Chapter Ind 4

ELEVATOR CODE

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 elevators.* A sidewalk elevator is a freight elevator, the hoistway being located partially outside the building and having no opening into the building at the upper terminal landing.

(i) *Hydraulic elevator.* A power elevator where the energy is applied, by means of a liquid under pressure, in a cylinder equipped with a plunger or piston.

(j) *Direct-plunger elevator.* A hydraulic elevator having a plunger or piston directly attached to the car frame or platform.

(k) *Grade level elevators.* A grade level elevator is a freight elevator, the hoistway being located partially outside the building located in an area not used by people or vehicles as a place of travel and having no opening into the building at the upper terminal landing.

(25) ELEVATOR, EXISTING INSTALLATIONS. Existing installations include all those elevators or parts of elevators installed before the effective date of this code.

(26) ELEVATOR, DUMBWAITER, NEW INSTALLATIONS. By new installations or elevator or dumbwaiter hereafter installed, is meant:

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

(b) Every elevator or dumbwaiter 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 and every hand dumbwaiter changed to power, after the effective date of this code.

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

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

(27) ESCALATOR. A power-driven, inclined, continuous stairway used for raising and lowering passengers.

(28) EMERGENCY DOOR 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.

(29) 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.

(30) FIRE-RESISTIVE WALL CONSTRUCTION. (a) Refer to Wisconsin Building Code, section Ind 51.05.

(b) 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 section Ind 51.05 of the Wisconsin Building Code.

(c) The wired glass in any hoistway enclosure shall have no pane less than ¼ inch thick nor greater than 720 square inches and not more than 54 inches vertical and 48 inches horizontal dimension.

(31) FIRE DOORS. See Hoistway doors: See Wisconsin Building Code, section Ind 51.09 for 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.

(32) 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.

(33) HOISTWAY, ELEVATOR OR DUMBWAITER. A shaftway for the travel of one or more elevators or dumbwaiters. It includes the pit and terminates at the underside of the overhead machinery space floor or grating, or at the underside of the roof where the hoistway does not penetrate the roof.

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

(35) HOISTWAY ACCESS SWITCH. A switch, located at a landing, the function of which is to permit operation of the car with the hoistway door at this landing and the car door or gate open, in order to permit access to the top of the car or to the pit.

(36) HOISTWAY DOOR OR GATE.

(a) *Door.* A hoistway landing door is one which completely fills the door opening giving access to the elevator car at any landing and is of solid construction, with or without vision panels, regardless of design or method of operation.

(b) *Gate.* A hoistway landing gate is one which gives access to the elevator car at any landing and consists of slats, bars, spindles, wire screen or expanded metal regardless of the method of operation. See section Ind 4.37 and 4.38.

(c) *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.

(d) *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 2 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.

(e) *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.

(f) *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.

(g) *Hoistway manually operated door or gate.* A manually operated door or gate is a door or gate which is opened and closed by hand.

(h) *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.

(i) *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.

(j) *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.

(k) *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.

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

(m) *Hoistway door, fire-resistive.* See Wisconsin Building Code, section Ind 51.09.

(37) HOISTWAY DOOR OR GATE INTERLOCK, PASSENGER AND FREIGHT ELEVATORS. (a) *Existing Installations.*

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

a. 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

b. 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.

2. 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:

a. 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

b. 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.

(b) *New Installations.*

1. Hoistway door interlock. A hoistway door interlock is a device, the purposes of which are:

a. 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.

b. 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.

2. Door unit system. A 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.

3. Hoistway unit system. A 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 in section Ind 4.32 and 4.37.

(38) 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.

(39) 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.

(40) 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.

(41) OVERTRAVEL, BOTTOM.

(a) 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.

(b) 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.

(42) 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.

(43) 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.

(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; am. (24) (h), cr. (24) (k), Register, July, 1959, No. 43, eff. 8–1–59.

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

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.

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

Ind 4.03 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 56 inches.

(1) 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 section Ind 35.28 to 35.31 inclusive of the general orders on Safety in Construction issued by the industrial commission.

(2) For man lift requirements, see general orders on Safety.

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

Plans

Ind 4.04 Plans; new installations. (1) Before starting work on any new installation of an elevator, power dumbwaiter or escalator, 3 copies of the plans shall be submitted to the industrial commission for approval, with 2 copies of application for each unit, properly filled out, on blank forms furnished by the commission.

(a) The form referred to under 4.04 (1) is SB–22 "Application For Construction, Erection And Remodeling Elevators" and may be obtained from the Industrial Commission, 1 West Wilson Street, Madison.

(2) A plan examination fee in the amount established under section 101.10 (13) (g), Wis. Stats., shall be paid for each installation requiring approval.

(3) Section Ind 4.04 (1) 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.

(4) Plans shall include: (a) Sectional plan of car and hoistway; (b) Sectional elevation of hoistway, machine room (showing machinery) and pit; (c) Plan of machine and supports showing details of materials, size of beams. If the hoistway has more than one entrance on any floor, all entrances shall be clearly shown.

(5) The elevator manufacturer and the architect shall cooperate in preparing plans to avoid discrepancy in design.

History: Cr. Register, April, 1957, No. 16, eff. 5–1–57; cr. (1) (a), Register, October, 1957, No. 22, eff. 11–1–57.

Ind 4.05 Inspections. (1) INTERVAL. All elevators, power dumbwaiters, or escalators operated in the state of Wisconsin shall be subjected to a regular inspection at least once every 12 months.

(2) INSPECTION BY INSURANCE COMPANIES. The industrial commission may accept inspections of elevators, power dumbwaiters, and escalators reported by certified inspectors, subject to the following conditions:

(a) Each installation shall be inspected once every 12 months.

(b) A detailed report of each unit inspected 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.

1. Where an insurance company inspects an elevator, power dumbwaiter or escalator within the city limits of Milwaukee, a detailed report of each unit inspected shall be filed with the Inspector of Buildings, City Hall, Milwaukee, 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.

Note: Reports required to be submitted to the Inspector of Buildings, Milwaukee, need not be filed with the commission.

(c) 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 section Ind 4.52)

1. The form referred to under 4.05 (2) (c) is SB–15A "Certificate Of Inspection" and is furnished to insurance companies by the Industrial Commission, 1 West Wilson Street, Madison.

(d) 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 for each unit inspected will be charged. (See section Ind 4.07)

(e) The competency of each elevator inspector shall be certified by each insurance company to the commission in writing prior to making inspections. Insurance company inspectors will be approved by the commission only after the receipt of acceptable evidence of competency and a satisfactory examination has been passed consisting of oral and written tests.

1. The form referred to under 4.05 (2) (e) is SB–12 "Insurance Company Elevator Inspector" and is furnished by the Industrial Commission to insurance company inspectors after their competency has been examined and approved.

(f) Insurance companies that cover elevators, escalators, or power dumbwaiters which come within the scope of liabilities of workmen's compensation, public liability, or comprehensive coverage in any manner or degree shall report to the industrial commission on January 1 each year the identity, location, and ownership of each such risk.

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 (2) (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.

Ind 4.06 Inspection by cities. In any city which provides a competent inspector, the industrial commission will accept inspections by such city, provided the conditions of section Ind 4.05 (2) (a), (c), (d), and (e) are complied with, substituting "city" for "insurance company".

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

Ind 4.07 Inspection fees. (1) A charge in accordance with the fee schedule established (Sec. 101.10 (12), Wis. Stats.), will be made by the industrial commission for each inspection of each elevator, power dumbwaiter, or escalator.

(2) A representative of the elevator company shall be present during the final inspection of each installation.

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

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

Ind 4.08 Tests and inspection; new installations. (1) A contract load test shall be made by the party installing an elevator or dumbwaiter before the elevator is placed into service. This test shall be made in accordance with the terms of section Ind 4.64.

(2) 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 each unit is placed in service.

(3) The party installing the elevator, power dumbwaiter, or escalator, shall give notice to the industrial commission not less than 10 days prior to the time the installation is complete and ready for inspection.

Note: For test of safety device see section Ind 4.64.

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

Ind 4.10 Hoistway enclosures; new installations. (1) The hoistway of every passenger or freight elevator or dumbwaiter hereafter installed in buildings of 2 stories or less in height, shall have enclosures that comply with the requirements of section Ind 4.12 or better.

Note: In all fire-resistive and mill constructed buildings the hoistway shall not be less than 2-hour fire-resistive construction, as indicated in Table 1.

(2) The hoistway of every passenger or freight elevator or dumbwaiter hereafter installed in buildings 3 stories or more in height shall consist of not less than one-hour fire-resistive construction, and outlined as follows:

(a) In all fire-resistive and mill constructed buildings the hoistway shall not be less than 2-hour fire-resistive construction, as indicated in Table 1.

(b) See section Ind 55.20 and 57.12-4 of the Wisconsin 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.

(c) 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.

(d) Every hoistway enclosure with no less than 2-hour fire-resistive construction shall extend to the roof or ceiling above hoistway.

Table 1

Hoistway Landings	Fire-Resistive Buildings	Mill Constructed Buildings	Ordinary Constructed Buildings	Frame Constructed Buildings
Basement to first	2 hr. Fire-Resistive Construction	2 hr. Fire-Resistive Construction	See Section Ind 4.12	See Section Ind 4.12
First to second	2 hr. Fire-Resistive Construction	2 hr. Fire-Resistive Construction	See Section Ind 4.12	See Section Ind 4.12
Basement to second	2 hr. Fire-Resistive Construction	2 hr. Fire-Resistive Construction	See Section Ind 4.12	See Section Ind 4.12
First to third	2 hr. Fire-Resistive Construction	2 hr. Fire-Resistive Construction	1 hr. Fire-Resistive Construction	1 hr. Fire-Resistive Construction
Basement to third	2 hr. Fire-Resistive Construction	2 hr. Fire-Resistive Construction	1 hr. Fire-Resistive Construction	1 hr. Fire-Resistive Construction
First to fourth	2 hr. Fire-Resistive Construction	2 hr. Fire-Resistive Construction	1 hr. Fire-Resistive Construction	1 hr. Fire-Resistive Construction

(3) 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 1¾ inches thick may be used.

(4) Where a 2-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.

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

(6) 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.

(7) (a) 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.

(b) For hoistway entrance protection see section Ind 4.31, 4.32, 4.37 and 4.38.

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

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

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

Ind 4.12 Guarding hoistway of elevators. New and existing installations. (1) The hoistway of every passenger or freight elevator or dumbwaiter where the travel does not exceed 2 stories shall be guarded with not less than the following requirements:

(a) Existing installations. 1. 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.

2. 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.

(b) New installations. 1. The hoistway of every passenger or freight elevator or dumbwaiter hereafter installed in existing buildings 2 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 7 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.

2. Exceptions: 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.

(3) 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.

(4) On every hand elevator 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.

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

Ind 4.13 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 7 feet above each floor and every stairway in the manner described in section Ind 4.12 (1), except that incombustible material shall be used throughout.

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

Ind 4.14 Guards for outside windows in hoistways. New and existing installations. (1) Every outside window in an elevator hoistway shall be guarded on the outside as outlined in the following items:

(a) *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.

(b) *Material.* Metal bars not less than ½ inch in diameter or equivalent and spaced not more than 10 inches center to center, or wire screen of wire not less than ¼ 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 ¼ inch thick, with the ends securely anchored, will be considered the equivalent of ½ inch diameter rods.

