

## Chapter Ind 4

### ELEVATOR CODE

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Ind 4.001 Definitions. (1) ANNUNCIATOR, ELEVATOR CAR. An electrical device in the car which indicates visually the landing at which an elevator landing signal registering device has been actuated.

(2) APPROVED. Means approved by the Industrial Commission.

(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.

(4) BUFFER. A buffer is a device designed to absorb the impact of the car or counterweight at the extreme lower limits of travel.

(5) CAPACITY. See Contract Load, or Rated Load.

(6) CAR, ELEVATOR. An elevator car is the load carrying unit including its platform, car frame, and enclosure.

(7) 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.

(8) CAR GATE, COLLAPSING. A collapsing gate is one that is distorted in opening and closing.

(9) CAR DOOR OR GATE ELECTRIC CONTACT. An electrical device, the function of which is to prevent operation of the driving machine by the normal operating device unless the car door or gate is in the closed position.

(10) 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.

(11) CAR FRAME (SLING). The supporting frame to which the car platform, upper and lower sets of guide shoes, car safety and the hoisting ropes or hoisting-rope sheaves, or the plunger of a direct plunger elevator are attached.

(a) *Car frame, overslung.* A car frame to which the hoisting-rope fastenings or hoisting-rope sheaves are attached to the crosshead or top member of the car frame.

(b) *Car frame, underslung.* A car frame to which the hoisting-rope fastenings or hoisting-rope sheaves are attached at or below the car frame.

(c) *Car frame, sub-post.* A car frame all of whose members are located below the car platform.

(12) **CAR PLATFORM.** The car platform is the structure, including the floor of the car, which directly supports the load.

(13) **CLEARANCE, BOTTOM CAR.** The clear vertical distance from the pit floor to the lowest structural or mechanical part, equipment or device installed beneath the car platform, except guide shoes or rollers, safety jaw assemblies and platform aprons or guards, when the car rests on its fully compressed buffers. (See *Overtravel, Bottom*)

(14) **CLEARANCE, TOP CAR.** The shortest vertical distance between the top of the car crosshead, or between the top of the car where no crosshead is provided, and the nearest part of the overhead structure or any other obstruction when the car floor is level with the top terminal landing. (See *Overtravel, Top*)

(a) *Clearance, top counterweight.* 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 bottom terminal landing.

(15) **COMPENSATING-ROPE SHEAVE SWITCH.** A device which automatically causes the electric power to be removed from the elevator driving-machine motor and brake when the compensating sheave approaches its upper or lower limit of travel.

(16) **CONTRACT LOAD, OR RATED LOAD, (CAPACITY).** Contract load, or rated load, is the approved safe live load specified in application and plans submitted for permit.

(17) **RATED SPEED.** The speed at which the elevator, dumbwaiter, escalator is designed to operate under the following conditions:

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

(b) *Escalators.* The rate of travel of the steps or carriage, measured along the angle of inclination, with rated load on the steps or carriage. In case of a reversible escalator the rated speed shall be the rate of travel of the steps in the up direction, measured along the angle of inclination, with rated load on the steps.

(18) **CONTROL.** The system governing the starting, stopping, direction of motion, acceleration, speed, and retardation of the moving member.

(a) *Generator-field control.* A system of control which is accomplished by the use of an individual generator for each elevator or dumbwaiter wherein the voltage applied to the driving-machine motor is adjusted by varying the strength and direction of the generator field.

(b) *Multi-voltage control.* A system of control which is accomplished by impressing successively on the armature of the driving-machine motor a number of substantially fixed voltages such as may be obtained from multi-commutator generators common to a group of elevators.

(c) *Rheostatic control.* A system of control which is accomplished by varying resistance and/or reactance in the armature and/or field circuit of the driving-machine motor.

(d) *Two-speed alternating current control.* A control for a 2-speed driving-machine induction motor which is arranged to run at 2 different synchronous speeds by connecting the motor windings so as to obtain a different number of poles.

(19) **CABLE LOCK.** A cable lock is a device installed and maintained so that the operating cable can be locked at any landing.

(20) **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.

(21) **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 Door or Gate, Section Ind 4.001 (Definition 36).

(22) **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.

(23) **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.

(24) **ELEVATOR.** A hoisting and lowering mechanism equipped with a car or platform which moves in guides in a substantially vertical direction, and the travel exceeds 56 inches.

