Chapter Ind 4

ELEVATOR CODE

History: Chapter Ind 4 as it existed on October 31, 1964 was repealed and a new chapter Ind 4 was created effective November 1, 1964.

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 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 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 the platform, car frame, and enclosure.

(7) CAR DOOR OR GATE. A 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 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 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 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 frame all of whose members are located below the car platform.

(12) CAR PLATFORM. A structure which forms the floor of the car and 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 *BOTTOM OVERTRAVEL.*)

(14) CLEARANCE. TOP CAR. Overhead or top clearance of the elevator car is the shortest vertical distance between the car crosshead and appurtenances and the nearest part of the overhead structure or any other obstruction when the car floor is level with the top landing.

(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) RUNBY, BOTTOM. Of an elevator car is the distance the car floor can travel below the level of the lower terminal landing until the car strikes its buffer.

(a) Bottom runby of an elevator counterweight is the distance the counterweight can travel below its position when the car floor is level with the upper terminal landing until the counterweight strikes its buffer.

(16) TOP, OVERTRAVEL. Of a traction elevator is the distance the car platform can travel above the level of the upper terminal landing until the counterweight buffer is fully compressed.

(a) Top overtravel, of an oil hydraulic 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.

(b) Top overtravel of the counterweight is the distance the counterweight can travel above its position when the car platform is level with the bottom terminal landing until the car buffer is fully compressed.

(17) 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.

(18) CONTRACT LOAD, OR RATED LOAD, (CAPACITY). The approved safe live load specified in application and plans submitted for approval.

(19) RATED SPEED. The speed at which the elevator, power dumbwaiter, escalator or moving walk or moving ramp is designed to operate under the following conditions.

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

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

(c) *Moving walk.* The rate of travel of the treadway measured along the line of travel or angle of inclination with the rated load on the treadway.

(20) CONTROL. The system governing the starting, direction of motion, stopping, 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 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.

(21) CABLE LOCK. A device installed and maintained so that the operating cable can be locked at any landing.

(22) CENTERING ROPE. Used in connection with hand cable control which, when pulled, will throw the operating device to the stop position.

(23) DOOR OR GATE DEVICE, POWER OPERATED. 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.

(a) *Doors.* See Hoistway Door or Gate, this section (Definition 37).

(24) DUMBWAITER. 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.

(25) 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.

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

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

(d) *Power elevator.* An elevator utilizing means other than gravity or manual energy 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 freight elevator, the hoistway being located partially outside the building and having no opening into the building at the upper terminal landing.

(j) *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.

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

(m) *Grade level elevators.* 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.

(n) *Material-handling elevators.* A hoisting and lowering mechanism equipped with a car platform used in conjunction with manual or automatic loading and/or unloading devices and that moves in guides in a substantially vertical direction and the travel exceeds 56 inches.

(26) EXISTING INSTALLATIONS. Every installation installed before November 1, 1964.

(27) NEW INSTALLATIONS. Every installation for which the contract was let after November 1, 1964.

(a) Every elevator or power dumbwaiter, escalator which, after November 1, 1964, is moved to a new location.

(b) Any complete part of an existing installation which is materially altered or replaced with new after November 1, 1964.

(c) 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 November 1, 1964.

(d) Every elevator or power dumbwaiter which is enlarged or the travel extended.

(28) ESCALATOR. A power-driven, inclined, continuous arrangement of steps used for raising and lowering passengers.

(29) MOVING WALKS AND MOVING RAMPS.

(a) *Landing.* The stationary area at the entrance or exit from a moving walk or moving ramp.

(b) *Moving walk or moving ramp.* A type of passenger-carrying treadway on which passengers stand or walk and in which the passenger-carrying surface remains parallel to its direction of travel and its movement is uninterrupted.

(c) *Moving walk or moving ramp, belt type.* A power-driven continuous belt treadway.

(d) *Moving walk or moving ramp, belt pallet type.* A series of connected and power-driven pallets to which a continuous treadway is fastened.

(e) *Moving walk or moving ramp, pallet type.* A series of connected and power-driven pallets which together constitute the treadway.

(f) *Moving walk or moving ramp, roller type.* A belt supported by a succession of rollers with their axes at right angles to the direction of the treadway motion.

(g) *Moving walk or moving ramp, slider-bed type.* A treadway sliding upon the supporting surface.

(h) *Moving walk, system.* A series of moving walks on an end to end or side by side relationship.

(j) *Pallet.* One of a series of rigid platforms which together form an articulated treadway or the support for a continuous treadway.

(k) *Treadway.* The exposed passenger-carrying member of a moving walk or moving ramp.

(m) *Moving walk.* A moving walk having a slope or angle not exceeding 3 degrees with the horizontal.

(n) *Moving ramp.* A moving ramp having a slope or angle exceeding 3 degrees with the horizontal.

(o) *Threshold comb.* The toothed portion of a threshold plate designed to mesh with a grooved treadway surface.

(p) *Threshold plate.* That portion at the entrance or exit to the treadway consisting of one or more stationary or slightly movable plates.

(30) EMERGENCY STOP SWITCH. An emergency stop switch (safety switch) is a device in the car used manually to cut off the power from the elevator machine independently of the operating devices.

(31) FACIA PLATE. A metal plate not less than $\frac{1}{8}$ inch 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.

(32) FIRE-RESISTIVE CONSTRUCTION.

Note: Refer to Building Code, Wis. Adm. Code, section Ind 51.05

(33) FULL-AUTOMATIC DOOR OR GATE. A vertically moving door or gate which is opened directly by the motion of the elevator car approaching the terminal landings and closed by gravity as the car leaves the landing.

(34) HOISTWAY, ELEVATOR OR POWER DUMBWAITER. A shaftway for the travel of one or more elevators or power 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.

(35) 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.

(36) HOISTWAY ACCESS SWITCH. Switches located at the lower and upper terminal landings to permit access to the pit and top of the car. The car travel limited to a zone sufficient for the full door opening.

(37) HOISTWAY DOOR OR GATE. (a) *Door.* A hoistway landing door is one which completely fills the door opening giving access to the elevator or dumbwaiter 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.

(c) *Hoistway 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 hoistway door or gate is in the closed position.

(d) *Hoistway bi-parting door.* A vertical or horizontal sliding door 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 vertically moving door or gate which is opened directly by the motion of the elevator car approaching the landing and closed by gravity as the car leaves the landing.

(f) *Hoistway semi-automatic door or gate.* 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 door or gate which is opened and closed by hand.

(h) *Hoistway power-operated door or gate.* A door or gate which is opened and closed by power other than by hand, gravity, springs, or the movement of the car.

(j) *Hoistway power-operated door or gate, automatically opened.* A door or gate which is opened by power, 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 door or gate which is opened and closed by power, the door movement in each direction being controlled by the elevator operator.

(m) *Hoistway, telescoping gate.* A gate in which the sections slip together without distortion of the section.

(n) *Hoistway door, fire-resistive.* See Building Code, Wis. Adm. Code, section Ind 51.09.