(2) 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 ½ 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.

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

Ind 4.15 Guards for projections in hoistways. (1) 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.

(a) On new installations these guards shall be of smooth metal not less than 1/16 inch in thickness and properly braced.

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

(c) Exceptions: The requirements of section Ind 4.15 (1) need not apply to the tracks of 2-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.

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

(3) 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 section Ind 4.15 (1).

(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 ½ inch where steel guide rails are used in side-post construction and not less than ¾ 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 ¾ inch. Every rope, cable, sheave and other similar moving parts shall have a clearance of not less than ¾ 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 ½ inch and for sliding doors 2¼ inches. In no case shall the hoistway face of the hoistway door project into the hoistway beyond the edge of the landing sill.

1. For existing installations of automatic-operation elevators where the clearance exceeds 1½ inches for swinging doors or 2½ 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 1½ 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 counterbalanced 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 facia 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 handgrips 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 ½ 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.

Table 3. Minimum Pit Depth and Overhead Clearance

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

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

(b) Table 3 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 section Ind 4.63.

(c) 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.

(d) 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.

(e) 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.

(f) 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% 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.

(6) 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.

(7) 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.

(8) 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.

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

Ind 4.18 Construction of pits. (1) The pit for every elevator 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) 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 ¼ inch thick, properly braced.

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

Ind 4.19 Buffers. (1) Oil or spring buffers shall be provided for every power elevator car and every set of counterweights 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:

(a) 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 (2½ times gravity retardation). Exception. The required buffer stroke specified in section Ind 4.19 (1) (a) 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% 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.

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

1. Be independent of the normal and final stop switches.

2. Provide a retardation of the ascending car not in excess of gravity.

3. Provide a stopping distance for the descending car not less than that shown in section Ind 4.64, Table 14.

(2) Each type of oil buffer used shall be tested to prove satisfactory results. Exception: 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: 1. 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.

Note: 2. 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% of the gravity stopping distance corresponding to the governor-tripping speed used.

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

Ind 4.20 Hoistways, penthouses, machine rooms and pits unobstructed. New and existing installations. (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.

(3) 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.

(4) 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 section Ind 4.20.

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

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

(a) Buffers (See section Ind 4.19).

(b) Car and counterweight safety devices (See section Ind 4.64).

(c) 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.

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

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

Ind 4.21 Headroom in machine rooms and overhead machinery spaces of power elevators. New installations. (1) A screen or floor shall be provided at the top of the hoistway of every power elevator hereafter installed in compliance with section Ind 4.23, and the elevator machine rooms and overhead machinery spaces above such floor shall have a clear headroom of not less than the following:

(a) Machine, control and motor-generator rooms, 7 feet.

Note: See section Ind 4.73 (14) for clearances between various parts of the equipment.

(b) Exception: Installations utilizing present machine spaces may be reduced to 6 feet when present building construction limits headroom.

(c) Spaces containing only overhead, secondary or deflecting sheaves, 3 feet 6 inches.

(d) Spaces containing overhead, secondary or deflecting sheaves, and governors, signal machines or other equipment, 4 feet 6 inches.

(e) Machinery spaces not overhead shall comply with section Ind 4.21 (1) (a).

(2) Where floors are provided under secondary and deflecting sheaves, the machine and supporting beams may encroach on the required headroom provided there is a clearance of not less than 3 feet between the underside of such beams and the top of the floor. Exceptions: (a) Overhead sheaves, governors and other equipment where the elevator machine is located below or at the side of the hoistway, provided that means of access for inspection and servicing of the governor shall be provided as follows: 1. A clear unobstructed access shall be provided to the governor, from outside the hoistway in the hoistway wall at the governor assembly, which shall be by means of a hinged door with lock. This door shall be not less than 20 inches or more than 24 inches square. Where the access to the governor is below the roof line, an unobstructed permanent ladder (folding or fixed) shall be provided. Where access to the governor is 4 feet or more above the roof line, a stairway shall be provided as required in section Ind 4.22 (4) and (5). For all installations, access to the roof from the top floor shall comply with section Ind 4.22 (4).

2. Sheaves and other equipment, except governor, can be inspected and serviced from the top of the car. In the event that the overhead sheaves or other equipment, except governor, cannot be serviced from standing directly on top of the car or cover, a metal grating or flooring as required in section Ind 4.21 (1) shall be provided with access to the overhead sheaves and governor from outside the hoistway conforming to the requirement of section Ind 4.22 (4) and (5).

(3) Where a new elevator terminates below an occupied floor or below a roof and a machine room cannot readily be provided, the required headroom may be decreased if approved in writing by the industrial commission.

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

Ind 4.22 Construction of machine rooms and penthouses. (1) 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 construction, the penthouse shall in all cases be

covered with incombustible material, or not less than one-hour fire-resistive construction.

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

(3) In every existing 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. (a) 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.

(4) In every elevator hereafter installed, access to the machine room or penthouse shall be made from outside the hoistway by means of an unobstructed stairway (with handrail), inclined not more than 60 degrees with the horizontal. Openings through the roof to serve the machine room or penthouse shall be completely protected from the weather. This protection shall be fitted with a door not less than 6 feet in height to permit horizontal entrance. Access to the machine room or penthouse may be under the same roof. One such stairway may serve a group of adjoining machine rooms or penthouses on the same roof.

(5) 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 Wisconsin Building Code.

(a) 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.

(b) 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.

(c) 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.

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

Ind 4.23 Floor over hoistways of power elevators; new installations. (1) LOCATION OF FLOOR. The floor shall be located:

(a) Above or level with the top of the machine beams where the machine is located over the hoistway.

(b) Below the overhead sheaves where the machine or pump is not located over the hoistway. See section Ind 4.21.

(2) STRENGTH OF FLOOR. The floor shall be capable of sustaining a concentrated load of 300 pounds at any 4 square inches, and where it constitutes the floor of a main or secondary-machinery space, it shall be designed for a live load of not less than 125 pounds per square foot in all open areas.

(a) Where the elevator machine is to be supported solely by the machine floor slab, the floor slab shall be designed in accordance with the requirements of sections Ind 51.00 and 51.01 of the Wisconsin Building Code.

(3) OVERHEAD BEAMS, FLOORS AND THEIR SUPPORTS. Overhead beams, floors and their supports shall be of steel or reinforced concrete and shall be designed for not less than the sum of the following loads:

(a) The load resting on the beams and supports which shall include the complete weight of the machine, sheaves, controller, governor, and other elevator equipment together with that portion, if any, of the machine room floor supported thereon.

(b) Twice the sum of the tensions in all wire ropes passing over sheaves or drums supported by the beams with the rated load in the car.

Note: Tensions are doubled to take care of impact, acceleration, stresses, etc.

(4) CONSTRUCTION OF FLOORS. Floors may be of concrete, or may be of metal construction with or without perforations. Perforated metal floors shall conform with the following:

(a) If of bar type grating, the openings between bars shall reject a ball ¾ of an inch in diameter.

(b) If of perforated sheet metal or of fabricated openwork construction, the openings shall reject a ball 1 inch in diameter.

(c) Wood floors not less than 2 inches thick may be used in buildings of ordinary or frame construction.

(d) 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 to prevent any loose parts from dropping through the openings.

(e) The floor shall extend over the entire area of the hoistway where the cross-sectional area is 100 square feet or less. Where the cross-sectional area is greater, the floor shall extend to not less than 2 feet beyond the general contour of the machine or sheaves or other equipment, and up to the entrance to the machinery space at or above the level of the platform.

(f) Where the floor does not cover the entire horizontal area of the hoistway, the open or exposed sides shall be provided with a standard guard rail 42 inches in height with an intermediate guard rail and a toeboard not less than 6 inches in height at the edge of the floor.

(g) Where there is a difference in levels of machine room and machinery space floors exceeding 15 inches, a standard guard rail 42 inches in height with an intermediate guard rail and a toeboard not less than 6 inches in height at the edge of the floor shall be provided

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 ¼ the rated load of the elevator, and the load is handled on and off the car platform manually or by means of hand trucks. For this class of loading, the rated load shall be based on not less than 50 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 ¼ 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 1¾ inches square; or if greater than 1¾ 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 1¾ 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 ½ 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 ¾ 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 ⅜ inch of the nearest face of the door jamb, or in the case of bi-parting doors only when the doors are within ⅜ 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 4.30.

(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 intermediate landing and full automatic 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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Ind 4.38 Freight elevator hoistway landing gate construction. (1) Hoistway landing gates shall comply with all the requirements as follows:

(a) Slats or bars shall be vertical and the net width of an opening shall be not more than 3 inches. Exception: A 5 inch gate opening will be permitted on existing cable-controlled elevators at the operating cable side to permit operation of the cable.

(b) The main horizontal cross bars shall extend into the guides or against the uprights at the gate post, or the gate shall be provided with guide shoes welded, bolted or riveted to the gate frame, so that the pressure on the gate from the landing side will not cause the gate to move into the hoistway in case the fastenings become loose.

Note: Where overhead rails are used on cars, center slots or openings in the landing gates will be permitted to allow passage of the trolley.

(c) The bottom bar shall not be more than 12 inches from sill when closed. (See section Ind 4.37 (18) (19) and (20)).

(d) The height of gate shall be 3½ feet or 5½ feet. (See section Ind 4.37 (10) (a)).

(e) Hoistway landing gates shall be designed to withstand a lateral force of 100 pounds concentrated at the center of the gate without deflecting the gate past the line of the threshold, and a force of 250 pounds, without forcing the gate from the guides or breaking the gate.

(f) A gate constructed of wire screen shall not be less than No. 10 U.S. Standard Gauge with mesh not greater than 2 inches.

(g) A gate constructed of expanded metal shall not be less than No. 13 U.S. Standard Gauge with mesh not greater than 2 inches.

(h) 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.

(i) 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 ¾ inch on the guide strip or in the guide post furrow.

(j) 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 section Ind 4.38 (1) (h).

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.

(k) 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.

(l) 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.

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

Ind 4.39 Freight elevator landings. New installations. 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.

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

Ind 4.40 Power freight elevator hoistway landing doors and gates; locking devices. (1) 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.

(2) For exception, see section Ind 4.001 Definition (37).

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

Ind 4.41 Factors of safety for cables. New and existing installations. (1) The factor of safety based on static loads for car and counterweight cables for power passenger and freight elevators shall be not less than the values given in Table 5 corresponding to the contract speed of the car.

Table 5. Factors of Safety for Hoisting Cables

Car Speed in Feet per Min.	Passenger Elevators	Freight Elevators	Dumb-waiters
50 or less	7.0	6.7	See Section Ind 4.79 (h) 1. Table 15
100	7.8	7.0	
200	8.5	7.6	
300	9.1	8.2	
400	9.7	8.7	
500	10.2	9.1	
600	10.6	9.5	
700	11.0	9.8	
800	11.25	10.0	
900	11.4	10.2	

(a) Unless the ultimate strength and material of a cable are known, the load shall be limited to the load allowed for an iron cable of the same diameter.

(b) No car or counterweight cable shall be repaired or lengthened by splicing.

