

Note: See Order 471.

Order 433.—Passenger Elevator Landings. New Installations.

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

SECTION III. FREIGHT ELEVATOR CAR ENCLOSURE.

Order 434.—Freight Elevator—Car Enclosure.

(a) Every freight elevator car shall be solidly enclosed on all sides, except the entrance side. The height of every such enclosure shall be at least 6 feet, except as follows:

(1) On every freight elevator hereafter installed the enclosure shall be at least 7 feet in height in front of the counterweight runway, and shall extend from floor to cover on every car where a cover is required or provided.

(2) On every hand carriage type elevator traveling not more than two stories the enclosure shall be at least $3\frac{1}{2}$ feet in height, except in front of the counterweight runway, where it shall be 7 feet high.

(3) On the side of the operating cable, sufficient open space to operate the cable shall be allowed, but in no case shall the opening be more than 15 inches wide.

(4) On hand elevators, the enclosure may be arranged on the pull rope side so as to permit free operation of the pull rope.

(b) Every freight elevator shall be equipped with a solid or openwork top cover. Openwork top covers shall reject a ball $1\frac{1}{2}$ inches in diameter and if made of wire mesh, shall be made of wire not less than No. 10 steel wire gauge (0.135 inches diameter) or its equivalent.

The car top or cover shall be sufficiently strong to sustain a load of 300 pounds applied on any square area 2 feet on a side and 150 pounds applied at any point, except the hinged sections next to the car entrance.

Exceptions:

(1) On an existing power freight elevator traveling one story no cover is required if the hoistway above the lowest story is enclosed to a height of 6 feet and

the bottom rail of each gate at the top landing extends to the floor.

(2) On an existing power freight elevator car 10 feet or more in length, open at one end only (except at the lowest landing), and traveling not more than two stories, but not to exceed 30 feet, a cover is required over only that half of the car next to the open end.

(3) No cover is required on a sidewalk elevator where the travel is not over one story.

Note: See Order 480-2(d).

(4) No cover is required over an existing hand elevator car where the bottom rail of every landing gate above the lowest landing rests on the floor.

(5) Where a hand elevator is not provided with a cover, a floor or screen shall be provided under the overhead machinery as specified in Order 424-(a).

(c) On any hand elevator operating outside of a building, except sidewalk elevators, the cover shall be solid and form a part of the car enclosure or cab.

(d) Where any entrance opening in an elevator hoistway is not equipped with a hoistway door, provided with a hoistway door interlock or electric contact, or where the entrance side of the car is not equipped with an approved car gate, the cover of the car shall be equipped with a hinged section facing each entrance, unless such entrance occurs only at the lowest landing. This hinged section shall be at least 12 inches wide, shall extend the full width of the entrance to within 5 inches of the landing sill, and shall be constructed so it will rise easily if it meets an obstruction as the car descends.

(e) Side emergency exits shall be provided on elevators hereafter installed where two or more freight elevators run in adjacent hoistways, and where hoistway landing doors are required and installed. Hinged or removable panels may be used and shall comply with Order 428-(d).

Order 435.—Freight Elevator—Car Entrances. New and Existing Installations.

There shall be not more than two entrances to any freight elevator car except when approved in writing by the Industrial Commission.

Order 436.—Freight Elevator—Car Doors or Gates.

(a) Every power elevator hereafter installed, where the contract speed is not in excess of 50 feet per minute, the secondary entrance shall be protected by an approved car door or gate, not less than 6 feet in height, completely filling the width of the opening and equipped with electric contact.

Exception: This requirement shall not apply to an elevator having but one entrance at the lower landing and the secondary entrance at the upper limit of travel only, provided that the distance between the edge of the car and the hoistway enclosure on the side of the secondary entrance is not more than 1½ inches and there are no projections in the hoistway on the side of the secondary entrance.

(b) Every power elevator hereafter installed, where the contract speed is in excess of 50 feet per minute, shall have each car entrance protected by an approved car door or gate, not less than 6 feet in height, completely filling the width of opening and equipped with electric contact.

Note: See Definition 8.

(c) On an existing power freight elevator having more than one entrance and having a difference in the landing floor levels at such entrances in excess of 30 inches, a car gate shall be installed on the secondary entrance.

A car gate shall also be provided if the distance between the edge of the car and the hoistway enclosure on the side of the secondary entrance is more than 7 inches at any point, or the hoistway enclosure on that side shall be altered so that it will come within the specified limit.

(d) Every automatic push button controlled elevator shall be provided with car doors or gates at each entrance, so arranged that the elevator cannot be operated unless all car doors or gates are closed; when horizontally sliding gates are used, when closed, shall reject a ball 3 inches in diameter.

(1) Every existing constant pressure controlled elevator having a secondary entrance shall be provided with a secondary car door or gate, so arranged that the

elevator cannot be operated unless the car door or gate is closed.

Exception (1) See Order 436(a) Exception.

Exception (2) The opening of the car door or gate electric contact shall not prevent the operation of the car when the car is being moved by a car leveling device.