(a) *Passenger elevator.* An elevator used primarily to carry persons other than the operator and persons necessary for loading and unloading.

(b) *Freight elevator.* An elevator primarily used for carrying freight and on which only the operator and the persons necessary for unloading and loading the freight are permitted to ride.

(c) *Hand elevator.* An elevator utilizing manual energy to move the car.

(d) *Power elevator.* An elevator utilizing energy other than gravitational or manual to move the car.

(e) *Electric elevator.* A power elevator where the energy is applied by means of an electric motor.

(f) *Electro-hydraulic elevator.* A direct-plunger elevator where liquid is pumped under pressure directly into the cylinder by a pump driven by an electric motor.

(g) *Carriage elevator.* 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) *Sidewalk elevator.* A freight elevator which operates between a sidewalk or other area exterior to the building and floor levels inside

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(44) 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.

(45) 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 traveling in the "Up" direction and all "Down" landing calls are answered when the car is traveling in the "Down" direction, except in the case of the uppermost or lowermost calls, which are answered as soon as they are reached, irrespective of the direction of travel of the car.

(46) 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.

(47) 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.

(48) 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.

(49) 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.

(50) 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.

(51) **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.

(52) **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.

(53) **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.

(54) **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.

(55) **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.

(56) **FACIA PLATE.** A metal plate not less than 1/16" in thickness, securely fastened, and extending flush from the top of the hoistway landing door frame to the landing sill above and run the full width of the door opening.

**History:** Cr. Register, April, 1957, No. 16, eff. 5-1-57; am. (5), (16) and cr. (56), Register, December, 1957, No. 24, eff. 1-1-58.

### Scope of the Elevator Code

**Ind 4.01 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.

**History:** Cr. Register, April, 1957, No. 16, eff. 5-1-57.

**Ind 4.02 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

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1. Insurance companies employing inspectors holding valid certificates of competency, inspect all risks annually, and regularly file proper inspection reports shall not be required to file a list of such risks on January 1 of each year.

2. Insurance companies insuring risks in cities of the first class shall not be required to make the above report provided the risks are located within the corporate limits of such cities and provided that such cities have equivalent reporting requirements.

3. Elevators, escalators, or power dumbwaiters covered by insurance companies as in section Ind 4.05 (f) not employing inspectors holding valid certificates of competency shall be subject to inspection by the industrial commission. Fees for performing such inspection services shall be paid in accordance with the provisions of the applicable fee schedule.

**History:** Cr. Register, April, 1957, No. 16, eff. 5-1-57; cr. (2) (c) (1) and (2) (e) (1), Register, October, 1957, No. 22, eff. 11-1-57; am. (2) (e). Register, December, 1957, No. 24, eff. 1-1-58.

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(4) 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 section Ind 4.15 (1).

(5) 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.

**History:** Cr. Register, April, 1957, No. 16, eff. 5-1-57.

**Ind 4.16 Car clearances.** (1) 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) (a) 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: for swinging doors  $\frac{1}{2}$  inch and 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.

1. 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.

2. If the hoistway door consists of 2 or more sections, the distance specified in section Ind 4.16 (1) and (1) (a), 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) For freight elevators, 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 where pass type vertical bi-parting counter-balanced hoistway doors are used, this clearance shall be not more than 8 inches. For existing installations, this clearance at the secondary entrance may be increased, if approved in writing by the industrial commission.

(f) For passenger elevators hereafter installed, the clearance between the hoistway wall or fascia plate and the car entrance sill shall not exceed 4 inches.

**History:** Cr. Register, April, 1957, No. 16, eff. 5-1-57; am. (1) (e), and cr. (1) (f), Register, December, 1957, No. 24, eff. 1-1-58.

**Ind 4.17 Depth of pit and overhead clearance including access to pits and stop switch in pits.** (1) **DEPTH AND CLEARANCE.** 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 Table 2. See section Ind 4.19 (1).

Table 2. 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 inches	48 inches	54 inches
200	48 inches	54 inches	60 inches

(2) **ACCESS TO PITS.** Access to pits of elevators hereafter installed shall comply with the following:

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

(b) Access to pits extending more than 4 feet below the sill, shall be provided by means of fixed vertical ladders of incombustible material, located within reach of the access door. The ladder shall extend not less than 30 inches above the sill of the access door, or hand-grips shall be provided to the same height.

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

(d) Where a separate pit access door is provided, it shall be self-closing and provided with a spring-type lock arranged to permit the door to be opened from inside the pit without a key. Such doors shall be kept locked.