(38) HOISTWAY LANDING DOOR INTERLOCKS. (a) *Existing installations.* 1. Mechanical interlocks. A mechanical hoistway landing door interlock is a device, limited to the following:

a. Elevators controlled from the car, and the hoistway provided with horizontally sliding doors equipped with a door locking device at each landing actuated by a related control unit in the car, thereby locking the car switch, lever, crank or wheel to prevent the operation of the driving machine by the normal operating device unless the hoistway landing door at that landing is locked within 4 inches of the fully closed position; and

b. To prevent the opening of a hoistway landing door from the landing side except by means of a special key.

2. Electro-mechanical interlock. A hoistway landing door interlock is a combination of electrical and mechanical devices which are:

a. To prevent the operation of the elevator driving machine by the normal operating device unless all hoistway landing doors are locked within 4 inches of the fully closed position; and:

b. To prevent the opening of the hoistway landing doors from the landing side except by means of a special key.

(b) *New installations.* 1. Hoistway door interlock. A device having 2 related and interdependent functions which are:

a. To lock the hoistway landing door in the closed position before the driving machine can be operated by the normal operating device.

b. To prevent the opening of the hoistway landing door from the landing side unless the car is within the leveling zone.

2. Hoistway unit system. A series of hoistway door interlocks, hoistway door electric contacts or hoistway door combination mechanical locks and electric contacts, or a combination thereof, the function of which is to prevent operation of the driving machine by the normal operating device unless all landing doors are locked in the closed position.

(39) LEVELING ZONE. The limited distance above or below an elevator landing, within which the leveling device may cause movement of the car toward the landing.

(40) LEVELING DEVICE, CAR. A leveling device is any mechanism or control which will move the car within a limited zone toward, and stop the car at the landing.

(41) OPERATING DEVICE. A car switch, push button, rope, wheel, lever, treadles, etc., employed to enable the operator to actuate the controller.

(42) 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.

(43) 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.

(44) AUTOMATIC OPERATION. An 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.

(45) NON-SELECTIVE COLLECTIVE AUTOMATIC OPERATION.. An 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.

(46) SELECTIVE COLLECTIVE AUTOMATIC OPERATION. An operation by means of one button in the car for each landing level served and by "Up" and "Down" button 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 direc-

tion 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.

(47) SINGLE AUTOMATIC OPERATION. An 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.

(48) CAR-SWITCH OPERATION. An 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.

(49) CAR-SWITCH AUTOMATIC FLOOR-STOP OPERATION. An 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.

(50) CONTINUOUS-PRESSURE OPERATION. An 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.

(51) DUAL OPERATION. 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, buttons may, however, be used to signal the operator that the car is desired at certain landings.

(52) PRE-REGISTER OPERATION. An 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.

(53) SIGNAL OPERATION. An 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.

(54) 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.

(55) RACEWAYS. Any channel for holding wires, or cables, which is designed expressly for, and used solely for, this purpose. Raceways shall be of metal and this term includes rigid metal conduit, flexible metal conduit or electrical metallic tubing.

(56) SAFETY, CAR OR COUNTERWEIGHT. A mechanical device attached to the car or frame to stop and hold the car or counterweight in case of predetermined overspeed, free fall, or slackening of the cables.

(57) SLACK-CABLE SWITCH, ELEVATOR. A slack-cable switch is a device for automatically cutting off the power in case the hoisting cables become slack.

(58) TERMINAL LANDING. The highest and lowest landing served by the elevator.

History: Cr. Register, October, 1964, No. 106, eff. 11–1–64.

SCOPE

Ind 4.01 General scope. The requirements of this code shall apply to every elevator, power dumbwaiter, material handling elevator, moving walk or moving ramp, or escalator installed in public buildings and places of employment as defined by Wisconsin statutes. This requirement applies to both existing installations and those hereafter installed unless otherwise specified.

History: Cr. Register, October, 1964, No. 106, eff. 11–1–64.

Ind 4.02 Renewing of elevator, dumbwaiter, escalator, etc. Where part or parts of equipment of an elevator, power dumbwaiter, material handling elevator, moving walk or ramp or escalator are impaired through ordinary wear, damage or deterioration by fire or other causes, to 50% of the original condition, the equipment shall be repaired or rebuilt in conformance with the requirements for new installations.

History: Cr. Register, October, 1964, No. 106, eff. 11–1–64.

Ind 4.03 Exemptions. (1) This code does not apply to the following.

(a) Belt, bucket, scoop, roller or similar inclined or vertical freight conveyors, portable tiering or piling machines when not serving more than the floor on which the tiering or piling machine is located.

(b) Skip hoists, belt manlifts, mine hoists, wharf ramps or apparatus in kindred classes, amusement devices, stage curtain hoists or lift bridges, nor to elevators with a travel less than 56 inches.

(c) 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 Wis. Adm. Code section Ind 35.28 to 35.31, inclusive, of the Safety in Construction Code issued by the industrial commission.

(d) For belt manlift requirements, see Wis. Adm. Code, section Ind 1.69, Safety code.

(e) For the employment of minors under 18 years of age see Wis. Adm. Code, section Ind 70.09 (1), Wages and Hours code.

History: Cr. Register, October, 1964, No. 106, eff. 11–1–64.

Ind 4.04 Plans; new installations. (1) Before starting work on any new installation of an elevator, power dumbwaiter, material handling elevator, moving walk or moving ramp, 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.

(2) Every manufacturer who furnishes equipment as described in subsection (1) to be installed by the owner or an agent of the owner, shall submit plans and application.

(3) 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.

(d) The guide rail bracket spacing.

(e) The size and weight per foot of any guide rail reinforcements where provided.

(4) The form referred to under subsection (1) is SB–22 "Application for Construction, Erection and Remodeling" and may be obtained from the Industrial Commission, Hill Farm State Office Building, 4802 Sheboygan Avenue, Madison, Wisconsin 53702.

(5) A plan examination fee in the amount established by Wis. Adm. Code section Ind 69.20 shall be paid for each installation requiring approval.

(6) Subsection (1) shall not apply in cities where permits are issued by the city in a manner approved by the industrial commission.

History: Cr. Register, October, 1964, No. 106, eff. 11–1–64.

Ind 4.05 Inspections. (1) INTERVAL. Every elevator, power dumbwaiter, material handling elevator, moving walk or moving ramp, or escalator operated in the state of Wisconsin shall be subjected to a regular inspection once every 12 months.

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

(a) Each installation shall be inspected at least 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.

(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, material handling elevator, moving walk or moving ramp, or escalator, as the case may be, and shall show the date of inspection, name of insurance company, name of inspector, and rated capacity.

(d) The insurance company shall use all reasonable diligence to secure compliance with the commission's rules. 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 Wis. Adm. Code 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 written tests.

1. The form referred to under subsection (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.

History: Cr. Register, October, 1964, No. 106, eff. 11–1–64.

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 Wis. Adm. Code section Ind 4.05 (2) (a), (c), (d)), and (e) are complied with, substituting "city" for "insurance company".

History: Cr. Register, October, 1964, No. 106, eff. 11–1–64.

Ind 4.07 Inspection fee. A charge in accordance with the fee schedule established by Wis. Adm. Code section Ind 69.25 will be made by the industrial commission of each inspection of each elevator, power dumbwaiter, material handling elevator, moving walk or moving ramp, or escalator.