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

Ind 4.42 Cable data. (1) There shall be posted for permanent record in a conspicuous place on the car beam of every elevator hereafter installed a metal sign bearing the following original data:

Cable Specifications

Kind of Cable	Number of Cables	Diameter in Inches	Rated Ultimate Strength	Date of Installation
Hoisting				
Car Counterweight				
Machine Counterweight				
Governor				

For governor cable see section Ind 4.47.

(2) Where steel cables are required or installed, this fact shall be indicated on the metal sign.

(3) On elevators hereafter installed and thereafter whenever cables are renewed on elevators, there shall be attached to the cable fastening or car beam a metal tag or plate bearing the following data:

Cable Installation Data

Diameter of Cables _____
Material of Cables _____
Rated Ultimate Strength _____
Date Installed _____

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

Ind 4.43 Renewing of cables. New and existing installations. Cables are considered unsafe and shall be renewed when through broken wires, wear, rust, undue strain, or other deterioration, the strength has decreased 25%. When for any reason it becomes necessary to renew one or more cables of a group supporting a common load, all cables in that group shall be renewed.

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

Ind 4.44 Number and size of cables required. (1) Every elevator car which requires hoisting cables shall have not less than 2 hoisting cables, except that on existing installations a single hoisting cable will be permitted if the factor of safety is not less than 10.

(2) Every traction elevator hereafter installed shall have not less than 4 cables, except, for 2 to 1 roping not less than 3 cables shall be used, or where the capacity is not more than 1200 pounds not less than 3 cables shall be used.

(3) Hoisting cables less than ½ inch in diameter shall not be used for power elevators.

(4) The minimum number of hoisting cables shall be determined by using the factor of safety in section Ind 4.41 (1) Table 5 together with the rated ultimate strength of the cable. The computed load on the car-hoisting cables shall be the weight of the elevator car, plus the contract load, plus the weight of the car-hoisting cables and the compensation minus the weight of the independent car counterweight, if any. (See section Ind 4.52 (1) Table 6).

Note: On traction elevator machines the number of cables required to secure adequate traction may exceed the number required in section Ind 4.44 (2).

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

Ind 4.45 Cable guards for sheaves and idlers. Every sheave or idler under which is led any hoisting, counterweight, or governor cable, shall be provided with a guard that will keep the cable on the sheave or idler if the cable becomes slack.

Note: See section Ind 1.04 in the "General Orders on Safety" for guarding of pinch points.

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

Ind 4.46 Cable terminal fastenings and turns required on drums. (1) The ends or terminals of each hoisting cable of elevators hereafter installed, shall be independently fastened to the cross-head of the car frame.

(2) Where a cable equalizer is used in any elevator installation, the details of construction of such equalizer shall be submitted to the industrial commission for approval, and only approved construction shall be used.

(3) Not more than one cable, on any elevator hereafter installed, shall be fastened into the same clevis or socket.

(4) The hoisting cables of every drum type elevator hereafter installed shall have at least one and one-half turns on the drum when the car is at either the bottom or top landing. This requirement shall also apply, where possible, in the recabling of existing installations. The winding drum end of every car or counterweight cable shall be secured on the inside of the drum.

(5) Where a cable is fastened in a socket, the strands of the cable shall be separated and turned in toward the center. The length of the turned portion of a cable shall be not less than 2½ times the diameter of the cable. The knot thus formed shall be drawn tightly into the socket which shall be filled with zinc or babbit. Cast iron socket thimbles shall not be used. The socket shall be drop-forged steel, steel casting, or formed in a substantial block of malleable cast iron or better, such as semi-steel.

(a) Exception: Where cable fastenings are installed by the cable manufacturer, other methods of socketing giving equivalent strength may be used.

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

Ind 4.47 Governor cables. (1) The governor cable shall be of iron, steel, monel metal or phosphor bronze. The cable shall be not less than ⅜ inch in diameter. Tiller-rope construction shall not be used for governor cables, except that tiller rope may be used for the portion of the cable wound on the safety drum, but such rope shall be of corrosion-resistant metal.

(2) In replacing existing governor cables they shall be of the same size, material and construction as the cable originally furnished by the manufacturer, except that where a cable of either different material or construction is employed, a test of the car or counterweight safety shall be made with the new cable to demonstrate that it will successfully operate the safety.

(3) In every elevator where a wire governor rope or cable is used, the governor sheaves shall be not less than 12 inches in diameter.

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

Ind 4.48 Drum and car counterweights. (1) Every drum type elevator hereafter installed shall comply with section Ind 4.81.

(2) Drum and car counterweights when used shall be made of metal, shall run in substantial guides, and shall be provided with not less than 4 guide shoes or slots.

(3) If 2 sets of counterweights run in the same guides, the car counterweight shall be above the machine counterweight, and there shall be a clearance of not less than 8 inches between them.

(4) If an independent car counterweight is used, it shall not be of sufficient weight to cause undue slacking in any of the cables during acceleration or retardation of the car.

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

Ind 4.50 Protection of counterweight cables. Existing installations. Where the cables of one set of counterweights pass through, or by, another set of counterweights, the cables shall be so protected as to prevent chafing or wearing.

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

Ind 4.51 Bolting of counterweights. (1) In each set of counterweights on every power elevator, unless the counterweights are contained in a steel frame, the separate weights shall be bolted together with not less than 4 bolts with lock nuts and cotter pins at each end, at least 2 of which bolts shall pass through all of the weights, tightly bolting them together. Each set of counterweights on hand elevators, and on hand elevators changed to power elevators shall be bolted together with not less than 2 bolts.

(2) In every counterweight stack over 8 feet high, there shall be a middle guide unless all weights are contained in a steel frame.

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

Ind 4.52 Capacities and loadings for passenger elevators. (1) Every passenger elevator hereafter installed shall be designed and constructed for the contract load, but in no case based on a loading per square foot of platform area less than given in Table 6.

Table 6. Passenger Elevator Capacities Corresponding to Effective Platform Areas

Effective Platform Area Square Feet	Rated Capacity	Loading of Car Per Square Foot in Pounds
10	700	70
13.5	1000	74
19	1500	79
24	2000	83
29	2500	87
33	3000	90
37.6	3500	93
42	4000	95
50	5000	98
58	6000	103
74	8000	108
87.5	10000	114

Note: The "effective platform area" is the area within the car enclosure. No allowance shall be made for handrails in determining this area.
The minimum contract load for elevators having effective platform areas not shown in section Ind 4.52 Table 6 may be obtained by interpolation.

(2) No passenger elevator used for hoisting safes or similar special freight shall be loaded in excess of the contract load.

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

Ind 4.53 Capacity plates. New and existing installations. (1) PASSENGER ELEVATORS. There shall be a metal plate which shall be fastened in a conspicuous place in each passenger elevator car, the letters and figures in each plate to be not less than ¼ inch in height, and to be stamped in, etched or raised on the surface of the plate, and shall bear the following information:

(a) The contract load of the elevator in pounds.

(b) The number of persons, including the operator, allowed on the car.

Note: The estimated number of persons allowed on the car is based on the contract load divided by 150.

(2) FREIGHT ELEVATORS. A metal plate with raised letters not less than ½ inch in height, stating the contract load of the elevator, shall be fastened in a conspicuous place in each freight elevator car.

(3) PLATE ON CROSS HEAD. A metal plate or plates shall be placed upon the car crosshead of each power elevator hereafter installed bearing the following information:

(a) The total weight of the complete car, including the safeties. See section Ind 4.04.

(b) The contract car speed in feet per minute at which the elevator is designed to travel.

(c) The cable data as required by section Ind 4.42 (1).

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

Ind 4.54 Stresses allowed in design; new installations. (1) Every elevator hereafter installed and every part thereof (except cables), and all structural support of such an installation, shall be designed and constructed to carry the contract load, using the safe working stresses specified below for car frame members and the stresses permitted by the Wisconsin Building Code for structural members. See tables in sections Ind 53.22, Ind 53.24, Ind 53.28 of the Wisconsin Building Code.

For cable stresses see section Ind 4.41.

(2) The stresses of rolled steel sections or annealed cast steel in the construction of car frames and platforms, based on the static load imposed upon them, shall not exceed the values given in Table 7 for steels meeting Specification A-7 of the American Society for Testing Materials for steel having an ultimate strength of from 60,000 to 72,000 lbs. per square inch for rolled sections or cast steel, and 52,000 to 62,000 lbs. per square inch for rivets.

(a) Where multiple sheaves mounted on separate sheave shafts are used, provision shall be made to take the compressive forces, developed by tension in the hoist ropes between the sheaves, on a strut or struts between the sheave-shaft supports, or by providing additional com-

Table 7. Maximum Allowable Stresses in Car-Frame and Platform Members and Connections for Steels Specified in section Ind 4.54 Table 7

Member	Type of Stress	Max. Stress Lbs. Per Sq. Inch	Area Basis
Car Crosshead	Bending	12,500	Gross Section
Car-Frame Plank Normal Loading	Bending	12,500	Gross Section
Car-Frame Plank Buffer Reaction	Bending	25,000	Gross Section
Car-Frame Uprights (Stiles)	Bending plus Tension	15,000 18,000	Gross Section Net Section
Hoisting-Rope Hitch Shapes	Bending plus Tension	8,000	Net Section
Platform Framing	Bending	12,500	Gross Section
Platform Stringers	Bending	15,000	Gross Section
Threaded Brace Rods and other Tension Members Except Bolts	Tension	8,000	Net Section
Bolts	Tension	7,000	Net Section
Bolts in Clearance Holes	Shear	7,000	Actual Area in Shear Plane
Bolts in Clearance Holes	Bearing	16,000	Gross Section
Rivets or Tight Body-fit Bolts	Shear	10,000	Actual Area in Shear Plane
Rivets or Tight Body-fit Bolts	Bearing	18,000	Gross Section
Any Framing Member, Normal Loading	Compression	$14{,}000 - \frac{59L}{R}$	Gross Section

pressive strength in the car frame or car-frame members supporting the sheave shafts.

(b) Where the sheave shaft extends through the web of a car-frame member, the reduction in area of the member shall not reduce the strength of the member below that required. Where necessary, reinforcing plates shall be welded or riveted to the member to provide the required strength. The bearing pressure shall in no case be more than that permitted in Table 7 for bolts in clearance holes.

(3) Where cars are suspended by hoisting ropes attached to the car frame by means of rope shackles, the shackles shall be attached to steel hitch plates or to structural steel shapes. Such plates or shapes shall be secured to the underside or to the webs of the car-frame member with bolts or rivets so located that the tensions in the hoisting ropes will not develop direct tension in the bolts or rivets.

(4) Where side bracing and similar members are attached to car-frame uprights, the reduction in area of the upright shall not reduce the strength of the upright below that required by this section.

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

Ind 4.55 Guide rails. General requirements. (1) T-section steel guide rails shall be provided for car and counterweights as follows:

(a) On every power freight elevator when the speed exceeds 100 feet per minute; and

(b) On every power freight elevator when the capacity exceeds 4,000 pounds and travel exceeds 50 feet; and

(c) On every passenger elevator.

Note: Hardwood guide rails may be used in lieu of T-section guide rails, provided that the capacity, speed and travel is within the requirements outlined in section Ind 4.55 (a) and (b).

Note: Where the use of steel guide rails presents an accident hazard, as in chemical shops or in plants where explosives are manufactured, wood guide rails may be used.