(3) **STOP SWITCH IN PITS.** There shall be installed in the pit of every power elevator hereafter installed an enclosed stop switch of the approved type and shall be in addition to the directional and final limit switches. This switch shall be so located as to be accessible from the pit access door. Where access to the pits of elevators in a multiple hoistway is by means of a single access door, the stop switch for each elevator shall be located adjacent to the nearest point of access to its pit from the access door.

(4) **PIT DEPTHS INCREASED.** 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 over the requirement of Table 2.

(a) 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.

(5) 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 Table 3. See section Ind 4.19 (1), (a).

(a) 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.

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at the edge of the higher level where such change in level occurs, and a stairway with handrails shall be provided for access between levels.

**History:** Cr. Register, April, 1957, No. 16, eff. 5-1-57.

**Ind 4.25 Guards for counterweight runways.** Guards between adjacent pits, new and existing installations. (1) 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.

(2) 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

- (a) Hand elevators;
- (b) Existing power elevators where there is not room for such guards;
- (c) 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.

(3) 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.

(4) (a) Where there is a difference in level between the floors of adjacent pits for elevators hereafter installed a rigid guard of unperforated metal, or a perforated metal guard having openings which will reject a ball 2 inches in diameter shall be installed for separating such pits. Guards shall extend not less than 6 feet above the level of the higher pit floor.

(b) Where the difference in level is 2 feet or less, a metal railing not less than 42 inches high measured from the level of the higher pit floor may be installed in lieu of the guard.

**History:** Cr. Register, April, 1957, No. 16, eff. 5-1-57.

**Ind 4.26 Spreader brackets and counterweight stops.** (1) The counterweight guide rails of every power drum type elevator 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.

(2) In every power drum type elevator, there shall be an I-beam or other obstruction, and it 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.

(3) 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.

**History:** Cr. Register, April, 1957, No. 16, eff. 5-1-57.

**Ind 4.27 Construction of cars; new installations.** (1) Every power freight elevator platform hereafter installed shall have a metal outside frame and shall be designed and constructed for one of the following classes of loading:

(a) *Class A. General freight loading.* Where the load is distributed, the weight of any single piece of freight or of any single hand truck and its load is not more than  $\frac{1}{4}$  the rated load of the elevator, and the load is handled on and off the car platform manually or by means of hand trucks. For this class of loading, the rated load shall be based on not less than 50 pounds per square foot of inside net platform area.

(b) *Class B. Motor-vehicle loading.* Where the elevator is used solely to carry automobile trucks or passenger automobiles up to the rated capacity of the elevator. For this class of loading, the rated load shall be based on not less than 30 pounds per square foot of inside net platform area.

(c) *Class C. Industrial truck loading.* Where the load is carried in transit by, or is handled on and off the car platform by means of industrial power trucks or by hand trucks having a loaded weight more than  $\frac{1}{4}$  the rated load of the elevator. For this class of loading the following requirements shall apply:

1. The rated load shall be based on not less than 50 pounds per square foot of inside net platform area.
2. The weight of the loaded industrial truck shall not exceed the rated load of the elevator.
3. The weight of the industrial truck plus any other material carried on the elevator shall not exceed the rated load when the industrial truck is also carried.

(e) *Signs, general.* Signs, in addition to the capacity and data plates required in section Ind 4.53 (2), shall be provided inside the car located in a conspicuous position and permanently and securely fastened to the car enclosure. In every elevator the sign shall specify the type of loading for which the elevator is designed and installed, with one of the following markings:

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

(f) *Signs, material and marking.* The material and marking of all signs shall conform to the requirement of section Ind 4.53 (2).

(2) 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.

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

(4) 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.

**History:** Cr. Register, April, 1957, No. 16, eff. 5-1-57; r. (1) (d), Register, December, 1957, No. 24, eff. 1-1-58.

**Ind 4.28 Passenger elevator. Car enclosure.** (1) (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.

(2) 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 section Ind 4.60 (1) (c).

(3) 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.

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

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

(6) An emergency exit with a cover shall be provided in the top of all elevator cars and shall conform to the following requirements:

(a) The exit opening on every elevator hereafter installed shall have an area of not less than 400 square inches, and shall measure not less than 16 inches on any one side.

1. The exit opening of every existing elevator installation shall have an area of not less than 320 square inches, and shall measure not less than 16 inches on any one side.