History: Cr. Register, October, 1964, No. 106, eff. 11–1–64.

Ind 4.08 Tests and inspections; new installations. (1) Every elevator, power dumbwaiter, material handling elevator, moving walk or moving ramp, or escalator shall be tested and inspected in conformance with the code requirements by a representative of the industrial commission before the installation is placed in service.

(a) The party installing such an installation shall give notice to the industrial commission not less than 10 days prior to the time the installation is complete and ready for inspection.

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

History: Cr. Register, October, 1964, No. 106, eff. 11–1–64.

Ind 4.10 Hoistway enclosures. (1) EXISTING INSTALLATIONS. (a) The hoistway of every existing passenger or freight elevator or power dumbwaiter where the travel does not exceed 2 stories, and where a fire-resistive enclosure is not required, shall be solidly enclosed with wood or metal to not less than 6 feet in height, and shall withstand a horizontal force of 100 pounds with not more than 1 inch deflection at any point.

(2) NEW INSTALLATIONS. (a) The hoistway of every passenger elevator shall comply with the requirements as described in this subsection.

1. The hoistway enclosure in buildings of ordinary or frame construction shall be not less than 1-hour, fire-resistive construction. (See

subsection (2) (c) and (d) and Wis. Adm. Code section Ind 4.31 for hoistway landing doors.)

2. The hoistway, regardless of travel in buildings of fire-resistive or mill construction, shall be enclosed with not less than 2-hour, fire-resistive construction. (See Wis. Adm. Code section Ind 4.31 for hoistway landing doors.)

(b) The hoistway of every freight elevator or power dumbwaiter shall comply with the requirements as described in this subsection.

1. The hoistway in buildings of ordinary or frame construction, where the travel does not exceed 2 stories, shall be solidly enclosed with wood or metal and shall withstand a horizontal force of 100 pounds with not more than 1 inch deflection at any point. (See subsection (2) (d))

2. The hoistway in buildings of ordinary or frame construction 3 stories or more in height, shall be enclosed with not less than 1-hour, fire-resistive construction. (See Wis. Adm. Code sections Ind 4.38 and 4.79 for hoistway landing doors.)

3. The hoistway regardless of travel in buildings of fire-resistive or mill construction shall be enclosed with not less than 2-hour, fire-resistive construction. (See Wis. Adm. Code sections Ind 4.38 and 4.79 for hoistway landing doors.)

a. *Exception.* 1. An elevator or power dumbwaiter hoistway which is placed in a fire-resistive stair enclosure, need not have an additional fire-resistive enclosure, but the hoistway shall be solidly guarded above each floor and every stairway with incombustible material and shall withstand a horizontal force of 100 pounds with not more than 1 inch deflection at any point.

b. *Exception.* 2. Elevators installed in power plants or similar buildings where landings consist of grille work, perforated metal or catwalks, the hoistway may be enclosed to a height of not less than 7 feet above each landing, provided the space in front of each car entrance opening shall be enclosed with a solid guard the full height of the hoistway. This guard shall be in a plane not more than 7 inches from the edge of the car.

(c) Where a passenger or freight elevator or power dumbwaiter is installed in a building which includes a *theatre or assembly* hall the hoistway enclosure shall be not less than 2-hour, fire-resistive construction. (See Wis. Adm. Code sections Ind 4.31, 4.38 and 4.79 for hoistway landing doors.)

(d) Where a passenger or freight elevator or power dumbwaiter is installed in an *apartment building, hotel, dormitory, convent, monastery, hospital, nursing home, or place of detention,* the hoistway shall comply with the requirements described in this subsection.

1. Where the building is of ordinary or frame construction and the travel does not exceed 2 stories, the hoistway shall be not less than 1-hour, fire-resistive construction. (See Wis. Adm. Code sections Ind 4.31, 4.38, and 4.79 for hoistway landing doors.)

2. Where the building is of ordinary or frame construction, 3 stories or more in height, the hoistway shall be not less than 2-hour, fire-resistive construction. (See Wis. Adm. Code sections Ind 4.31, 4.38, and 4.79 for hoistway landing doors.)

3. Where the building is of fire-resistive construction, regardless of travel, the hoistway enclosure shall be not less than 2-hour, fire-

resistive construction. (See Wis. Adm. Code sections Ind 4.31, 4.38, and 4.79 for hoistway landing doors.

(e) Windows shall be prohibited in an elevator hoistway.

(f) The hoistway for elevators located on the outside of a building shall be enclosed to conform with the requirements as follows:

1. Shall be solidly enclosed at ground floor to the height of not less than 7 feet.

2. The hoistway over the lower landing entrances shall be solidly enclosed the entire height of the hoistway; not more than 7 inches from the edge of the car.

History: Cr. Register, October, 1964, No. 106, eff. 11–1–64.

Ind 4.12 Guarding of hoistways; existing installations. (1) 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 shall be cut in the enclosure.

Note: 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 but not more than 15 inches in width.

(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 the ceiling shall be enclosed with vertical wood or metal bars spaced not more than 2 inches apart. This enclosure shall be in a plane not more than 8 inches from the edge of the car.

(4) The hoistway for elevators located on the outside of a building shall be enclosed to conform with the requirements as follows:

(a) Shall be solidly enclosed at the ground floor to a height of not less than 7 feet.

(b) The hoistway over the lower landing entrances shall be solidly enclosed the entire height of the hoistway; not more than 7 inches from the edge of the car.

History: Cr. Register, October, 1964, No. 106, eff. 11–1–64.

Ind 4.14 Guards for outside windows in hoistways; 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 a 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.

1. *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, October, 1964, No. 106, eff. 11–1–64.

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 metal guards not less than ⅛ inch in thickness and beveled to make an angle of not less than 60 degrees with the horizontal.

(a) *Exception.* The requirements of subsection (1) shall not apply to door hangers and power driving devices; nor the projections of 1 inch or less on door lintels; nor to projections into the hoistway on interlocks or other door locking 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) Elevators equipped with a leveling device shall have the hoistway entrance sill provided with vertical guards extending down to a point not less than 2 inches beyond the leveling zone and beveled at the lower edge as required in subsection (1).

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

(a) An inching device, controlled by means of up-and-down continuous pressure buttons or switches located in the car and when used with the hoistway door or gate, or car door or gate open; vertical guards shall be provided below the car platform to conform with subsection (4).

(5) For passenger elevators hereafter installed, the clearance between the edge of the car sill and the hoistway wall or facia plate shall not exceed 4 inches, and the width shall be not less than the full car door or gate opening.

History: Cr. Register, October, 1964, No. 106, eff. 11–1–64.

Ind 4.16 Car and landing clearances. (1) The clearances between the car entrance sill and any landing sill shall be not less than ½ inch, and not greater than 1½ inches, except for corner post construction the clearance shall be not less than ¾ inch.

(2) For every automatic-operation elevator the distance from the hoistway face of the door or gate to the edge of the hoistway sill, measured from the face of the door or gate nearest the car shall be not more than the following:

(a) Swinging doors, 1 inch.

(b) Vertical or horizontal sliding doors, 2¼ inches.

(c) Gates, 4 inches.