(e) The functioning of a car door or gate electric contact on elevators hereafter installed to prevent the movement of the car, shall not be dependent solely on the action of a spring, or springs, nor solely upon gravity, nor shall it be dependent on the closing of an electric circuit.

(f) Every car gate shall run in guides, the legs shall extend to the floor, the gate shall be at least 6 feet high and, in the case of a vertically sliding gate, shall contain no openings greater than 3 inches measured in a horizontal direction and the bottom rail shall not be more than 1 inch off the floor when the gate is closed.

(g) Every manually operated vertically sliding car gate hereafter installed shall be counterbalanced from two sides.

(h) An electric contacted car gate shall be provided to protect each car entrance of every power elevator hereafter installed, operating in a hoistway outside of a building and which is enclosed only at the ground floor. (See Order 412-(c).)

SECTION III-A. FREIGHT ELEVATOR HOISTWAY LANDING DOORS OR GATES.

Order 437.—Freight Elevator Hoistway Landing Doors or Gates.

(a) All openings in the hoistway enclosure of every freight elevator shall be protected at landings in one of the following ways:

Hoistway Landing Doors.

(1) For elevators installed prior to August 12, 1926, doors may be used only where previously installed and

where the doors are equipped with self-acting locks which cannot be opened from the outside and that a regular operator is stationed on the car. (See definition No. 34-1).

(2) For elevators installed since August 12, 1926, all doors shall be equipped with either mechanical interlocks, electro-mechanical interlocks or electric contacts with approved door locks. (See definition No. 34-1.)

(3) Balanced Doors. In elevators hereafter installed, vertical bi-parting counterbalanced or counterweighted doors shall be equipped with electric contacts and approved door locks, or interlocks. (See definition No. 34-2.) (See Order 410)

(4) If electric contacts are provided on a hoistway door and are not part of an interlock system, the lock or latch and contact shall be so arranged as to insure the door being in a position to be locked or latched when or before the contact is closed.

(5) On freight elevators hereafter installed, where reference is made to definition No. 34-2 (covering Door Unit System and Hoistway Unit System), all requirements of Order 431-(e), (f) and (g) and of Order 432-2 must be complied with.

(b) On electric elevators hereafter installed, where fire doors are used as gates at hoistway landings, the doors shall be equipped with electric contacts and approved door locks or interlocks.

On other types of elevators, the doors shall be equipped with mechanical interlocks.

(c) Hoistway landing door contacts hereafter installed shall be designed so that they positively open by the locking bar or by a lever or other device attached to and operated by the door.

(d) The functioning of a hoistway door electric contact hereafter installed to prevent the movement of the car by the operating device shall not be dependent solely on the action of a spring or springs, nor solely upon gravity, nor shall it be dependent on the closing of an electric circuit.

(e) Hoistway landing doors on existing continuous pressure operation controlled freight elevators shall be equipped with door electric contacts and approved door locks or interlocks.

(f) On every freight elevator hereafter installed, provision shall be made for the opening of the lower terminal landing door from the landing side by means of a key or other approved device which cannot be easily duplicated.

(g) A service key shall be provided to open the hoistway door from the landing side at the landing where the car is normally parked out of service. This key shall open this door only when the car is within the landing zone and shall open no other hoistway door.

Exception: Automatic operation or continuous-pressure-operation elevators, and elevators normally parked out of service at the lowest landing, provided the pit depth does not exceed the requirement in Order 417.

(h) Vision panels shall be provided on all hoistway landing doors hereafter installed except where car position indicators are installed at each floor. Where required or used, vision panels shall conform to the following requirements:

(1) The area of any single panel shall be not 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.

(2) Where one single panel 8 inches by 10 inches is used, mullions or division strips must be provided between panels, and they shall be of fire-resistive material and of substantial construction.

(3) Panels shall be of clear wired glass.

(4) The center of a panel shall be not less than 54 inches nor more than 66 inches above the elevator landing.

(5) The panel shall be so located that an operator in the car can see through it from the normal operating position

(6) Where vision panels are provided in power-operated doors, the wired glass panel shall be substantially flush with the surface of the landing side.

(i) On every existing hand elevator traveling not more than 30 feet, or serving not more than two floors and basement, or three floors without basement where hoistway landing doors are used, the doors shall be equipped with self-locking devices designed to prevent opening the doors from the outside except by means of a key, which key shall be placed in the care of a responsible person, or so arranged that the doors can be opened only when the car is at, or within 3 inches of the floor level.

Note: Where possible, vertically rising gates should be installed in preference to doors.

Hoistway Landing Gates.

(j) Where required and used, vertically sliding hoistway landing gates shall comply with the following requirements:

Car Speed Ft. per Min.	Height of Gate		Operation of Gate	
	Existing	Hoistway New**	Existing	Hoistway New**
(1) Less than 50	3½ ft. or 5½ ft.	3½ ft. or 5½ ft.	Semi-automatic at each landing or semi-automatic at each intermediate landings and full automatic at terminal landings or balanced gate with electric* contact and lock.	Balanced gate with electric contact and lock
	3½ ft. or 5½ ft.	5½ ft.	Same as above	Same as above
(2) 50 to 75	5½ ft.	5½ ft.	Semi-automatic at each landing or Balanced gate with electric contact and lock.*	Same as above

* Note: Balanced gates with electric contacts are not permitted on elevators with mechanical brake. (See Order 460-1(e).)