(b) The exit shall be so located as to provide a clear passageway unobstructed by fixed elevator equipment located in or on top of the car.

(c) The exit cover of every elevator hereafter installed shall open outward and shall be hinged or may be arranged to slide horizontally in guides, fastened to the car top, so that the cover can be opened from both inside and from on top of the car without the use of tools.

(7) Tops of car enclosures shall be so designed and installed as to be capable of sustaining a load of 300 pounds on any square area 2 feet on a side and 100 pounds applied at any point. Simultaneous application of these loads is not required.

(8) 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 section Ind 4.16 (1) (a).

*Note:* For car door or gate requirements, see section Ind 4.30.

**History:** Cr. Register, April, 1957, No. 16, eff. 5-1-57; am. (6) (a), cr. (6) (a) 1., am. (6) (c), Register, December, 1957, No. 24, eff. 1-1-58.



**Ind 4.29 Passenger elevator. Car furnishings; new and existing installations.** (1) No glass shall be used in elevator cars except to cover certificates, lighting fixtures, and appliances necessary for the operation of the cars.

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

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

(2) A metal handrail not less than 1 inch in diameter, or equivalent, and approximately 3½ feet above the floor, shall be placed on each side, except the entrance side, or sides, of every passenger car.

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

(4) 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 section Ind 4.05.

**History:** Cr. Register, April, 1957, No. 16, eff. 5-1-57.

**Ind 4.30 Passenger elevator. Car door or gate.** (1) 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.

(a) 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.

(2) 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.

(3) 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, except that in the event a power gate operator is used to operate the hoistway door retiring cam, a maximum of 10 inches of clear gate opening will be permitted.

(4) Sliding car doors for passenger elevators may be solid; may be equipped with glass vision panels, but in no case shall the panels exceed 80 square inches in area, or may be provided with open grille or bars which will reject a ball 1½ inches in diameter. Glass panels in excess of 80 square inches in area shall be laminated or otherwise shatterproof.

(5) 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

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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 section Ind 4.32 (6) 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.

(6) 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.

(a) 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.

(7) For automatic-operation passenger elevators having power-closed or automatically released, 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.

(8) For automatic-operation passenger elevators 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:

(a) for swinging hoistway door if a car gate is used, 4 inches;  
(b) for swinging hoistway door if a car door is used, 5½ inches;  
(c) 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.

**History:** Cr. Register, April, 1957, No. 16, eff. 5-1-57.

**Ind 4.31 Passenger elevator. Hoistway landing doors.** (1) In every passenger elevator 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 section Ind 4.001 definition (30) (a). Every landing door shall be of sufficient strength to resist a lateral pressure of 250 pounds applied at the center. (See section Ind 4.10.) Exception: In cases where the doors in outside walls of elevator hoistway enclosures are not required by the Wisconsin Building Code to be fire-resistive, the phrase in section Ind 4.31 (1) reading "every such door shall be an approved fire-resistive door" does not apply.

(2) Vertically sliding or doors of the bi-parting type shall not be used to protect landing openings, except doors used exclusively for freight.

(3) Doors shall not swing on vertical axis except on automatic push button elevators and except where approved in writing by the industrial commission.

(4) Existing wood doors in an existing hoistway will be accepted, but if such doors contain grille work or screen, the openings shall be closed.

(5) 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 section Ind 4.28 (1).

(6) Every existing passenger elevator shall be provided with an emergency key which cannot easily be duplicated, which will, irrespective of the position of the car, open the lowest terminal landing door from the landing side. This key shall open no other hoistway landing door. This emergency key shall be placed in a receptacle having a transparent breakable cover clearly marked, "Elevator Door Key for Fire Department and Emergency Use Only", and shall be located at the lowest landing. Emergency keys shall be especially designed to prevent easy duplication.

*Note A:* 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 B:* See section Ind 4.71.

(8) Emergency keys, not easily duplicated, shall be provided for elevators hereafter installed, to open certain hoistway landing doors from the landing side regardless of car position, in the manner and subject to the conditions described in this subsection.

(a) Emergency key openings shall be provided for landing doors of automatic push button controlled elevators as follows:

1. Single hoistway—at each floor.

2. Multiple hoistway—at the lowest terminal and the landing door immediately above it.

(b) Emergency key openings shall be provided at the lowest terminal landing for car switch controlled elevators equipped with hoistway landing doors.