(d) For existing installations where the clearance exceeds that as outlined in the subsection (2) (a), the space between the hoistway side of the landing door and the edge of the landing sill shall be filled in by suitable means.

(e) The hoistway face of the hoistway landing door or gate shall not project into the hoistway beyond the edge of the landing sill.

(3) For freight elevators other than automatic-operation the distance from the hoistway face of the door or gate to the edge of the hoistway sill measured from the face of the door or gate nearest the car shall be not more than 4 inches.

(4) For freight elevators where hoistway landing gates are provided the clearance between the hoistway wall and the edge of any car entrance sill shall be not greater than 7 inches at any point.

(5) For freight elevators a clearance between the hoistway wall and the edge of any car entrance sill shall be not greater than outlined in this subsection.

(a) Four (4) inches for horizontal sliding hoistway landing doors.

(b) Seven (7) inches for vertical bi-parting counterbalanced hoistway landing doors.

(c) Eight (8) inches for vertical pass type counterbalanced hoistway landing doors.

(6) For every automatic operation elevator the car door or gate shall be so located that the distance from the face of the hoistway door or gate nearest to the landing sill to the face of the car door or gate nearest to the car sill shall be not more than 5½ inches.

(7) The clearance between any part of the elevator hoistway wall and the elevator car or counterweight and appurtenances shall have a clearance of not less than ¾ inch.

(8) The clearance between the car platform and the counterweight shall be not less than 1½ inches.

History: Cr. Register, October, 1964, No. 106, eff. 11-1-64.

Ind 4.17 Elevator pits. (1) A pit shall be provided for every power elevator.

(a) The pit shall be at least equal in area to the hoistway. The walls and floor shall be substantially constructed of incombustible material forming a tight enclosure. The construction of the pit floor and supports shall be adequate to resist the impact of the counterweight or the fully loaded car striking the buffer at governor tripping speed. The floor shall be approximately level.

(2) Where water cannot be kept out of a pit with ordinary construction, proper drains or sumps, with or without pumps, shall be provided with cover, or a pit tank shall be constructed of not less than ¼ inch steel plate.

(3) Where existing foundation footings are encountered in a new or altered installation and it is impractical to disturb the footings, the maximum permissible encroachment shall be not more than 15% of the cubic content of the pit.

(4) Where there is a difference in level of floors of adjacent pits greater than 8 inches, a solid guard of incombustible material shall be provided to separate such pits. Guards shall extend not less than 6 feet above the level of the higher pit floor.

(5) Access shall be provided to all pits to conform with Wis. Adm. Code sections Ind 4.31 (5) (a) and (6) (a) and Ind 4.38 (1) (a) 7. and Ind 4.38 (2) (b) 7. and 8., or by means of a separate pit entrance access door.

(a) Where separate access pit doors are provided the doors shall be at least 2 feet by 6 feet in size and equipped with self-acting locks, arranged to permit the doors to be opened from inside the pit without a key.

(6) A fixed ladder shall be provided in the pit of every elevator hereafter installed. This ladder shall be of incombustible material, located within reach of the access door and shall extend not less than 30 inches above the sill of the access door, or hand grips shall be provided to the same height.

(a) *Exception.* Where separate pit entrance access doors are provided.

(7) 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 accessible from the pit access door adjacent to the ladder when ladders are used and approximately in line with the pit access door sill. 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.

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

History: Cr. Register, October, 1964, No. 106, eff. 11-1-64.

Ind 4.18 Minimum pit depth and overhead clearance. (1) The pit depth for every power elevator hereafter installed shall be not less than the number of inches specified in the requirements outlined in Tables 2 and 3 of this section. The depth of trenches, depressions or foundation encroachments as of Wis. Adm. Code section Ind 4.17 (3) shall not be considered in determining the pit depth.

(a) For cable and hydraulic elevators the bottom runby for the car and counterweight shall be not less than shown in Table 1.

TABLE 1

Cable Elevators				Hydraulic Elevators		
Speed F.P.M.	Control	Buffers	Runby	Speed F.P.M.	Buffers	Runby
25 to 50	Rheostatic	Spring	6 inches	100 or less	Spring	3 inches
Between 51 and 100	Rheostatic	Spring	9 inches	100 to 300	Spring	6 inches
Over 100	Rheostatic	Spring	12 inches			
Up to 200	Generator Field Control	Spring	6 inches			
Over 200	Generator Field Control	Oil	6 inches			

1. Maximum bottom runby for car shall not exceed 12 inches.

2. The maximum bottom runby for counterweight shall not exceed 24 inches.

(b) The minimum pit depth for elevators hereafter installed requiring spring buffers shall be not less than shown in Table 2.

TABLE 2

MINIMUM PIT DEPTH—ELEVATORS HAVING SPRING BUFFERS

Contract Speed F.P.M.	Capacity 0 to 3000	Capacity 3001 to 6000	Capacity 6001 to 10,000	Capacity 10,001 to 16,000	Capacity 16,000 and over
25 to 50	42 inches	48 inches	54 inches	60 inches	66 inches
51 to 100	48 inches	54 inches	60 inches	66 inches	72 inches
101 to 200	54 inches	60 inches	66 inches	72 inches	76 inches

(c) The minimum pit depth for elevators requiring oil buffers shall be not less than shown in Table 3.

TABLE 3

MINIMUM PIT DEPTH—ELEVATORS HAVING OIL BUFFERS

Contract Speed F.P.M.	Capacities up to 10,000 pounds	Capacities 10,001 pounds and over
201 to 300	76 inches	82 inches
301 to 400	88 inches	94 inches
401 to 500	104 inches	110 inches
501 to 600	120 inches	126 inches
601 to 700	138 inches	144 inches
701 to 800	150 inches	156 inches

Note: Interpolation may be used for intermediate speeds.

1.*Exception.* 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 oil buffer, provided the pocket is 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 not be included in the pit depth.

(2) When the car rests on the fully compressed buffer, there shall be at least two feet clearance vertically between the lowest projection of the underside of the car platform, except guide shoes and aprons attached to the car sill, and any obstruction in the pit, exclusive of compensating device, buffer, and buffer supports. In no case shall the pit depth be less than shown in Tables 2 and 3 of this section.

(3) For every power cable and hydraulic elevator hereafter installed requiring spring buffers, the minimum overhead clearance for car and counterweight shall be not less than shown in Table 4.

TABLE 4

Cable Elevators			Hydraulic Elevators	
Contract Speed F.P.M.	Overhead Car Clearance	Overhead Counterweight Clearance	Contract Speed F.P.M.	Overhead Car Clearance
0 to 100	42 inches	30 inches	0 to 50	36 inches
101 to 200	48 inches	36 inches	51 to 100	42 inches
			Over 100	48 inches

(4) For every power elevator hereafter installed requiring oil buffers, the minimum top clearance for car and counterweight shall be not less than shown in Table 5.

TABLE 5

CABLE ELEVATORS

Contract Speed F.P.M.	Overhead Car Clearance	Overhead Counterweight Clearance
201 to 300	60 inches	42 inches
301 to 400	66 inches	48 inches
401 to 500	72 inches	54 inches
501 to 600	84 inches	66 inches
601 to 700	96 inches	78 inches
701 to 800	102 inches	84 inches

Note: Interpolation may be used for intermediate speeds.