** Note: See Order 410.

(k) For elevators installed prior to August 12, 1926 balanced gates may be used only where previously installed and where gates are equipped with self-acting locks which cannot be opened from the outside and that a regular operator is stationed on the car. (See definition No. 34-1).

(l) Hoistway landing gate contacts hereafter installed shall be designed so that they are positively opened by the locking bar or by a lever or other device attached to and operated by the gate.

(m) The functioning of a hoistway gate electric contact hereafter installed to prevent the movement of the car by the operating device shall not be dependent solely on the action of a spring or springs, nor solely upon gravity, nor shall it be dependent on the closing of an electric circuit.

(n) If electric contacts are provided on a hoistway gate and are not part of an interlock system, the lock or latch and contact shall be so arranged as to insure the gate being in a position to be locked or latched when or before the contact is closed.

(o) Hoistway landing gates on existing continuous pressure operation freight elevators shall be equipped with gate electric contacts and gate locks or interlocks.

(p) On existing installations, except in the case of continuous pressure operation elevators, gates over 8 feet wide may be full automatic, provided the car speed is not over 50 feet per minute and an operator is stationed on the car, or where means is provided for stopping the elevator without reaching over, through, or under the gates.

(q) Every full automatic gate shall be so arranged that it will be fully closed when the car has traveled a distance of not more than 8 feet from the landing.

(r) The bottom rail of each landing gate at an opening in an outside wall shall not be more than 1 inch above the sill. On new installations, the outside landing gate shall not be less than 5½ feet high.

(s) The bottom bar of each landing gate except at basement landings shall extend to within 12 inches of the

sill when closed. On existing installations, when conditions require more space to secure sufficient headroom for safety, a clearance of not more than 20 inches between the lower bar of a closed gate and the floor will be permitted.

(t) A bar gate not less than 12 inches in total depth may be used on elevators hereafter installed at basement landings where conditions will not permit a standard gate, except that the distance from the floor to the bottom of such a bar gate when closed shall not be more than 30 inches. Existing installations equipped with bar gates at the basement landings will be accepted if the gates are self-closing, or balanced gate with an electric contact and approved lock.

(u) No collapsible gate shall hereafter be installed at any hoistway landing.

(v) Hoistway landing gates for hand operated elevators shall be semi-automatic at each landing or semi-automatic at each intermediate landing and full automatic at terminal landings.

Order 438.—Freight Elevator Hoistway Landing Doors or Gates; Construction.

(a) The net width of an opening between the slats or bars of a landing gate shall be not more than 3 inches, except that on existing installations the side toward the operating cable, where such cable is provided, there may be an opening large enough to permit the operation of the cable, but not more than 5 inches in width. On elevators in plants where overhead rails are used on cars, center slots or openings in the landing gates will be permitted to allow passage of the trolley.

(b) In elevators hereafter installed, the main horizontal cross members of every landing gate, to which members the vertical slats or bars are fastened, shall extend into the guides or against uprights at the gate posts, so that pressure exerted on the gate from the landing side will not cause the gate to move into the hoistway in case the slat or bar fastenings become loose or disarranged.

(c) Hoistway doors or gates shall withstand a force of 100 pounds applied perpendicularly to the door or gate at

any point without permanent deformation and without being sprung from their guides.

Note: A gate constructed of wire screen of not less than No. 10 U. S. Standard Gauge, with mesh not greater than 3 inches, measured along the wire from center to center of wires at points where they cross, will be considered the equivalent of a wood gate.

(d) Every gate shall move in guides and shall be so constructed that the gate upright or shoe on the gate will have a lap of at least $\frac{3}{4}$ inch on the guide strip or in the guide post furrow.

(e) Every door or gate guide post or track shall be securely fastened to the supporting wall or structure in such a manner that the door or gate will withstand the lateral pressure specified in paragraph (c) of this order.

Note: The use of wood plugs and/or metal expansion bolts in brick, tile or plaster walls for fastening guide posts or track is not permitted. Through bolts with adequate bearing plates shall be used where possible.

(f) Every gate shall be properly balanced, and hung with substantial sash cord or flexible cable or chain over pulleys not less than 3 inches in diameter.

(g) Gate or door counterweights shall be boxed in, or shall run in metal guides from which they cannot be dislodged. The bottoms of the boxes, or guides, shall be of such construction that the counterweights will be retained if the ropes break.

Order 439.—Freight Elevator Landings. New Installations.

(a) 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 6 feet from the threshold.

Order 440.—Power Freight Elevator Hoistway Landing Doors and Gates; Locking Devices.

Every landing door and gate, except full automatic doors and gates, for power freight elevators, shall be equipped with an approved door or gate lock so arranged that the door or gate cannot be opened unless the car is at the landing. This lock shall be so constructed and located that it cannot be easily reached from the floor when the door or gate is closed.

For exception, see definitions Nos. 34-1-(a)-(2) and 34-2-(c).