(c) All emergency key openings shall be provided with a cover fastened securely to the landing door with Phillip screws.

(d) Emergency keys shall be kept in a receptacle having a transparent breakable cover. This receptacle shall be located at the lowest landing and shall be clearly marked "Elevator Door Key for Fire Department and Emergency Use Only."

(9) 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 or interlocks.

(10) Vision panels shall be provided in all hoistway landing doors of every automatic operated elevator 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:

(a) 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.

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

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

(d) Panels shall be of clear wired glass.

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

(f) The panel in swing type doors shall be located for convenient vision when opening the door from the car side.

(g) 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.

**History:** Cr. Register, April, 1957, No. 16, eff. 5-1-57; r. (7), am. (8), Register, December, 1957, No. 24, eff. 1-1-58.

**Ind 4.32 Passenger elevator, Hoistway landing door interlocks. (1) EXISTING INSTALLATIONS.** (a) Interlocks, either mechanical or electro-mechanical as outlined in section Ind 4.001 definition 37 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.

(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. See section Ind 4.71 for automatic operated elevators. 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.

(3) **INTERLOCK SYSTEM.** In section Ind 4.32 (2) (a) 1. and 2. 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.

(4) **DOOR UNIT SYSTEM.** 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.

(5) **AUTOMATIC OPERATION.** 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.

(6) **WHERE DOOR CLOSER IS USED.** 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 section Ind 4.32 (5), 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 section Ind 4.32 (5), and lock it in this position.

(7) **INTERLOCK DESIGN.** The interlock for all hoistway doors shall be so designed that the door is locked in the closed position as defined in section Ind 4.32 (5) and (6) before the car can be operated.

*Note 1:* 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.

*Note 2:* 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 3:* See section Ind 4.71.

**History:** Cr. Register, April, 1957, No. 16, eff. 5-1-57.

**Ind 4.33 Passenger elevator landings.** The landing threshold shall be constructed and maintained so that persons will not readily slip thereon.

**History:** Cr. Register, April, 1957, No. 16, eff. 5-1-57.

**Ind 4.34 Freight elevator. Car enclosure.** (1) 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:

(a) On every freight elevator 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.

(b) On every hand carriage type elevator traveling not more than two stories the enclosure shall be at least 3½ feet in height, except in front of the counterweight runway, where it shall be 7 feet high.

(c) 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.

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

(2) Every freight elevator shall be equipped with a solid or openwork top cover. Openwork top covers shall reject a ball 1½ 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.

(a) 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.

(3) Exceptions: (a) 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.

(b) 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.

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

*Note:* See section Ind 4.80.

(d) 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.

(e) Where a hand elevator is not provided with a cover, a floor or screen shall be provided under the overhead machinery as specified in section Ind 4.23 (2).

(4) 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.

(5) 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.

(6) On every elevator hereafter installed, the car top without a hinged section shall be provided with an exit cover which shall be hinged so that the cover can be opened from both inside and from on top the car without the use of tools. This exit opening shall have an area of not less than 400 square inches, and shall measure not less than 16 inches on any one side.

**History:** Cr. Register, April, 1957, No. 16, eff. 5-1-57; cr. (6), Register, December, 1957, No. 24, eff. 1-1-58.

**Ind 4.35 Freight elevator. Car entrances; new and existing installations.** There shall be not more than 2 entrances to any freight elevator car except when approved in writing by the industrial commission.

**History:** Cr. Register, April, 1957, No. 16, eff. 5-1-57.

**Ind 4.36 Freight elevator. Car doors or gates.** (1) 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.

(2) 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 section Ind 4.001 Definition 9.

(3) 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.

(4) 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.

(5) 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. See section Ind 4.36 (1) for Exception.

(6) Exception. 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.

(7) 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.

(8) 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.

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

(10) An electric contacted car gate shall be provided to protect each car entrance of every power elevator hereafter installed, oper-

ating in a hoistway outside of a building and which is enclosed only at the ground floor. (See section Ind 4.12 (4)).

**History:** Cr. Register, April, 1957, No. 16, eff. 5-1-57.

**Ind 4.37 Freight elevator hoistway landing doors or gates.** (1) All openings in the hoistway enclosure of every freight elevator shall be protected at landings in one of the following ways:

(a) 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 section Ind 4.001 (37) (a) 1.

(b) 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 section Ind 4.001 (37) (a) 1.