(5) In no case shall the car strike any part of the overhead when the counterweight is fully compressed on the buffer at governor tripping speed.

History: Cr. Register, October, 1964, No. 106, eff. 11–1–64.

Ind 4.19 Buffers. (1) Spring or oil buffers shall be installed under the cars and counterweights of every power elevator as described in this subsection.

(a) Spring buffers may be used where the contract speed does not exceed 200 feet per minute.

(b) Spring buffers for cars and counterweights shall be capable of supporting a static load having a minimum of twice and a maximum of three times the total weight of the car plus the contract load or of the weight of the counterweight respectively without being compressed completely solid.

(c) The stroke of the buffer springs shall be equal to or greater than shown in Table 6 of this section.

TABLE 6

Contract Car Speed Feet Per Minute	Stroke in Inches
100 or less	1½
101 to 150	2½
151 to 200	4

(2) Approved type oil buffers shall be used for car and counterweight when the contract speed exceeds 200 feet per minute.

Exception. Where type C safeties are used, oil buffers are not required in the pit.

(a) Where type C safeties are used, switches shall be provided in connection with the oil buffers as outlined in this subsection.

1. A switch shall be provided which will automatically interrupt the power circuit in the event the buffer is compressed more than 10% of its stroke.

2. A switch shall be provided which will automatically interrupt the power circuit in the event the oil in buffer is below the minimum required level.

(3) Oil buffers shall develop an average retardation not in excess of 32.2 feet per second per second; and shall develop no peak retardation greater than 80.5 feet per second per second having a duration exceeding (1/25th) of a second with any load in the car from contract load to a minimum load of 150 pounds when the buffers are struck with an initial speed of not more than 115% of the rated speed.

(a) The minimum stroke for car and counterweight oil buffer shall be such that the car or counterweight on striking the buffers at 115% of the rated speed as shown in Table 7 of this section shall be brought to rest with an average retardation of not more than 32.2 feet per second per second.

TABLE 7

Rated Speed in Feet Per Minute	115% of Rated Speed in Feet Per Minute	Gravity Slowdown Distance in Inches at 115% of Rated Speed	Minimum Strokes of Oil Buffers Permitted in Inches
200	230	2¾	2¾
225	259	3½	3½
250	288	4¼	4¼
300	345	6¼	6¼
350	402	8¼	8¼
400	460	11	11
450	517	13¾	13¾
500	575	17	17
600	690	24¾	24¾
700	805	33¼	33¼
800	920	43¾	43¾

(4) When a new or altered elevator is installed in an existing hoistway and foundation footings are encountered as outlined in Wis. Adm. Code section Ind 4.17 (3), the minimum buffer stroke as speci-

fied in Table 7 of this section may be reduced provided an emergency terminal stopping device as described in this subsection is used and which will limit the speed at which the car or counterweight can strike its buffer. The reduced stroke shall be based on at least 115% of the reduced striking speed and shall be not less than 50% of the stroke required for rated speeds under 800 feet per minute, nor less than 33⅓% or 18 inches, whichever is greater.

(a) An emergency terminal stopping device when installed in connection with reduced-stroke oil buffers shall conform with the following requirement.

1. Shall operate independently of the normal terminal stopping switch should this switch fail to slow down the car at the terminal landing as intended.

2. Shall provide a retardation not in excess of 32.2 feet per second per second.

3. Shall not apply the car safety device.

4. Shall be so designed and installed that a single short circuit caused by a combination of grounds, or by other conditions, shall not prevent their functioning.

(5) Oil buffers shall be provided with means of determining that the oil level is within the maximum and minimum allowable limits. Glass sight gauges and pipe plugs shall not be used. Oils used in oil buffers shall have a pour point of zero (0) degrees Fahrenheit or lower and a viscosity index of 75 or higher.

Note: The range in viscosity of buffer oil to be used, as specified in Saybolt Seconds Universal will be considered as standard and approved by the industrial commission.

(6) Oil buffers shall have a metal plate securely attached thereto, marked by the manufacturer in a legible and permanent manner, as outlined in this subsection.

(a) The maximum and minimum loads and the maximum striking speeds for which the buffer may be used.

(b) The viscosity of the oil at 100 degrees Fahrenheit to be used.

(c) The viscosity index number of the oil to be used.

(d) The pour point in Fahrenheit of the oil to be used.

(7) Car buffers shall be tested in the field by running on to them with contract load at not less than ½ contract speed. Counterweight buffers shall be similarly tested with empty car. The final limit switch shall remain operative during these tests and temporarily relocated if necessary for full compression of the buffers. When the load is lifted the buffers shall return to the fully extended position within 90 seconds.

(8) Before field testing an oil buffer, the manufacturer, upon request, shall file for approval with the industrial commission complete information on the buffer design. Certified tests by a recognized testing laboratory may also be accepted as satisfactory evidence for approval.

History: Cr. Register, October, 1964, No. 106, eff. 11–1–64.

Ind 4.20 Hoistways, machine rooms and pits. Restrictions. New and existing installations. (1) No wires, cables, pipes or conductor enclosures shall be installed in any hoistway except those needed to serve the elevator or dumbwaiter equipment, including wiring for heating,

ventilating, lighting the car or hoistway and wiring for communication with the car.

(a) *Exception.* Other raceways or cables may in exceptional cases be installed in the hoistway only if approved in writing by the industrial commission provided that all openings, terminals, outlet or junction boxes are located outside the hoistway.

(b) *Exception.* In existing installations, pipes in hoistways may remain unless carrying noxious gases, or steam with a pressure exceeding 15 pounds.

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

(3) There shall be no thoroughfare, occupied or storage space under the hoistway of an elevator unless a structure is provided sufficiently strong to withstand without failure the impact of the car with contract load or the impact of the counterweight on their respective buffers when either is descending at governor tripping speed.

(4) There shall be no machinery, apparatus or material located in the machine room which is not a part of the elevator equipment, unless separated by a rigidly constructed partition not less than 3 feet away and extending not less than 6 feet in height.

(5) Access to the machine room or penthouse for elevators hereafter installed shall not be through any toilet room, sleeping room or private quarters.

History: Cr. Register, October, 1964, No. 106, eff. 11–1–64.

Ind 4.21 Machine rooms, penthouses, overhead sheaves and/or governors. New installations. (1) Where the machine and/or controller is located over the hoistway; a floor or grating shall be provided at the top of the hoistway of every power elevator to conform with Wis. Adm. Code section Ind 4.23 and the headroom or working space shall be not less than 7 feet in height.

(a) *Exception.* For new installations in existing machine rooms or penthouses the headroom or working space shall be not less than 6 feet in height.

(2) Where a secondary floor or metal grating is provided below the machine room or penthouse floor and the space contains sheaves and/or governor, a floor or metal grating shall be provided to cover the full area of the hoistway and the headroom or working space shall not be less than 4 feet in height.

(3) Where the elevator machine room is located below or at the side of the hoistway the headroom or working space shall be not less than 7 feet in height.

(4) A floor or metal grating shall be provided below all overhead sheaves and/or governors and shall cover the full area of the hoistway and shall conform with the requirements outlined in this subsection.