(2) The guide rails shall be extended at the top and bottom to prevent guide shoes running off in case the overtravel is exceeded.

(3) In new installation of power elevators, the guide rails shall not be used to support the overhead machinery.

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

Ind 4.56 Sizes and construction of guide rails. New installations. (1) T-section steel guide rails shall meet the minimum requirements as outlined in section Ind 4.56 Table 8.

Table 8

Maximum Permissible Total Weight of Car and Load Total Weight of Counterweights Per Pair of Rails (Pounds)	Minimum Weight of Each Car Guide Rail (Pounds per foot)	Minimum Weight of Each Counterweight Guide Rail Pounds per Foot		
		With Guide Rail Safeties	Without Guide Rail Safeties	
			1-to-1 Roping	2-to-1 Roping
4000	7½**	7½*	6½	6½
15000	14	14	7½	7½
27500	22½	22½	7½	14
40000	30	30	7½	14

* If the rails are effectively bracketed or tied at intervals of 6 feet or less to prevent spreading, this load may be doubled. This applies only to 7½ lb. rails and only when such rails are used for counterweights.

** If car guide rails weighing 7½ lbs. per foot are effectively bracketed or tied at 10-foot intervals, the 4000 lb. load may be increased to 4500 lbs., and if bracketed or tied at 6½-foot intervals, this load may be increased to 5000 lbs.

(2) The size of wood guide rails shall be not less than the following:

Table 9

Total Weight of Car and Load per Pair of Maple Guide Rails	Dimensions of Each Guide Rail in Inches				
Above Pounds	To and Including Pounds	Car	Counter-weight	Hand Power	
				Car	Counter-weight
----------	2500	1¾x1¾	1⅛x1¼	1¾x1¾	1⅛x1¼
----------	5000	2 x2¼	1¼x1½		
5000	8000	2½x2¾			

(3) Joints in steel or wood guide rails shall be tongued and grooved. Steel rails shall be fitted with fishplates, each secured with not less than 4 substantial bolts through each rail.

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

Ind 4.57 Fastening of guide rails. New installations. (1) Car and counterweight guide rail brackets and their fastenings shall comply with requirements as outlined in section Ind 4.57 Table 10.

Table 10

Weight of Rails in Pounds per Foot	Diameter of Bolts in Inches
6½—7½	½
14	⅝
22½	¾
30	¾

(a) Guide rail brackets secured to existing brick or concrete hoistway walls shall have through bolts and shall be fastened at not more than 8 feet apart.

(b) Where the vertical distance between the car guide rail supports provided by the building structure is greater than 14 feet, the car guide rails of passenger and freight elevators shall be suitably reinforced or additional supports of adequate design and strength shall be provided.

(2) Rails and/or brackets shall not be directly supported and fastened to hoistway enclosure walls unless such wall is of such construction and strength as to adequately withstand the thrust imposed on the rails under all normal conditions of elevator service. Where so supported and fastened, the fastenings to such walls shall be by means of steel or iron, bond blocks or inserts built into the wall with expansion bolts or by through bolts or their equivalent. Through bolts where used shall be backed on the outside face of the wall with metal plates of such thickness and size as to adequately distribute the load on the wall. Expansion bolts shall not be used unless the wall construction is such as to rigidly and permanently hold the fastening in place.

(3) The guide rail brackets and their supports shall be designed, spaced and fastened, and shall not deflect more than ¼ inch under normal operation, and shall withstand without undue deflection or permanent deformation, the application of the car safety device when applied to the guides as specified in section Ind 4.64 (14) (a) (b) and (c) when stopping with contract load, and in the case of freight elevators, the thrusts due to a concentrated load placed on or removed from the car.

(4) Freight elevator rail brackets shall be located as close as possible to the position where they will receive substantially the full thrust of the guide shoes, when the car platform is level with the landing sill.

(5) Wood plugs inserted in a wall for guide rail anchorage are not permitted.

(6) Fastenings to hollow tile walls, plaster partitions and similar construction are not permitted.

(7) Material used for shimming steel rails shall be metal so secured as not to drop from its position if the fastening becomes loose.

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

Ind 4.58 Minimum size of drums and sheaves. The diameter of drums and sheaves on every power elevator shall be not less than outlined in section Ind Table 11.

Table 11

Diameter in Inches of Cables	Diameter in Inches of Drums and Sheaves
1/2	20
9/16	22
5/8	24
3/4	30
7/8	36
1	40

Note: A larger diameter than the required minimum is recommended.

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

Ind 4.59 Machinery. General requirements. (1) The factors of safety based on the static loads (the contract load plus the weight of the car, cable, counterweight, etc.) to be used in the design of elevator machines hereafter installed shall be:

(a) Hand Elevators:

For wrought iron or steel 5
For cast iron, cast steel and other materials 8

(b) Power Elevators:

For wrought iron or steel 8
For cast iron, cast steel and other materials 10

(2) Drums and sheaves on elevators shall be steel or cast iron with machine finished grooves, except on hand elevators, and no traction U groove shall be more than 1/16 inch larger than the cable it carries.

(3) Every drum, traction sheave, pulley, gear, or other such part of an elevator installation shall be securely keyed on its shaft, except that no key is required under the following conditions:

(a) On geared machines where the gear and driving sheave are mounted on and bolted to a common gear and sheave spider.

(b) On gearless machines where the drive sheave is directly bolted to a flange integral with the armature spider or shaft.

(c) Idler sheaves and sheaves which turn on shafts as bearings.

(4) Elevator gear housings in elevators shall have a sufficient number and correct size of openings so located as to permit proper inspection of the gears, and gear spider fastenings. Exception: A gear housing cover that is not integral with the bearing cap, does not require gaskets to prevent oil leakage, and is not to exceed 30 lbs. in weight, will be acceptable in lieu of section Ind 4.59 (4).

(5) Overhead direct connected electric elevator machines shall be mounted on continuous steel or cast iron bed plates.

(6) No cable or link chain of any description shall be used to form the operating connection between the machine and the shifting gear or wheel on any single belt elevator remodeled.

(7) In elevators every shaft shall be fillet finished at every journal or shoulder cut.

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

Ind 4.60 Prohibited installations. (1) NEW AND EXISTING INSTALLATION. (a) No belt or chain driven machine shall be used in any passenger elevator installation.

(b) No friction gearing or clutch mechanism shall be used for connecting the drums or sheaves to the main driving gear of any elevator.

(c) No passenger car shall have more than 2 entrances except in existing installations when approved in writing by the industrial commission.

(d) No passenger elevator shall be installed having continuous pressure button operation.

(e) A drum type freight elevator installation equipped with a mechanical brake shall not have hoistway limit switches, car door or gate electric contacts, hoistway landing door or gate electric contacts, or any combination thereof, except when approved in writing by the industrial commission. See section Ind 4.63 (6).

(f) No emergency release shall be installed on an elevator car which can be started from a landing.

(2) NEW INSTALLATIONS. (a) Chains shall not be used for hoisting in connection with a power elevator. Exception: See section Ind 4.82, special requirements.

(b) Sidewalk elevator installations are prohibited from the effective date of this code. See section Ind 4.801 for grade level elevators.

(c) Winding drum machines are prohibited except as indicated in section Ind 4.81.

(d) Belt driven freight elevators shall be limited to a travel of not more than 50 feet in any case and to a speed of not more than 50 feet per minute.

(e) No power elevator which consists of the platform or carriage type of car supported by cables attached at 4 or more points shall hereafter be installed.

(f) Cast iron worm gears shall not be used in the hoisting mechanism of any elevator hereafter installed.

(g) No power elevator hereafter installed shall be controlled or operated by a hand cable.

(h) No elevator of any type shall have more than one compartment, nor shall elevator cars counterbalance each other.

(i) No power freight elevator shall have a contract speed in excess of 100 feet per minute except automatic operation and elevators controlled by regular operators. Exception: When controlled by a 2 speed motor, and all requirements complied with, outlined as follows:

1. Speed not to exceed 150 feet per minute.
2. Equipped with automatic floor leveling.
3. Each car entrance to be equipped with an approved car gate and electric contact.

(j) Sheaves or idlers shall not be suspended in cast iron stirrups from the under side of the supporting beam.

(k) Cast iron guide rails shall not be used.

(l) No hand elevator hereafter installed shall exceed 1,500 pounds capacity.

(m) The travel of any hand elevator hereafter installed shall not exceed 30 feet.

History: Cr. Register, April, 1957, No. 16, eff. 5–1–57; am. (2) (b), Register, July, 1959, No. 43, eff. 8–1–59.

Ind 4.61 Power attachments to hand elevators. New and existing installations. No power attachment, such as worm reduction units, rope clutch or rope grip devices, belts to improvised rope wheels, or any similar device, shall be installed on any hand elevator unless all requirements for power elevators are complied with. Exception: See section Ind 4.82, special requirements.

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

Ind 4.62 Slack cable devices. (1) A slack cable device which will automatically shut off the power and stop the machine if the cables loosen or break shall be provided on every drum type power elevator, except on existing belt driven freight elevators where the machines are in good condition and such devices cannot be provided without rebuilding the machines.

(2) Every slack cable switch on elevators shall be so constructed, installed and maintained that it will not automatically reset when the slack in the cable is removed.

(3) Every ceiling drum type elevator machine shall be so located with respect to height that the slack cable device will operate with not more than 6 feet of slack cable. Recommendation: A ceiling type machine should be located not higher than the first story ceiling as this will permit proper lead to the cable and will result in longer service of each cable.

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

Ind 4.63 Limit stops. New and existing installations. (1) Every elevator which is provided with an electric brake shall be equipped with final terminal stopping devices that will automatically interrupt the power circuit and stop the car in case of over-travel at each terminal of travel, except on electric oil hydraulic elevators.

(2) If multi-phase alternating current is used to operate the motor of any elevator hereafter installed, the terminal stopping devices shall be so arranged and connected that if phase reversal occurs and the car over-travels at either terminal the motor cannot be again started until the phase reversal is corrected, except where the requirements of section Ind 4.72 (1) are met.

(3) Final terminal stopping device for elevators hereafter installed shall consist of limit switches mounted in the hoistway and directly operated by a cam attached to the car.

(4) Every electric elevator hereafter installed shall be equipped with normal stopping device at each terminal of travel. Such device shall consist of stopping switches mounted on the car or in the hoistway and directly operated by the movement of the car.

(5) Every drum type elevator machine shall be equipped with an approved machine automatic terminal stopping device which will automatically stop the machine if the car over-travels either of the terminal landings.

(a) On alternating current drum type elevator machines hereafter installed, the terminal stopping device as outlined in section Ind 4.63 (5) shall also directly open the electric circuit to the motor and brake. This device shall be in addition to the device required by section Ind 4.63 (1).

(6) Every traction type elevator machine with a mechanical brake shall be equipped with an electric brake and limit switches.

(7) Final limit switches and the oil buffer shall be located so that the engagement of the buffer and the opening of the limit switch will occur as nearly simultaneously as possible without interfering with the normal operation of the elevator. When spring buffers are provided, the final limit switches shall be opened before the buffer is engaged.

(8) Limit switches, directional and/or final shall be located at the "Bottom" approximately in line with the lower terminal landing sill and at the "Top" approximately in line with the car top or cover when the car is at the upper terminal landing.