(2) Doors shall be provided on all freight elevators hereafter installed where the contract speed exceeds 100 feet per minute and shall comply with section Ind 4.32 (2). See section Ind 4.001 Definition (37) and section Ind 4.71 (2) (b) 3.

(3) Where doors are provided on freight elevators hereafter installed where the contract speed does not exceed 100 feet per minute doors shall be equipped with electric contacts and approved locks or interlocks. (See section Ind 4.10)

(4) Hoistway landing doors hereafter installed shall be of sufficient strength to resist a lateral pressure of 250 pounds applied at the center.

(5) 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.

(6) Every freight elevator with counterbalanced doors shall be provided with an emergency key which cannot easily be duplicated, which will, irrespective of the position of the car, open the lowest terminal landing door from the landing side. This key shall open no other hoistway landing door. This emergency key shall be placed in a receptacle having a transparent breakable cover, clearly marked, "Elevator Door Key for Fire Department and Emergency Use Only", and shall be located at the lowest landing.

(8) Emergency keys, not easily duplicated, shall be provided for elevators hereafter installed to open certain hoistway landing doors from the landing side regardless of car position, in the manner and subject to the conditions described in this subsection.

(a) Emergency key openings shall be provided for landing doors of automatic or continuous pressure push button controlled elevators installed with horizontal or swinging doors as follows:

1. Single hoistway—at each floor.
2. Multiple hoistway—at the lowest terminal and the landing door immediately above it.

(b) Emergency key openings shall be provided at the lowest terminal landing for landing doors of car switch controlled elevators equipped with horizontal sliding doors.



(c) All emergency key openings shall be provided with a cover fastened securely to the landing door with Phillip screws.

(d) Emergency keys shall be kept in a receptacle having a transparent breakable cover. This receptacle shall be located at the lowest landing and shall be clearly marked "Elevator Door Key for Fire Department and Emergency Use Only."

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

(a) 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.

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

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

(d) Panels shall be of clear wired glass.

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

(f) The panel in swing type doors shall be located for convenient vision when opening the door from the car side.

(g) 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.

(10) On every existing hand elevator traveling not more than 30 feet, or serving not more than 2 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.

(11) Where required and used, hoistway landing gates shall comply with the requirements as outlined in section Ind 4.37 Table 4.

(a) On freight elevators hereafter installed, hoistway landing gates shall not be used or installed where the contract speed exceeds 100 feet per minute. (See section Ind 4.10 (2) and Table 1 and Ind 4.37 (3)).

(12) 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 section Ind 4.001 Definition (37)).

(13) 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.

Table 4

Car Speed Ft. per Min.	Height of Gate		Operation of Gate	
	Hoistway		Hoistway	
	Existing	New**	Existing	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 inter- mediate landing and full auto- matic at terminal landings or balanced gate with electric* contact and lock.	Balanced gate with electric contact and lock
(2) 50 to 75.....	3½ ft. or 5½ ft.	5½ ft.	Same as above	Same as above
(3) Over 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 section Ind 4.60 (1) (e)).

\*\* Note: See section Ind 4.10.

(14) 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.

(15) 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.

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

(17) 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.

(18) 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.

(19) 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.

(20) 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.

(21) 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, and the speed shall not exceed 50 feet per minute. 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.

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

(23) 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.

**History:** Cr. Register, April, 1957, No. 16, eff. 5-1-57; am. (6), and (8), r. (7), Register, December, 1957, No. 24, eff. 1-1-58.

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locks are provided. Such chains shall extend at least 5 feet below the bottom of the platform, shall be spaced not more than 5 inches apart, and shall be made of not less than No. 10 U. S. Standard Gauge wire with long links.

**History:** Cr. Register, April, 1957, No. 16, eff. 5-1-57.

**Ind 4.70 Control mechanism.** (1) There shall not be installed or used any control system which depends upon the completion or maintenance of an electric circuit for the interruption of the power and for the application of electro-mechanical brakes at the terminals, for the operation of car safety devices, or for the closing of a contactor by an emergency switch or stop button, except that the requirements in this paragraph do not apply to dynamic braking and speed control devices.

(2) The car switch or hand lever on every power elevator which requires such mechanism shall be so arranged that the movement of the switch handle or lever toward the opening (which operator usually faces) will cause the car to descend and the movement of the switch handle or lever away from the opening will cause the car to ascend. Except on hydraulic elevators and existing electric lever control elevators, the switch handle or lever shall return to the neutral position when released, and shall automatically latch in this neutral position.