(a) The headroom or working space shall be not less than 4 feet in height.

(b) Access to the sheaves and/or governor from the roof shall be by means of a hinged door with latch; this door shall be not less than 20 inches by 24 inches.

1. Where the access door is 4 feet or more above the roof a stairway-type ladder shall be provided to the access door.

(c) Access to the roof shall be by means of a stairway in compliance with Wis. Adm. Code section Ind 4.22 (4).

(5) Where a new elevator terminates below an occupied floor and the headroom or working space in the machine room cannot be provided as required in subsection (1) the headroom or working space may be decreased if approved in writing.

History: Cr. Register, October, 1964, No. 106, eff. 11–1–64.

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 1-hour, fire-resistive construction.

(2) Machine rooms shall be provided with adequate heating and provided with natural or mechanical ventilation to insure safe and normal operation of elevators hereafter installed.

(3) For 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) For 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 machine rooms or penthouses on the same roof.

(5) All stairways or stairway type 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 or shall be of standard fire escape construction.

(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 stairs join the platform.

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

(7) Where an elevator installation has a scuttle opening provided in the machine room floor, the opening shall be equipped with a sub-

stantial hinged cover so arranged that the opening cannot be conveniently used as an entrance to the machine room.

History: Cr. Register, October, 1964, No. 106, eff. 11–1–64.

Ind 4.23 Floor over hoistways of power elevators; new installations. (1) A floor shall be provided to conform with the requirements outlined in this subsection.

(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 is not located over the hoistway. (See Wis. Adm. Code section Ind 4.21)

(2) The floor shall be capable of sustaining a concentrated load of 300 pounds on 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 supported solely by the machine floor slab, the floor slab shall be designed in accordance with the requirements of the Wisconsin Building Code, Wis. Adm. Code sections Ind 51.001 and 51.01.

(3) 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 the 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) Floors may be of concrete, or 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 pass shall be fitted with suitable guards at least 2 inches high to prevent any loose material from coming in contact with such cables, and to prevent any loose parts from dropping through the openings.

(e) 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 shall be provided at the edge of the higher level. A stairway shall be provided for access between levels. Stairways having more than 3 risers shall be provided with handrails.

History: Cr. Register, October, 1964, No. 106, eff. 11–1–64.

Ind 4.24 Guards for counterweights. (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.

(2) Solid metal guards shall be installed in the pit on the open side or sides of all counterweights of elevators hereafter installed. Guards shall extend from a point not more than 18 inches above the pit floor to not less than 90 inches in height above the floor, properly reinforced and braced in strength and stiffness to not less than $\frac{1}{16}$ inch sheet steel.

(a) *Exception.* Hand elevators.

(b) *Exception.* Existing power elevators where there is not room for such guards.

(c) *Exception.* Where compensating chains or cables are attached to the counterweight.

(3) On existing installation where the counterweight runway is located outside the elevator hoistway, the runway shall be solidly enclosed on all sides and a removable panel 12 inches longer than the counterweight stack shall be provided on the outside at the bottom.

History: Cr. Register, October, 1964, No. 106, eff. 11–1–64.

Ind 4.25 Counterweights; existing drum type installations. (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) For every power drum type elevator, there shall be an I-beam or other obstruction, strongly secured at the upper limit of travel of the countereweights 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) For every hand type 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.

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

(5) 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.

(6) Where an independent car counterweight is used, the weight shall not cause slack in the hoist cables at any time.

(7) 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, October, 1964, No. 106, eff. 11–1–64.

Ind 4.26 Counterweights and compensating devices. New installations. (1) Counterweights shall be located only in the hoistway of the elevator which they serve.

(2) Counterweight weight sections for all elevators over 100 feet per minute shall be mounted and secured in structural metal frames so designed as to prevent shifting of the weight by an amount which will reduce the runing clearance to not less than ¾ inch.

(a) At least 2 tie rods shall be provided which shall pass through all weight sections. Tie rods shall be provided with lock nuts and cotter pins at each end.

(b) Counterweight frames shall be guided on each end by upper and lower guiding members attached to the frame.

(c) Frames and rods shall be of steel or other metals conforming to Wis. Adm. Code section Ind 4.54. Where metals other than steel are used, a factor of safety of not less than 5 shall be included in the design with the car at rest and the countereweight at the top of its travel.

(d) When a hoisting sheave is mounted in the frame, provisions shall be made to maintain the strength of the member supporting the shaft and the reduction in area shall not reduce the strength of the member below that required. The bearing pressure shall in no case exceed that for bolts in clearance holes as indicated in Wis. Adm. Code section Ind 4.54.

(3) Counterweight weight sections may be installed without frames for passenger and freight elevators up to 100 feet per minute providing the sections are securely fastened together with not less than 4 tie rods equipped with washers, lock nuts and cotter pins at each end. All rods shall pass through all weight sections. Suitable means shall be provided to limit the movement of the weight sections and to prevent the reduction in running clearance to not less than ¾ inch.

(a) The weight stacks shall be guided on each guide rail by upper and lower guide members.

(b) For every counterweight stack over 8 feet in height, there shall be a middle guide weight.

(4) Compensating chains or cables shall be fastened to or on brackets to the counterweight frame or bottom guide weight and shall not be fastened on individual tie rods.

(5) Compensating-cable sheaves shall be provided with a switch, mechanically opened to remove the electric power from the elevator driving-machine motor and brake before the sheave reaches its limits of travel.

History: Cr. Register, October, 1964, No. 106, eff. 11-1-64.

Ind 4.27 Car construction. New installations. (1) Every elevator shall have a car frame consisting of a crosshead, uprights (stiles), and a plank located approximately at the middle of the car platform and in no case further from the middle than ⅛ of the distance from front to back of the platform.

(2) Car frames shall be guided on each guide rail by upper and lower guide members attached to the frame.

(3) The frame and its guiding members shall be designed to withstand the forces resulting under the loading conditions for which the elevator is designed. (See Wis. Adm. Code section Ind 4.52 (1) and (2) for capacity and loading of elevators.)

(4) For freight type car frames which are located entirely below the car platform, the vertical distance between the top and bottom car guide shoes shall be not less than 40% of the distance measured between the guide rails.

(5) Where multiple sheaves are mounted on car frame members on separate sheave shafts, provisions 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 compressive strength in the car frame or car-frame members supporting the sheave shafts.

(a) 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 Wis. Adm. Code section Ind 4.54 for bolts in clearance holes.

(6) 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 due to the attachment and/or added forces imposed on the upright below that required in Wis. Adm. Code section Ind 4.54.

(7) Where cars are suspended by hoisting cables 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.

(8) Every elevator car shall have a platform consisting of a solid floor attached to a platform frame supported by the car frame and extending over the entire area within the car enclosure. The platform frame members and the floor shall be designed to withstand the forces developed under the loading conditions for which the elevator is designed and installed.

(9) Materials used in the construction of car frames and platforms shall conform to the following:

(a) Car frames and outside members of platform frames shall be made of steel or other metals and shall conform with Wis. Adm. Code section Ind 4.54.

(b) Platform stringers for freight elevators designed for Class B or C loading shall be of steel or other metals. (See Wis. Adm. Code section Ind 4.52 (2)).