(9) Limit switches shall be securely fastened to the steel guides or to the hoistway walls or floor beams by means of substantial steel clamps or brackets. Where the switches are mounted on hoistway walls, they shall be fastened by means of through bolts, or equivalent. The use of lag bolts, screws or nails for this purpose is prohibited.

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

Ind 4.64 Car safety devices and speed governors. (1) A car safety device capable of stopping and sustaining the car with the contract load shall be attached to every elevator except:

(a) Freight elevators which travel not more than 10 feet.

(b) Direct lift plunger elevators.

(c) Existing carriage type elevators which travel not more than 18 feet, and in no case more than one story, provided the cables and their end fastenings shall have a factor of safety of not less than 10.

(2) A sliding type car safety device shall be provided for every elevator hereafter installed in which the contract speed is more than 100 feet per minute. This device shall be so arranged that it can be released inside the car, on top of the car, or by operating the machine in the up direction. Exception: *Type C (Combination Instantaneous and Oil-Buffer Safety)*

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

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

(b) The oil buffers shall conform to all requirements specified in section Ind 4.19 for oil buffers, except that the stroke shall be based on governor tripping speed and on an average retardation not exceeding 32.2 feet per second per second.

(c) After the buffer stroke, as defined in section Ind 4.64 ~~(2)~~ (b) has been completed, provision shall be made for an additional travel of the plunger or piston of not less than 10% of the buffer stroke to prevent excessive impact on the buffer parts and the auxiliary safety plank.

(d) Where the distance between guide rails exceeds 8 feet, the safety shall be provided with two oil buffers of substantially identical calibration, and the buffers shall be so located as to develop minimum stresses in the auxiliary safety plank during safety operation.

(e) Buffers shall be located in line with and symmetrically between the guide rails.

(f) The auxiliary safety plank shall be so supported and guided below the car frame that the proper clearances for the safety parts shall be maintained during normal operation.

(g) The auxiliary safety plank shall be so designed that the maximum stresses in the plank shall not exceed those specified for similar car frame members.

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

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

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

(4) A safety shall not be used to stop a car in an ascending direction.

(5) Every car safety device hereafter installed, except on hand elevators, shall have the dogs or clamps of the safety device attached to and located in the lower part of the car frame adjacent to or below the car platform. The gripping surfaces of a car or counterweight safety device shall not be used to guide the car or counterweight. Safeties shall be applied mechanically and shall be so designed that on their application the forces which provide the stopping action shall be compressive forces on each side of the guide rail sections. Multiple car safeties may be used subject to the approval of the industrial commission provided that at least one of the car safety devices meets the requirement of the first sentence of section Ind 4.64 (8).

(6) Every drum or idler sheave which is underneath the car and is used to actuate the car safety device shall be so guarded to prevent the rope or cable leaving the drum or sheave and shall be securely fastened to the car frame directly or by means of metal brackets.

(7) A cut-out switch that will open the motor and brake control circuits shall be provided in connection with every car safety device on every electric elevator hereafter installed.

(8) A speed governor shall be installed in connection with the required car safety device for every power elevator hereafter installed and every existing power elevator traveling more than 18 feet. The car speed governor shall be set to cause the application of the safety at a speed not more than 40% and not less than 15% above normal, provided that no governor shall be required to trip at less than 175 feet per minute. For contract speeds exceeding 500 feet per minute and not exceeding 700 feet per minute, the governor tripping speed shall not be more than 33-1/3% above the contract speed, and for contract speed exceeding 700 feet per minute not more than 25% above contract speed.

(9) The counterweight safety, if provided, may be operated by the same governor and governor rope that is used to operate the car safety. Provision shall be made to cause the application of the counterweight safety at a speed greater than that at which the car safety is applied, but at not more than 10% above that speed. Broken-rope safeties of the instantaneous type may be used on counterweights within the limits of section Ind 4.64 Table 12.

(10) Every speed governor hereafter installed shall be of a type which will securely grip the governor cable without serious cutting, tearing or deformation thereof and thereby actuate the car safety

Table 12

Contract Speed—Feet per Minute	Total Weight of Counterweight Pounds
250	2000
200	3000
160	4000
125	5000

device, and shall be located where it cannot be struck by the car or counterweight in case of overtravel and where there is sufficient space for full movement of governor parts.

(11) Every type of car safety device hereafter installed not heretofore approved and having a rated capacity less than 20,000 pounds shall be subjected to a type drop test. Such tests shall be made at the risk and expense of the elevator manufacturer under the direction of the industrial commission. Complete plans and specifications for every car safety device and speed governor to be tested shall be submitted to the commission for approval, or the manufacturer may make such tests and submit to the industrial commission with complete plans and specifications, certified copies of the tests made on forms satisfactory to the commission, duly witnessed and sworn to by a person or persons satisfactory to the commission for which approval is desired.

(a) The test load shall equal the maximum load, including the weight of the safety, for which approval is requested. The free fall shall be such that the safety under test shall have attained the maximum governor tripping speed for which approval is requested, assuming 100% efficiency, before the safety actuating device starts to function, but in no case shall the required fall be greater than that needed to attain 300 feet per minute. The drop test may be made with the governor with which the safety will be used. If so tested, the governor shall actuate the safety. The governor shall be set for the maximum tripping speed for which approval is requested except that a tripping speed of more than 300 feet per minute shall not be required. The distance from the starting point to the final point of rest under the above test conditions shall not be more than 12 feet. The application of the car safety device shall not cause the car platform to become out of line in excess of ½ inch per foot measured in any direction. No car safety device, or combination of car safety device and speed governor, shall be used which has not been so tested and approved.

(12) Every type of car safety device, and every combination of car safety device and speed governor, shall be maintained in proper working condition and shall be subjected to running tests at intervals as outlined as follows:

(a) Every power elevator with a car safety device and speed governor combination shall by not later than January 1, 1949, be subjected to an actual running test with the load indicated by the capacity plate on the car and, by tripping the governor by hand at contract speed, stop and hold the car with the contract load. This test shall be made with all electric apparatus operative except for the cutout switch required by section Ind 4.64 (7). On such tests

car safeties of the sliding type shall stop the car within the limits specified in section Ind 4.64 (15) Table 13 except that the stopping distance shall be based on the car speed at which the governor is tripped. In the event the safety device and governor combination fails to function as required, the owner or agent shall renew or replace any part or parts of equipment and make a test or tests necessary to insure satisfactory operation of the safety device and governor.

(b) When a test is made and the safety device and governor combination prove satisfactory on either new or existing installations, a similar test shall be made at every three year period thereafter. Reports of tests of section Ind 4.64 (a) and (b) shall be submitted to the industrial commission on forms furnished by the commission.

1. The form furnished by the Industrial Commission, 1 West Wilson Street, Madison, is SB–2E "Test Report On Safety Device".

(c) If the approved rated capacity of safeties hereafter installed is less than the weight of the car, the contract load and the cables suspended from the car, a new drop test shall be made and complete plans and specifications shall be submitted to the industrial commission for approval.

(13) A drop test made on a car safety device that is designed and constructed to trip by inertia, when set within the drop test requirements, shall be considered satisfactory. The governor in connection with the above safety device as a combination shall be tested separately by means of a weight test, and also to determine tripping speed.

Note: Test of car safety devices and other safety appliances by the United States Bureau of Standards will be recognized by the industrial commission.

(14) Tests of the car safety device and speed governor combination shall be made before the elevator is placed in regular service. Such tests shall be made with cables attached and all electric apparatus operative, except for the cutout switch required by section Ind 4.64 (7) and shall comply with the following:

(a) Where elevators having *type A safeties* are equipped with alternating current driven machine motors, a test of the safeties shall be made with the contract load in the car and shall be tested at contract speed in the down direction and by tripping the governor by hand.

(b) Where elevators having *type B and C safeties* are equipped with "generator field control", an overspeed test of the safeties shall be made with the contract load in the car, by gradually increasing the speed of the car until the governor causes application of the safety. The stopping distance for type B safeties and the governor tripping speed shall conform with requirements of section Ind 4.64 (15) Table 13.

(c) The stopping distance for *type C* safeties shall be equal to the stroke of the buffer located between the lower member of the car frame and auxiliary safety plank, and shall conform to the requirements of section Ind 4.19.

(d) For elevators, where the contract load is unable to bring about overspeed and for elevators without sufficient travel to permit overspeed, the governor shall be tripped by hand at maximum obtainable speed.

(e) No test of the safeties with safe-lifting load in the car shall be made.

(f) No person shall be permitted to ride on the elevator car during an overspeed test or drop test.

(g) The governor tripping speed shall be checked for compliance with section Ind 4.64 (15) Table 13.

(h) The pull-out of the governor cable from its normal running position until the safety jaws begin to apply pressure to the guide rails shall not exceed 30 inches.

(i) Stopping distance is the actual slide as indicated by the marks on the rails.

(15) Car safety devices (safeties) are identified and classified on the basis of performance characteristics after the safety begins to apply pressure on the guide rails. On this basis, there are 3 types of safeties:

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

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

Table 13. Maximum and Minimum Stopping Distances Type B Car Safeties with Rated Load, and of Type B Counterweight Safeties

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

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

(16) Each safety shall be marked for identification by the manufacturer by a plate that may be placed in a conspicuous location on the plank. This plate shall show the range of weight and speed for which the safety is approved; said weight to include the complete car structure, the safety, the contract load in the car, and all moving equipment, the weight of which is borne by the safety and the name of the manufacturer.

Type _____
Load Range _____
Speed _____
Manufacturer _____

(17) The governor shall be marked for identification by a plate, which marking shall give the type, tripping speed, size and material of cable and the name of the manufacturer.

Type _____
Tripping Speed _____
Cable Size _____
Cable Material _____
Manufacturer _____

History: Cr. Register, April, 1957, No. 16, eff. 5–1–57; cr. (12) (b) (1), Register, October, 1957, No. 22, eff. 11–1–57.

Ind 4.65 Brakes. (1) Every direct connected electric elevator hereafter installed shall be equipped with an electrically released spring applied brake so designed, installed and maintained that it will not be released until the power has been applied to the motor. Under normal operating conditions, the action of the brake magnet in allowing the brake to set shall not be retarded by any motor field discharge or counter voltage, nor by any single ground or short circuit.

Note: See section Ind 4.63 (6) for traction elevators with mechanical brake.

(2) Every power elevator shall be equipped with a brake so designed, installed and maintained that it will be released whenever the control mechanism is shifted to the starting position, and so that the brake will be applied whenever the control device is moved to the stopping position.

(3) Every hand elevator shall be equipped with a brake that will operate effectively in either direction of motion of the elevator. Whenever such a brake has been applied it shall remain locked in position until released.

(4) The brake on every hand elevator hereafter installed shall be so arranged that it will operate automatically at the top landing.

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

Ind 4.69 Warning chains; new and existing installations. Warning chains shall be hung from the car platform within 2 inches of the edge of the entrance side or sides of every power freight elevator, except where hoistway landing doors with electric contacts or inter-

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-presure 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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emitting devices shall be placed at least 4 feet above the line of the lowest floor levels unless they are of the explosion-proof type or of the enclosed type with contacts immersed in oil.