(3) An externally operated circuit-breaker or disconnecting fused switch opening all lines shall be installed separately in the supply circuit. This switch shall be of the enclosed type and shall be a horsepower rated motor circuit switch, and shall not be made to close from any other part of the building, and shall be located to be visible from the elevator machine in the machine room at the lock-jamb side of the entrance door.

(4) On existing elevators, dumbwaiters and escalators where a proper type of disconnecting device has not been installed in the machine room or visible from the machine, and in the opinion of the industrial commission is not reasonably safe, the device shall be relocated or a new device of the proper type and design shall be installed, and shall be located in the machine room at the lock-jamb side of the entrance door.

(5) All elevators hereafter installed where the travel exceeds 14 feet shall be provided with 2 switches externally operable and permanently mounted vertically on the car crosshead and shall comply with the following:

(a) An operating switch to render all landing buttons and car switch or car buttons inoperative.

(b) An "UP" and "DOWN" button which will enable the car to be operated in either direction, as long as the button is held in contact.

(c) The car speed shall not exceed 100 feet per minute.

(d) It shall operate the car only when all car doors and gates and all hoistway landing doors and gates are in the closed position.

(e) The operating switches shall be of the enclosed type, externally operable, and so arranged and connected that when operative, the movement of the car shall be solely under the control of this device, except as provided in section Ind 4.70 (5) (g), and any power-door operating devices shall be inoperative. The means for accomplishing this function shall be located between the car crosshead and that side of the car which is nearest to the hoistway door used for access.

(f) They shall be used only for the purpose of adjustment, inspection, maintenance and repair of the elevator or hoistway equipment.

(g) Separate additional means, of the continuous-pressure type, may also be provided to make power-door operating devices and automatic car-leveling devices operative from the top of the car for testing purposes. Exception: Elevators that travel 14 feet or less.

(6) Every elevator equipped with hand cable control shall be provided with adjustable stop balls, to center the control mechanism and stop the car at each terminal landing.

(7) Every hand cable controlled elevator, except hydraulic elevators, shall be equipped with a properly adjusted centering rope so arranged that it can be easily and safely used at any point in the car travel.

(8) In every hand cable controlled elevator, the sheaves which lead the hand cable from the hoistway to the machine shall be guarded to prevent injury to an operator and so that the cable cannot run off. Every idler sheave under which is led an operating cable shall be provided with a guard that will keep the cable on the sheave.

(9) The handrope for operating of an elevator shall be accessible from the car at any point in the car travel.

(10) When necessary to renew a section of the hand cable, each splice shall be made with standard shackles.

(11) The overhead tension weight for the hand cable of any elevator equipped with lever control apparatus shall be secured by a chain attached to the weight and to a suitable anchorage.

(12) The car of every power freight elevator with hand cable control shall be equipped with a cable lock so designed, installed and maintained that the hand cable can be locked at any landing to prevent the operation of the car by persons on other floors. Exception:

(a) Sidewalk Elevators.

(b) Elevators equipped with safety switches or electric contacted gates, provided requirement of section Ind 4.70 (6) is complied with.

*Note:* See section Ind 4.72 (5).

(13) The car of every electrically driven elevator equipped with an electric brake shall be provided with an emergency stop switch which will cut off the source of power. This switch shall be adjacent to the operating device.

(a) Exception: This requirement need not apply to existing elevators controlled by hand cable, installed prior to August 12, 1926.

(14) If the stop button of an automatic operated elevator is marked "STOP" it may be used as the emergency stop switch and shall be suitably identified and of a distinctive color.

(15) Contacts of emergency stop switches or buttons shall be directly opened mechanically and shall not be solely dependent upon springs for opening the contacts. A self-restoring type of switch or button may be used only on elevators having single-automatic operation and manually operated or self-closing hoistway doors. Exception: (a) This requirement need not apply to existing elevators controlled by hand cables.

**History:** Cr. Register, April, 1957, No. 16, eff. 5-1-57; am. (5) (a), (b), (c), (d), Register, December, 1957, No. 24, eff. 1-1-58.

**Ind 4.71 Automatic and continuous pressure operation elevators. New and existing installations.** (1) **EXISTING INSTALLATIONS.** Existing installations of automatic and continuous pressure operation elevators shall conform to the following requirements:

(a) The breaking of a circuit to stop an automatic or continuous pressure operated elevator at the terminal shall not depend on the operation of a spring or springs in tension nor upon the completion of an electric circuit.