(c) Platform stringers for freight elevators designed for Class A loading shall be of steel or other metals or of wood.

(d) Platform stringers for passenger elevators shall be of steel or other metals, or of wood. Where wood is used the underside exposed wood surfaces shall be covered with not less than No. 26 U. S. gauge metal.

(e) Where wood is used for platform stringers or for platform floors and subfloors, it shall be properly cured clear structural quality lumber.

Note: Guards below the car platform, where elevators have leveling or inching devices. (See Wis. Adm. Code section Ind 4.15 (4)).

(f) Cast iron shall not be used for any part subject to tension, torsion or bending.

1. *Exception.* Guiding supports, guide shoes or compensating cable anchorage.

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

(11) The car frame members of every elevator car shall be securely welded, bolted and/or riveted and braced.

History: Cr. Register, October, 1964, No. 106, eff. 11–1–64.

Ind 4.28 Passenger elevator. Car enclosures. (1) Every existing passenger elevator car shall be solidly enclosed with wood or metal on all sides from floor to car top or ceiling, except for the entrance opening.

(2) For every elevator hereafter installed, the car enclosure shall be constructed of solid incombustible panels to the full height of the car top or ceiling, except for the entrance sides, and shall conform with the requirements outlined in this subsection.

(a) The enclosure shall be securely fastened to the car platform and so supported that it cannot loosen or become displaced in ordinary service or on application of the car safety or on buffer engagement.

(b) 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.

(3) The material for passenger car enclosures shall conform with the requirements outlined as follows:

(a) Metal shall be equal in strength and as fire-resistive as $\frac{1}{16}$ inch thick sheet steel.

(b) Fire-retardant-treated-wood, wood or wood materials of equivalent combustible characteristics provided all exterior surfaces of the enclosure are covered with sheet metal not less than 26 U. S. gauge.

(c) Any other construction which is approved by the industrial commission as equal in strength and fire-resistivity to conform with subsections (3) (a) and (b) based on tests submitted from a recognized testing laboratory.

(d) Slow-burning combustible materials for insulating, sound deadening or decorative purposes may be used for lining enclosures if firmly bonded to the enclosure. Such materials shall not be padded or tufted.

(4) Where vent openings are installed in the car enclosure they shall conform with the requirements outlined as follows:

(a) Lower vents shall not be extended more than 1 foot above the floor and shall reject a ball 1 inch in diameter.

(b) Upper vents shall not be located less than 6 feet above the floor and shall reject a ball 2 inches in diameter.

(c) All vent openings greater than ½ inch of the smallest dimension shall be properly guarded on the outside.

(5) Every passenger elevator car shall be provided with a car top or cover constructed of solid material, designed and installed as to be capable of sustaining a load of 300 pounds on any square area 2 feet on a side.

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

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

2. 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 openings shall be so located as to provide a clear passageway unobstructed by fixed elevator equipment located in or on top of the car.

(c) For elevators hereafter installed the car lighting shall in no case obstruct the clear top exit opening. False or drop ceilings located below the exit panel shall be designed for clear access to exit panel.

History: Cr. Register, October, 1964, No. 106, eff. 11–1–64.

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) Handrails shall be provided at each side or sides of every passenger elevator car and shall be mounted approximately 3½ feet above the floor, except for the entrance openings.

(3) No seats, except one for the attendant shall be placed in the elevator.

(4) No signs or advertisements shall be posted in any elevator car, other than those required for the operation of the elevator.

(5) Ventilating fans or blowers, if used, shall be securely fastened in place and located above the car ceiling or outside the enclosure.

History: Cr. Register, October, 1964, No. 106, eff. 11–1–64.

Ind 4.30 Passenger elevator. Car door or gate. (1) For elevators hereafter installed car gates are prohibited where the car speed exceeds 100 feet per minute.

(2) A car door or gate of the horizontal sliding type shall be provided at each entrance to elevator cars hereafter installed in compliance with subsection (1). This door or gate when closed shall guard the full opening and each door or gate shall be provided with a door or gate electric contact.

Exception. The door or gate electric contact is not required to prevent the operation of the car when being moved within the leveling zone.

(a) Electric contacts shall be provided on all elevator car doors and gates installed after August 12, 1926 where the car speed is in excess of 150 feet per minute and the state registration is over 7,000.

1. Where new cabs are installed for existing installations, car doors or gates shall be provided and equipped with a car door or gate electric contact.

(3) Every existing automatic operation elevator shall be provided with a car door or gate at each entrance and equipped with a car door or gate electric contact.

(4) The distance between bars or slats on car gates shall not exceed 3 inches when the gate is fully expanded.

(a) Collapsible-type car gates hereafter installed shall have at least every fourth vertical member of the gate guided at the top and every second vertical member guided at the bottom.

(b) Collapsible-type car gates shall not be power opened to a distance exceeding one-third (⅓) of the clear gate opening, and in no case more than 10 inches.

(5) Vision panels when used in car doors shall not exceed 80 square inches in area and no single panel shall exceed 6 inches in width and shall be laminated or wire glass and the inside surface of the panel shall be substantially flush with the surface of the door.

(6) Door panels shall have a substantially flush surface without recessed or raised moldings.

(7) For automatic operation elevators the car door or gate shall be considered in the closed position when the clear open space between the edge of the door or gate and the nearest face of the closed jamb does not exceed 2 inches, or for center-parting doors or gates when the door panels or gates are within 2 inches of contact with each other.

(8) For car switch operation elevators an 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.

(9) Car door or gate electric contacts shall be positively opened by the movement of the door or gate and shall be maintained in the open position and shall be so located that they are not readily accessible from inside the car.

(10) For automatic operation passenger elevators having power-closed or automatically released self-closing car doors or gates and manually closed or self-closing hoistway doors, the closing of the car door or gate shall be prevented unless the hoistway door is in the closed position.

(11) For elevators hereafter installed when both the car and the hoistway doors are power operated, they shall be equipped with a re-open device which will function to stop and re-open both car and hoistway doors in the event the doors are obstructed while closing.

Note: It is permissible to close power operated car and hoistway doors at reduced speed and power when they have been delayed for prolonged periods through the use of the re-opening device.

History: Cr. Register, October, 1964, No. 106, eff. 11–1–64.

Ind 4.31 Passenger elevator hoistway landing doors. (1) Each landing of every passenger elevator hereafter installed shall be equipped with a door. These doors may be horizontally sliding of the single or multi-section type or single section horizontal swinging and shall fill the entire opening of the hoistway.

(a) Where a 1-hour fire-resistive constructed hoistway is required, all hoistway landing entrances shall have minimum fire-resistive rating of ¾ hour. Wood doors of solid flush type 1¾ inches thick are acceptable. (See Wis. Adm. Code section Ind 4.10.)

(b) Where a 2-hour fire-resistive constructed hoistway is required all hoistway landing entrances shall have a minimum fire-resistive rating of 1½ hours. The doors shall be marked or identified to indicate that the entrance construction meets the fire rating requirements

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(e) An emergency exit with a cover shall be provided in the top of all elevator cars and shall conform with the requirements outlined as follows:

1. The exit opening shall have an area of not less than 400 square inches and shall measure not less than 16 inches nor more than 25 inches on any one side.