(2) The floor underneath every unit of unenclosed electrical apparatus shall be covered with a fire-resistive material.

(3) Elevators installed in hazardous locations shall also comply with the Wisconsin State Electrical Code.

(4) No part of any electric circuit having a voltage in excess of 750 shall be used on any car control system. Circuits of higher voltage may be used in machine rooms or penthouses for operation of motors and brakes, provided that all control and signal wiring is thoroughly insulated from such power circuits, and all machine frames and metal, hand operated cable, etc., be permanently grounded.

(a) The maximum voltage permitted on elevators shall not exceed 300 volts to ground on any elevator operating devices in the car, or at the landings, including push buttons of elevator signalling circuits.

(5) All live parts of electrical apparatus in or on elevator cars or in elevator hoistways shall be enclosed to protect against accidental contact.

(6) Conductors in auxiliary gutters used in machine rooms, under controllers, starters and similar apparatus for elevator machines, shall be of rubber covered type.

(a) Conductors between main circuit resistors and the back of control panels shall be of the slow-burning type (type SB), or of the asbestos-covered type (type A). All other wiring on control panels, unless subjected to a temperature exceeding 120 degrees F (49° C.), shall be of the rubber-covered type having a flame retardant, moisture-resistant outer cover or shall be of other type especially approved for the purpose.

(b) Elevator control circuits and conductors or groups of conductors having flame retardant outer cover shall not be used as connections for the operating circuits of elevator controllers unless such outer covering is also moisture resistant.

(c) Traveling cables used as flexible connections between the car and the hoistway, shall be of type E, elevator cable, and shall have a flame retardant and moisture resistant outer cover.

(7) The minimum size of conductors for elevator wiring shall be as follows:

(a) For lighting circuits, No. 14, except that for flexibility 2 No. 16 may be used in parallel in traveling cables.

(b) For elevator operating and control circuits, No. 18.

(c) For signal circuits and for fixtures, No. 18.

(8) The following wiring methods shall be employed: (a) In hoistways. Conductors located in the hoistway, except traveling cables and conductors used in signal systems, shall be installed in rigid conduit or electrical metallic tubing, except that flexible conduit or armored cable may be used between riser and limit switches, interlocks, push buttons or similar devices. (See section Ind 4.73 (17)).

(b) On the car. Conductors and traveling cables on the car shall be run in rigid conduit, electrical metallic tubing or wireways; except that short runs of:

1. Flexible conduit or armored cable may be used if so located as to be kept free from oil, and securely fastened in place.

2. Type S cord may be used as the flexible connection between the fixed wiring on the car and the switch on the car door or gate if securely fastened in position not liable to mechanical injury.

(c) The conductors of motor circuits between motors and control panels may be grouped without any additional insulation of the separate conductors, provided that the complete group is either taped or corded, and painted in manner to make same as a rigid, self-supporting form, not over 3 feet long, and not in a position liable to mechanical damage or subject to a temperature in excess of 120° F. (49° C.).

(d) A bushing may be used in lieu of a box or terminal fitting at ends of conduit or electrical metallic tubing where conductors leave the conduit or tubing behind a switchboard, or where more than 4 conductors leave the conduit or tubing at control apparatus or in similar locations, in which case the conductors shall be bunched, taped and painted with insulating paint. Such a bushing shall be of the insulating type except for lead covered conductors.

(9) Conductors of car-lighting circuits, and signal systems when not an integral part of the elevator wiring system, shall be separated and run in separate traveling cables and raceways.

(10) Conductors for elevator circuits, including operating, control and power conductors, and signal conductors when an integral part of the wiring system, may be run in the same traveling cable or raceway system when the power supply is from the same source, even though the characteristics of the voltage and/or current may be changed within the system by rectifying, transforming or other converting devices supplied from the elevator feeder circuit; provided that all conductors are insulated for the maximum voltage found in the cable or raceway system, and the live parts of the equipment are insulated from ground for this maximum voltage. Such a traveling cable or raceway may also include a pair of telephone conductors to serve a telephone in the car, provided such conductors are insulated for the maximum voltage found in the cable or raceway system.

(11) Traveling cables for all signal circuits, and for all other circuits not over 100 feet in length, may be suspended by suitable clamps if the cables are so constructed that the weight of the cable is not carried by the individual conductors.

(12) Wherever the traveling cables in swinging may come in contact with projections or corners of the building construction in the hoistway, such as I-beams, ledges and the like, such irregular surfaces shall be made smooth by covering with heavy gauge sheet metal or other suitable means.

(13) If No. 18 conductor is used for signal circuits, it shall be protected by fuses rated at not to exceed 3 amperes.

(14) Clearances around control panels in a single machine room shall have a clear space around the live parts as of Table 14.

(15) Reduction of clearances for short intervals by building columns behind the switchboard, or by equipment on a single panel in the switchboard, is permitted provided the clearances are not reduced below those required for a single panel board.

Note: This rule is not intended to forbid mounting controllers on the machine, nor enclosing the rear of control panels in removable cabinets. If such cabinets are installed, the prescribed dimensions of clear space apply when the back of the cabinet is removed.

Table 14. Clearances

	Rear	Front	Side
Single Panel Not over 42 inches wide	24"	36"	18" (one side)
Double Panel Or single panel over 42 inches wide	24"	36"	18" (each side)
3 or More Panels	36"	36"	18" (one side)

(16) If the wiring to fixed motors is in armored cable or metal raceways, junction boxes to house motor terminals shall be provided. These housings shall be of ample size to properly make connections and they shall be of substantial metal construction.

(17) Wiring shall be in approved rigid conduit or electrical metallic tubing, except where otherwise specified in this code and shall conform to the requirements of the Wisconsin State Electrical Code.

(18) Where electrical metallic tubing is used it shall comply with the following requirements:

(a) Straps, hanger or other supports shall be provided for each length of electrical metallic tubing regardless of length to insure continuous and substantial grounded system.

(b) Electrical metallic tubing shall not be run or laid on the penthouse floor, pit floor or in any other location subject to mechanical damage.

(c) Electrical metallic tubing shall not be used in grain elevators or in hazardous locations where vapor or gas and air, dust and air, or other highly flammable substances are present.

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

Ind 4.74 Grounding. For electric elevators, dumbwaiters and moving stairways, the frames of all motors, elevator machines, controllers, operating cable and the metal enclosures for all electrical devices in or on the car or in the hoistway shall be grounded.

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

Ind 4.75 Signal system; new and existing installations. (1) Every elevator and every power dumbwaiter shall be equipped with a signal system or warning bell, so arranged that it can be safely and conveniently operated from any landing, except (a) elevators and dumbwaiters controlled by automatic or continuous pressure operation and provided with operating buttons at the landings; (b) hand elevators traveling not more than 30 feet.

(2) Every automatic push button elevator shall be provided with an emergency call bell with a properly placarded push button in the car.

(3) All elevators in such locations as acid towers, grain elevators and similar places, shall, when required by the industrial commission, be provided with an emergency signal system or telephone to call the boiler room or other place where assistance can be obtained in case of an emergency.

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

Ind 4.76 Lighting. (1) CAR LIGHTING. Elevator cars shall be adequately lighted when in use. The intensity of illumination shall be not less than 2 foot candles at the edge of the car platform.

(2) LANDING LIGHT. Every elevator hoistway landing within or in connection with an occupied building shall be provided with sufficient light to clearly see small objects at the threshold.

(3) PENTHOUSE AND OVERHEAD LIGHTING. Every penthouse shall be provided with suitable artificial light of an intensity of not less than 2 foot-candles at the floor. Every elevator machine room and the area about a ceiling type machine, including overhead sheave rooms and lofts shall be amply lighted. Control of such lighting shall be in the approach to the penthouse or overhead equipment.

(4) WORK LIGHTS. Every power elevator hereafter installed shall be equipped with work light and convenience outlets as follows:

(a) Work light receptacle and convenience outlet on top of car.

(b) Work light receptacle on underside of platform.

(c) Work light receptacle and convenience outlet at lowest hoistway level if hoistway landing doors are used.

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

Ind 4.77 Operation of elevators; new and existing installations. A competent operator shall be stationed on the car of every passenger elevator while in use, except automatic and continuous pressure operation elevators.

Note: Section 103.69 (3) (h), Wis. Stats., prohibits the employment of persons under 18 years of age in the operation of elevators.

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

Ind 4.78 Maintenance; new and existing installations. (1) Elevators, dumbwaiters and escalator equipment shall be kept in safe operating condition, properly lubricated and clean, including pits and penthouses.

(2) Hatch covers of the vertically rising type used on elevators shall not be used for storage purposes, nor as passageways.

(3) Explosives or highly flammable substances shall not be stored within 20 feet of any elevator hoistway or penthouse.

(4) Material which is not a permanent part of the elevator equipment shall not be permitted on the top or cover of an elevator car.

Note: A sign should be used to plainly designate a freight elevator, at the same time prohibiting unauthorized persons from riding on the car.

(5) No material shall be stored or other equipment installed in the penthouse or machine room of any elevator except that which is necessary for the maintenance and operation of the elevator unless the elevator equipment is entirely isolated by a solid partition 3 feet away from it and extending from the floor to the ceiling.

Note: See general orders on Safety in Construction, section Ind 35.33 for "Protection from falling objects."

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

Dumbwaiters, Special Types of Elevators and Escalators.

Ind. 4.79 Dumbwaiters. (1) NEW AND EXISTING INSTALLATIONS. (a) The hoistway openings of every electric dumbwaiter shall be provided with landing doors, so arranged that the dumbwaiter cannot be started unless all doors are closed. Where a fire-resistive hoistway is required, all landing doors shall be fire-resistive (see section Ind 4.10 and 4.12).

(b) Every dumbwaiter hoistway opening at the floor level shall be protected by a gate in compliance with section Ind 4.37 and 4.38. Every other dumbwaiter hoistway shall be enclosed on the loading side to a height of at least 30 inches above each floor.

(c) A dumbwaiter shall not have a platform area greater than 9 square feet and not more than 4 feet in height, shall have a solid cover over the full area of the car, and a carrying capacity of not more than 500 pounds.

Note: Dumbwaiters installed before August 12, 1926, where the platform is greater than 9 square feet and the height is more than 4 feet, will be accepted provided all the other dumbwaiter requirements of August 12, 1926, are complied with.

(2) NEW INSTALLATIONS. (a) No power dumbwaiter hereafter installed shall be controlled or operated by cable control.

(b) Power dumbwaiters shall be equipped with brakes which are automatically applied when the power is cut off the motor. Exception: Hydraulic dumbwaiters.

(c) Power dumbwaiters having a travel of more than 30 feet, and a capacity of more than 100 pounds and operated by winding-drum machines shall be provided with a slack-cable device which will cut off the power and stop the car if the car is obstructed in its descent.

(d) Power dumbwaiters shall be provided with limit switches to automatically stop the car at each terminal of travel.

(e) Every hoistway landing door or gate, on a power dumbwaiter hereafter installed, shall be equipped with electric contacts and approved locks or interlocks.

(f) Dumbwaiter cars shall be of such strength and stiffness that they will not deform appreciably if the load leans or falls against the sides of the car.