(b) Where hoistway landing door locking system is renewed or replaced, the equipment used shall comply with the requirements of new elevator installations as outlined in sections Ind 4.32 and Ind 4.37.

(2) **NEW INSTALLATIONS.** (a) Neither the operation of a spring or springs in tension nor the completion of another electric circuit shall be depended upon to break the circuit to stop an automatic operation elevator at the terminals. If springs are used they shall be in compression. The interruption of the electric circuit shall prevent the movement of the car.

(b) Automatic operation elevators shall conform to the following requirements:

1. If the car has started for a given landing, no impulse can be given from any landing to send the car in the reverse direction until the car has reached the destination corresponding to the first impulse. It is permissible, however, to stop the car at any intermediate landing to take on or discharge passengers going in the original direction.

2. If the car has been stopped to take on or discharge passengers and is to continue in the direction determined by the first impulse, it is permissible to start the car by the closing of the car gate.

3. The car cannot be started under normal operation unless every hoistway door is closed and locked in the closed position (Hoistway Unit System). See section Ind 4.32 (2).

4. Exception to section Ind 4.71 (2) (b) 3. are outlined as follows:  
a. On landings where no landing operating device is provided, the interlocks on such landings may be of a type which can only be unlocked manually from the car side.

b. Freight elevators with a contract speed not to exceed 100 feet per minute. (See section Ind 4.37 (1) (3) and (10)).

(3) **ELECTRIC OIL-HYDRAULIC PASSENGER ELEVATORS.** In addition to hoistway landing door interlocks, a device shall be provided which shall compensate for the creeping of the car away from the landing by leakage in the valve or in the cylinder.

*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 under this code where interlocks are required.

**History:** Cr. Register, April, 1957, No. 16, eff. 5-1-57.

**Ind 4.72 Electrical protection.** (1) Every elevator driven by a polyphase alternating current motor shall be protected against damage due to phase reversal by either:

(a) Limit switches as specified in section Ind 4.63 arranged to cut all wires, or all except one, which shall be the ground conductor on grounded systems, and so connected that after the car overtravels it cannot be moved until the phase reversal is corrected, or

(b) A reverse phase relay, or other protective device, which will prevent starting the motor if the phase rotation is in the wrong direction. This requirement shall also apply to existing elevators installed since August 12, 1926.

*Note:* This does not apply to alternating current motors used in motor generator sets.

(2) The proper functioning of a reverse phase relay shall not be dependent upon the closure of an electric circuit to open the motor circuit in case of failure or reversal of phase.

(3) If an overload circuit breaker is used for a direct-current electric elevator, the wiring shall be arranged so that the circuit of the brake-magnet coil is opened at the same time that the line circuit is opened.

(4) Every electrically driven elevator except electro-hydraulic, hereafter installed shall be provided with an elevator potential switch which will cause and maintain interruption of power to the main circuit during excessive reduction or failure of supply voltage. This protection may be a part of the control equipment.

(5) Every electrically driven elevator with an emergency stop switch or electric contacted gates, which is controlled by a hand cable, lever or wheel, shall be equipped with a sequence device requiring the centering of the operating device after the power has been cut off the motor before the car can again be started. This may be accomplished by the addition of a relay interlocked with the control apparatus.

(6) Every elevator which is hereafter changed from hand cable control to car switch or automatic or continuous pressure operated shall comply with new installation requirements outlined as follows:

(a) Enclosed type circuit breaker or disconnect switch. See section Ind 4.70 (3).

(b) Electric brake. See section Ind 4.65 (1).

(c) Hoistway limit switches. See section Ind 4.63 (1) and (2).

(d) Electric contacted hoistway landing doors or gates. See section Ind 4.37.

(e) Electric contacted car door or gate. See section Ind. 4.36.

(f) Emergency switch on the car. See section Ind 4.70 (14).

(g) A cutout switch in connection with the car safety device. See section Ind 4.64 (7).

(h) All wiring to comply with section Ind 4.73.

(7) When any material change in electrical equipment is hereafter made on any power elevator or dumbwaiter, the wiring and equipment which is an integral part of that which is being replaced or renewed must comply with the requirements of new installations.

**History:** Cr. Register, April, 1957, No. 16, eff. 5-1-57.

**Ind 4.73 Switches and wiring.** (1) In every elevator hereafter installed in garages, the hoistway limit switches and other spark-

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