1. Cars shall be made of wood or metal and of solid construction.

2. Cars for power dumbwaiters shall be reinforced with metal from the bottom of the car to the point of suspension.

3. Metal cars shall be of metal sections rigidly riveted, welded or bolted together.

(g) Dumbwaiter cars, machines and hoisting cables shall be capable of sustaining the loads given in Table 15.

Table 15. Minimum Allowable Dumbwaiter Capacities Corresponding to Effective Platform Area

Horizontal Area in Sq. Ft.	Structural Capacity in Lb.
4	100
5	150
6.25	300
9	500

(h) Power dumbwaiters, except those of the direct-plunger type, shall be provided with one or more iron or steel hoisting cables, chains or tapes. Where cables are exposed to corrosion, they may be covered with marline or other equivalent protective covering.

1. The factor of safety for car and counterweight cables based on static loads shall be not less than the values corresponding to the contract speed of the car as outlined in Table 16.

Table 16. Factors of Safety For Dumbwaiter Cables

Factor of Safety	Car Speed (Ft. per Min.)
5.4	50
5.7	100
6	150
6.3	200
6.6	250
6.9	300
7.2	350
7.5	400
7.7	450
8	500

2. The safety factor for tapes shall not be less than 25% greater than given in the above table.

3. The safety factor for chain shall not be less than 100% greater than given in the above table.

4. The number and size of the cables, chains or tapes are determined by using the factor of safety in the above table and the rated ultimate strength of the cable, chains or tape. The computed load on the cable, chains or tape shall be the weight of the car plus the contract load, plus the weight of hoisting cables, chains or tapes and compensation.

(i) Guide rails shall be securely fastened to the hoistway, and the joints shall be tongued and grooved, doweled, or fitted with splice plates.

(j) Sections of counterweight for dumbwaiters having a capacity exceeding 100 pounds or having a speed exceeding 100 feet per minute shall be secured by at least 2 tie rods passing through holes in all sections, unless suitable frames or boxes are provided. The tie rods shall have lock nuts at each end and secured by cotter pins.

(k) There shall be no thoroughfare under the hoistway of a dumbwaiter or its counterweight unless there is a structure under the hoistway sufficiently strong to withstand without failure the impact of the car with contract load, or the impact of the counterweights, when either is dropped freely in its guides from the upper limits of overtravel; provided that for cars or counterweights equipped with governor-operated safeties, the impact shall be computed for governor-tripping speed. When broken rope safeties are used, the impact of the car or counterweight shall be computed for a free drop of the car or counterweight from ⅛ its travel.

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

Ind 4.80 Sidewalk elevators. (1) EXISTING INSTALLATIONS. (a) Every sidewalk elevator shall be covered at the top with hinged or vertically lifting type covers which shall when closed be capable of sustaining a live load of 300 pounds per square foot. The limitations of the sidewalk opening, except for existing installations, shall in no

case exceed 5 feet at right angles to the curb and 7 feet parallel to the curb. The surface of the covers shall be rough and no part of them shall project above the sidewalk when closed.

(b) Hinged hatch covers may be used on sidewalk elevators hereafter installed only if the elevator car has a clear platform area of not more than 35 square feet. Hinges of hatch covers shall be of sufficient strength and be securely fastened to withstand the service of normal operation.

(c) Every power sidewalk elevator shall be provided with one of the following requirements:

1. A device to prevent its operation until the hatch covers over the top of the hoistway are open, or

2. Flat metal tops or arched bows of sufficient strength to open the hatch covers.

(d) When hatch covers are left open, a full guard not less than 30 inches in height shall be provided in each side of the sidewalk opening not fully protected by the hatch covers. This guard shall be so fastened that it cannot be pushed into the sidewalk opening.

(e) Beveled toe-guards shall be provided under the edges of the sidewalk and under other projections, if any, as required by section Ind 4.15.

1. If the platform of an existing sidewalk elevator rises above the sidewalk, similar toe-guards shall be provided under the platform on all exposed sides.

2. If the platform of a sidewalk elevator rises above the sidewalk, aprons shall be attached to the under side of the platform fully protecting all exposed sides (see section Ind 4.87 (7)).

(f) Every existing power sidewalk elevator traveling not more than 15 feet, or more than one story, shall comply with sections Ind 4.02, 4.05, 4.06, 4.07, 4.12 (1), 4.15, 4.18 (1), 4.36 (3), and sections Ind 4.37 and 4.38 (as applied to the lower landing), 4.73 (5), (6) (b), (7), (8), (11), (12), (18), 4.74, 4.76 (2), 4.78 (1).

(g) Every existing power sidewalk elevator traveling more than 15 feet shall, in addition to section Ind 4.80 (1) comply with section Ind 4.65 (1).

(h) Hydraulic sidewalk elevators shall be subject to sections Ind 4.85, 4.86, 4.87, and 4.88 as may reasonably be applicable to sidewalk elevators.

(i) Every hand chain hoist elevator shall comply with sections Ind 4.12 (1), 4.37 and 4.38 (as applied to lower landing) 4.78 (1), 4.80 (1) and 4.80 (2).

(j) Every hand or existing power sidewalk elevator car platform shall be enclosed to a height of one foot on the sides not used for entrance.

History: Cr. Register, April, 1957, No. 16, eff. 5–1–57; r. (2), Register, July, 1959, No. 43, eff. 8–1–59.

Ind 4.801 Grade level elevators. (1) NEW INSTALLATIONS. (a) Every grade level elevator hereafter installed shall be subject to the following conditions:

1. Shall not pierce a sidewalk, or be located within a building, and shall not be located in an area used by people or vehicles as a place of travel.

2. Travel shall not exceed one story.

3. Shall be controlled and operated by a spring loaded constant pressure key switch located at the upper landing only, adjacent to the metal doors.

4. Speed shall not exceed 20 feet per minute.

5. Horizontal openings for grade level elevators shall be protected by weather-tight hinged metal doors having a non-slip upper surface.

6. Doors shall be of sufficient strength to support safely the static load of not less than 300 pounds per square foot uniformly distributed.

7. The limitations of the grade opening shall in no case exceed 5 feet at right angle to, and 7 feet parallel to the building line.

8. Hinges of the doors shall be of sufficient strength and be securely fastened to withstand the service of normal operation. The line of the hinges shall be at right angles to the building wall.

9. The edge of the door adjacent to any building wall or other obstruction shall not be more than 4 inches from such wall or obstruction.

10. There shall be a minimum clearance of 18 inches between the face of the door and any obstruction when the doors are in the open position.

11. The doors shall be opened by the ascending car and shall be self-closing as the car descends and shall be kept in the closed position when the car is not at the top landing. Stops shall be provided to prevent the doors from opening more than 85 degrees from their closed position.

12. If the platform of any grade level elevator rises above the grade level, the underside of the car platform shall be equipped with vertical aprons, protecting all exposed sides, extending at least 2 inches below the grade level when the car is at the upper limit of travel.

13. Guide shoes for grade level elevators (except plunger elevators) shall be at least 24 inches long unless 2 sets of shoes are used, spaced 18 inches between center.

14. If single guide shoes not less than 24 inches long are used, 6 inches of the shoe may be off the rail when the platform is level with the top landing.

(b) All wiring shall be in rigid conduit. Fittings, switches and all electrical equipment shall be of the waterproof type.

(c) Every grade level elevator shall comply with the requirements for power freight elevators excepting the provisions of section Ind 4.70 (5) and Ind 4.34 (2) and (a).

History: Cr. Register, July, 1959, No. 43, eff. 8–1–59.

Ind 4.81 Special type freight elevators. WINDING DRUM MACHINES. Winding drum machines may be used for freight elevators only; shall not have counterweights, and shall be limited to a capacity not to exceed 2500 pounds. The speed shall not exceed 50 feet per minute and the travel not to exceed 35 feet.

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

Power Chain or Cable Hoist

Ind 4.82 Special requirements. (1) Every power chain or cable hoist used in connection with an elevator shall comply with the following:

(a) Capacity shall not exceed 800 pounds.

(b) Speed shall not exceed 25 feet per minute.

(c) Travel shall not exceed 15 feet or more than one story, and a broken rope safety shall be provided when the travel exceeds 10 feet.

(d) The elevator shall be operated from the landings only and shall be constant pressure push button operation.

(2) In addition, the following sections or parts of sections with changes as noted shall also apply:

(a) Section Ind 4.10 (1). Hoistway enclosure.

(b) Section Ind 4.16 (1) (b) and (d).

(c) Section Ind 4.17. Pit depth shall be not less than 12 inches.

(d) Section Ind 4.23. The overhead supports shall be designed and constructed to carry the total load plus twice the load for impact.

(e) Section Ind 4.34 (1) and (2). Car enclosure.

(f) Section Ind 4.37 (11). Operation and height of gate.

(g) Section Ind 4.38. Gate construction.

(h) Section Ind 4.41. Safety factor.

(i) Section Ind 4.53 (2). Capacity plate.

(j) Section Ind 4.62 (2) (a). Slack cable.

(k) Section Ind 4.63 (4). Limit stops.

(l) Section Ind 4.65 (1). Brake.

(m) Section Ind 4.70 (3). Service switch.

(n) Section Ind 4.73. Wiring

(o) Section Ind 4.74. Grounding.

(p) Section Ind 4.76 (1). Car light.

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(3) All electric chain hoists shall be equipped with not less than ⅝ inch roller chain with a rated capacity of not less than 6,000 lbs.

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

Ind 4.83 Stage elevators. (1) EXISTING INSTALLATIONS. (a) Every elevator located below a stage and traveling one story only, shall have the opening on the stage floor equipped with a flush hatchway cover which, when the elevator is down, shall be closed, forming part of the stage floor.

(b) The opening in the stage floor shall be protected by toeguards as required in section Ind 4.15. The hoistway in the basement shall be enclosed with guards as described in section Ind 4.12 and a swinging door equipped with a lock shall be provided at each entrance. The speed of any elevator installed in such a manner shall not exceed 50 feet per minute. The carrying capacity of the car platform shall be as required in section Ind 4.27 (1).

(2) NEW INSTALLATIONS. (a) Every stage elevator hereafter installed shall be operated from one point only, from which point the operator shall be able to see the hoistway opening in the stage floor from at or above the stage floor level.

(b) The hoistway entrances on elevators hereafter installed shall be equipped with gates or doors provided with electric contacts and approved door locks or interlocks.

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

Hydraulic Elevators

Ind 4.85 Construction and general requirements; new installations. (1) Every piston rod of tension-type hydraulic elevators shall have a factor of safety of not less than 8, based on the cross-sectional area at the root of the thread. A true bearing shall be maintained under the nut at each end of the piston rod to prevent eccentric loading on the rod.

(2) Every hydraulic elevator machine, whether of the vertical or horizontal type, shall be so constructed and so roped that the piston will be stopped before the car can be drawn into the overhead work. A stop of ample strength shall be provided to bring the piston to rest when under full pressure without causing damage to the cylinder or cylinder head.

(3) The traveling sheaves for vertical hydraulic elevators shall be guided. The guide rails and guide shoes shall be of metal. The side frames of traveling sheaves for vertical hydraulic elevators shall be made of structural steel or of forged steel.

(4) Pressure tanks shall be made and tested in accordance with the requirements of the Wisconsin Boiler Code issued by the industrial commission.

(5) Every pressure tank that may be subjected to vacuum shall be provided with one or more vacuum valves to prevent collapse of the tank.

(6) Every pressure tank shall be so located and supported that inspection may be made of the entire exterior.

(7) Where a booster pump is used to operate a hydraulic elevator the operating device on the car must be so arranged that full control of the elevator in either direction is maintained.

(8) The outlet of each pressure tank shall be so located as to prevent the entrance of air or other gas into the elevator cylinder.

(9) Automatic stop valves shall be packed with cup leather, or other means shall be used to prevent sticking of the valve stems.

(10) Each pump connected to the pressure tank of a hydraulic elevator shall be equipped with a relief valve, so installed that it cannot be shut off. The relief valve shall be of sufficient size and so set as to pass the full capacity of the pump at full speed without exceeding the safe working pressure of the pump or tank. The relief valve shall be piped to discharge into the discharge tank or into the pump suction. Two or more relief valves may be used to obtain the capacity.

(11) Every elevator pump, unless equipped with a pressure regulator which controls the motive power, shall be equipped with an automatic by-pass.

(12) Every hydraulic elevator operated from a pressure tank where the fluid pressure is obtained by directly admitting steam, air or other gas to the tank shall comply with all the rules covering hydraulic elevators. For limitations in use see section Ind 4.60.

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

Ind 4.86 Safety equipment; new and existing installations. (1) The hand cable on every hydraulic elevator shall be equipped with a limit stop to prevent damage to the valve mechanism.

(2) Every tank for a hydraulic elevator shall be fitted with a ¼ inch pipe connection for attaching a test gauge when the tank is in service so that the accuracy of the pressure gauge can be ascertained.

(3) Every pressure tank shall be equipped with a water gauge glass to indicate the height of the water in the tank. Pet cocks may be used where pressure is obtained by steam, air, or other gas.

(4) Each pressure tank shall be equipped with a pressure gauge which correctly indicates pressure to at least 1½ times the normal working pressure of the tank. This gauge shall be connected to the tank by a brass or other non-corrodible pipe in such a manner that the gauge cannot be shut off from the tank except by a cock with a "T" or lever handle. (The "T" or lever must be set in line with the direction of the flow.) The cock shall be in the pipe near the gauge.

(5) The cylinders of hydraulic elevator machines, except plunger type machines, shall be provided with means for releasing air or other gas.

(6) Every hydraulic elevator hereafter installed shall be provided with an independent automatic means of gradually stopping the car at the terminal landings.

(7) Where a booster pump is used to operate a hydraulic elevator, means shall be provided so that full control of the elevator in either direction is maintained at all times by the operating device.

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

Ind 4.87 Plunger type elevators. New installations. (1) The piping system of plunger elevators shall be provided with proper means to eliminate or prevent water hammer in both directions of travel.

(2) The sections of the piston shall be rigidly joined, and the bottom section shall be so designed and installed that it cannot leave the cylinder.

(3) A cast iron plunger shall not be used in any case where the elevator travel is more than 50 feet.

(4) Every plunger type elevator operating on greater than 150 pounds pressure shall have extra heavy pressure pipe and fittings throughout.

(5) There shall be no lead piping in the water line between the plunger cylinder and the operating valve.

(6) The construction of the operating valve shall be such that the opening and closing of the valve will gradually stop the flow of water to and from the cylinder.

(7) No sidewalk elevator of the plunger type with sliding extended car guide rails shall rise more than 56 inches above any sidewalk.

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

Ind 4.88 Maintenance. (1) The piston rods of hydraulic elevator machines, except plunger type machines, shall be exposed for inspection at least once every 2 years. The preparation for such inspections shall be made by the owners or parties using the elevators.

(2) The discharge tank and the pressure tank of every hydraulic elevator shall be cleaned at least once every 2 years. The water level in the pressure tank of a hydraulic elevator shall be maintained at about two-thirds of the capacity of the tank.

(3) Each pump connected to the pressure tank of a hydraulic elevator shall be equipped with a relief valve so installed that it cannot shut off. The relief valve shall be of sufficient size and so set as to pass the full capacity of the pump at full speed without exceeding the safe working pressure.

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

Ind 4.89 Recabling hydraulic elevators. Where more than one vertical hydraulic cylinder is placed in the same hoistway, or where the horizontal cylinders are placed in duplex or triplex, the operation of all such connected elevators shall be stopped by closing the main water supply valve before recabling any one of the elevators.

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

Escalators

Ind 4.90 Construction. (1) ANGLE OF INCLINATION. (a) The angle of inclination of an escalator shall not exceed 30 degrees from the horizontal.

(2) WIDTH. (a) Escalators shall be not less than 22 inches nor more than 48 inches wide between the balustrading measured on the incline at a height of 27 inches vertically above the nose line of the steps. In no case shall such width exceed the width of the steps by more than 13 inches.

(3) BALUSTRADING AND HANDRAILS. (a) Escalators shall be provided on each side with solid balustrading. On the step side the balustrading shall be smooth, without depressed or raised paneling or molding, except for necessary protective moldings parallel to the run of the steps and vertical moldings projecting not more than ¼ inch and properly beveled and used to cover joints of panels.

(b) Where glass panels are used in balustrading, they shall be approved tempered type glass.

(c) The clearance between the step treads and the balustrading (curtain guard) shall not exceed ⅛ inch.

(d) There shall be no abrupt change in the width between the balustrades, and any change shall be not more than 8% of the greatest width.

(e) In changing from the greater to the smaller width the change in the direction of the balustrading shall be not more than 15 degrees from the line of travel.

(f) Each balustrading shall be equipped with a handrail moving at substantially the same speed and in the same direction as the travel of the steps.

(g) Each moving handrail shall extend at normal handrail height not less than 12 inches beyond the line of the comb plate teeth at the upper and lower landings, except that for speeds of 75 F.P.M. or less, and/or a width of 30 inches or less, the handrail extension may be stationary.

(h) Hand or finger guards shall be provided at the point where the handrail enters the balustrading.

(i) A guard shall be installed in the apex of the angle formed where the balustrading meets a ceiling or soffit line.

(4) TREADS AND LANDINGS. (a) Step frames and treads shall be of incombustible material. Step treads shall be horizontal and of a material and design affording a secure foothold. Exception: Slow burning material may be used for treads provided they are covered on the underside with sheet metal not less than No. 27, U. S. gauge.

(b) The depth of any step tread in the direction of travel shall be not less than 15¾ inches, and the rise between treads shall not exceed 8½ inches. In no case shall the width of a step tread be less than 16 inches.

(c) The maximum clearance between treads on the horizontal run shall be ⅛ inch.

(d) The tread surface of each step shall be slotted in a direction parallel to the travel of the steps. Each slot shall be not more than ¼ inch wide and not less than ⅜ inch deep, and the distance from center to center of adjoining slots shall be not more than ⅜ inch.

(e) There shall be a comb plate at the entrance and exit of every escalator. The comb plate teeth shall be meshed with and set into the slots in the surface of the tread, so that the points of the comb teeth are always below the top surface of the treads.

(f) Comb plates shall be adjustable in both the horizontal and vertical directions.

(g) Sections forming the comb plate teeth shall be so arranged as to be readily replaceable without the use of special tools.

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

Ind 4.91 Strength of trusses or girders. The truss or girder shall be so designed that it will safely sustain the steps and running gear in case of failure of the track system to retain the running gear in its guides.

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

Ind 4.92 Track arrangement. The track arrangement shall be designed to prevent displacement of the steps and running gear if a step chain breaks.

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

Ind 4.93 Capacity and loading. (1) The contract load, in pounds, shall be computed by the following formula:

$$\text{Contract Load} = 4,6WA$$

(a) In this formula, W is the width of the escalator treads in inches, and A the horizontally projected distance in feet between the upper and lower comb teeth.

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

Ind 4.94 Factors of safety. (1) The factors of safety to be used in the design of escalators shall be at least the following, based on the static loads:

(a) For trusses and all structural members including tracks, 5.

(b) For escalators driving machine:

1. For wrought iron or wrought steel, 8,
2. For cast iron, cast steel, or other materials, 10.

(c) For power transmission members, 10, except step chains composed of cast steel links which shall be thoroughly annealed, in which case the factor of safety shall be 20.

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

Safety Requirements

Ind 4.95 Limits of speed. The rate of speed of the steps measured along the angle of inclination shall not exceed 125 feet per minute.

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

Ind 4.96 Application of power. An electric motor shall not be used as a driving means for more than one escalator. The drive machine shall be connected to the main drive shaft by toothed gearing or a coupling, or shall be connected by a chain.

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

Ind 4.97 Safety devices. (1) The following safety devices shall be provided.

(a) An emergency stop button or other type of switch marked "STOP BUTTON" or "STOP SWITCH" shall be conspicuously located in a readily accessible position, at or near the top and bottom landing of each escalator and shall be guarded against accidental contact. The operation of either one of these buttons or switches shall cause the interruption of power to the drive machine.

(b) It shall be impossible to start the drive machine by means of these buttons or switches.

(c) Starting buttons or switches shall be located within sight of the escalator and shall be of the key-operated type.

(d) A speed governor shall be provided which will cause the interruption of power to the drive machine in case the speed of the steps exceed a predetermined value which shall be not more than 40% in excess of the normal running speed.

(e) A broken step chain device shall be provided that will cause the interruption of power to the drive machine in case a step chain breaks and, where no automatic chain tension device is provided, in case excessive sag occurs in either step chain.

(f) Where tightening devices operated by means of tension weights are provided for any purpose, provision shall be made to retain these weights in the truss in case the weights should fall.

(g) Each escalator shall be provided with an electrically released, mechanically applied brake of sufficient power to stop it when fully loaded.

(h) This brake shall automatically stop the escalator when operating or tending to operate in the descending direction in case any of the above safety devices fail to function.

(i) If the drive machine is connected to the main drive shaft by a chain, a device shall be provided which will cause the application of a brake on the main drive shaft in case the drive chain parts.

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

Ind 4.98 Lights and access. (1) Permanent provision for artificial lighting shall be provided in every machine room, which can be lighted without passing over or reaching over any part of the machinery.

(2) Reasonable access to the interior of the escalator shall be provided for inspection and maintenance.

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

Ind 4.99 Tests. (1) Each type of escalator shall be type tested for the contract load which it is designed to carry. Such tests may be made at the option of the manufacturer in his plant or on the first escalator of that type installed in a building. In case the first installation of a given type is not of sufficient rise and/or width to permit testing it for the maximum rated load of the type, subsequent type tests shall be made with load until a maximum load test has been made.

(2) All installations made subsequent to the type tests shall be tested in the field without load as follows:

(a) Speed tests. The application of the overspeed safety device shall be obtained by causing the escalator to travel at governor tripping speed as specified in section Ind 4.97 (d), except where an alternating current driving motor is used the governor switch may be tripped by hand at normal speed.

(b) Broken step chain. The application of the broken step chain device called for in section Ind 4.97 (e) shall be obtained by operating the actuating device by hand.

(c) Broken drive chain. The broken drive chain device called for in section Ind 4.97 (1), where a drive chain is provided, shall be tested by operating the actuating device by hand.

(d) Stop buttons. The emergency stop buttons called for by section Ind 4.97 (1) (a) shall be tested by operating these buttons when the escalator is operated in each direction of travel.

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