2. 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.

3. The exit cover shall open upward and shall be hinged 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.

(f) Hinged or removable panels shall not be provided in car tops except for emergency exits.

History: Cr. Register, October, 1964, No. 106, eff. 11-1-64.

Ind 4.35 Freight elevator. Car door or gate. (1) EXISTING INSTALLATIONS. (a) A door or gate shall be provided at the car entrance to conform with the requirements outlined in this subsection.

(b) At each entrance of every automatic operation elevator.

(c) At each entrance of every continuous pressure or car switch operation elevator where the contract speed is in excess of 50 feet per minute.

(d) At the secondary entrance of every continuous pressure or car switch operation elevator not in excess of 50 feet per minute.

1. *Exception.* This requirement is not applicable to an elevator having but one entrance at the lower landing and the secondary entrance at the upper limit of travel, provided the distance between the edge of the car and the hoistway enclosure at the secondary entrance does not exceed 1½ inches with no projections and the speed does not exceed 50 feet per minute.

(e) At the secondary entrance of every power elevator having more than one entrance and having a difference in the floor levels in excess of 30 inches.

(f) At the secondary entrance of every elevator where 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 required limit.

(g) Every door or gate shall be not less than 6 feet in height; shall extend to within 1 inch of the car floor and when closed shall guard the full width of the opening; and the distance between bars or slats shall not exceed 3 inches, and each door or gate shall be provided with a door or gate electric contact to prevent movement of the car unless the door or gate is within 2 inches of being in the fully closed position.

1. *Exception.* This door or gate electric contact is not required to prevent the operation of the car when being moved within the leveling zone.

(2) NEW INSTALLATIONS: (a) A door or gate shall be provided at each car entrance.

1. *Exception.* Car doors or gates are not required on elevators of the continuous pressure operating type having but one entrance at the lower landing provided the travel does not exceed 14 feet or

more than one story; the speed does not exceed 35 feet per minute; and the distance between the edge of the car and the hoistway enclosure at the secondary entrance does not exceed 1½ inches with no projections; and the car operating buttons located not less than 24 inches from the edge of the car sill.

(b) Doors and gates, when in the closed position, shall guard the full width of the car opening and shall extend from a point not more than 1 inch above the car floor and to a height of not less than 6 feet. Each door or gate shall be provided with a door or gate electriic contact to prevent the movement of the car unless the door or gate is within 2 inches of being in the fully closed position.

Exception. The door or gate electric contact is not required to prevent the operation of the car when being moved within the leveling zone.

1. Gates shall be of the horizontal sliding collapsing type or vertical sliding type. Collapsible type gates when fully closed shall reject a ball 3 inches in diameter; and at least every fourth vertical member shall be guided at the top and every second vertical member guided at the bottom. Vertical sliding gates shall be of hardwood or metal and shall reject a ball 3 inches in diameter, and 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.

2. Collapsible type gates shall not be power opened.

3. Doors shall be of the horizontal or vertically sliding type. There shall be no openings in doors, except for vision panels.

4. Vision panels in car doors shall not exceed 80 square inches in area and no single panel shall exceed 6 inches in width and shall be laminated or wire glass.

(c) Vertically sliding car doors or gates shall be counterbalanced from two sides. Balance (counterweight) weights for vertical operating doors or gates shall be located outside the car enclosure and shall run in guides or boxed in. Guides shall be of metal, and the bottom of the guides or boxes shall be so constructed as to retain the weight if the suspension member fails.

(d) Car door or gate electric contacts shall be positively opened by the movement of the door or gate and shall be maintained in the open position and shall be so located that they are not readily accessible from inside the car.

History: Cr. Register, October, 1964, No. 106, eff. 11–1–64.

Ind 4.36 Freight elevator hoistway landing entrance openings. Every freight elevator entrance opening in the hoistway enclosure shall be protected with a door or gate and when closed shall guard the opening as outlined in Wis. Adm. Code section Ind 4.37 and Ind 4.38.

History: Cr. Register, October, 1964, No. 106, eff. 11–1–64.

Ind 4.37 Freight elevator hoistway landing gates.

(1) EXISTING INSTALLATIONS. (a) Hoistway landing gates where provided shall conform with the requirements outlined in this subsection. (See Wis. Adm. Code section Ind 4.38 for hoistway landing doors.)

1. Where the car speed does not exceed 75 feet per minute, gates shall be not less than 3½ feet in height; and semi-automatic operation at each landing or full-automatic at terminal landings or balanced

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(3) A fillet shall be provided at any point of change in the diameter of driving-machine shafts and sheave shafts to prevent excessive stress concentrations in the shaft.

(a) Shafts which support drums, sheaves, couplings and other members, and which transmit torque, shall be provided with tight-fitting keys.

(4) Gear housings for elevator machines shall have openings so located as to permit proper inspection of the gears, and gear spider fastenings.

(a) *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 pounds in weight, will be acceptable in lieu of subsection (4).

(5) The motor drive on geared traction elevators shall be directly connected to the gearing provided and mounted on continuous steel or cast iron bed plates.

(a) *Exception.* Existing drum type machines, hydraulic elevators and new installations of winding drum machines installed in compliance with the requirements of Wis. Adm. Code section Ind 4.61.

History: Cr. Register, October, 1964, No. 106, eff. 11-1-64.

Ind 4.60 Prohibited installations. (1) NEW AND EXISTING INSTALLATIONS. (a) Freight elevators shall not be used for transporting passengers.

(b) Belt or chain driven machines shall not be used for any passenger elevator installation.

1. *Exception.* Oil hydraulic elevators.

(c) Friction gearing or a clutch mechanism shall not be used to connect a driving-machine drum or sheave to the main driving gear of any elevator.

(d) Continuous pressure button operation from the landings shall not be used for passenger elevators.

(e) An emergency hoistway landing door and/or car gate by-pass switches are prohibited.

(f) Drum type freight elevator installations 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.

(g) 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.

(2) NEW INSTALLATIONS. (a) There shall be not more than 2 entrances to any passenger or freight elevator car.

(b) Chains shall not be used for hoisting in connection with a power elevator.

1. *Exception.* See Wis. Adm. Code section Ind 4.82 special requirements.

(c) Sidewalk elevator installations are prohibited. (See Wis. Adm. Code section Ind 4.81 for grade level elevators.)

(d) Winding drum machines are prohibited, except as indicated in Wis. Adm. Code section Ind 4.61.

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

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

(g) Continuous pressure push button operation elevators shall not have a contract speed in excess of 100 feet per minute.

(h) Sheaves or idlers shall not be suspended in cast iron stirrups from the supporting beams.

(j) Hand power operated elevators shall be limited to one floor travel.

(k) Hand cable power operated elevators and dumbwaiters are prohibited.

(m) Carriage type elevators supported by cables attached at 4 or more points are prohibited.

History: Cr. Register, October, 1964, No. 106, eff. 11–1–64.

Ind 4.61 Winding drum machines. Winding drum machines shall 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, October, 1964, No. 106, eff. 11–1–64.

Ind 4.62 Slack cable devices. Slack cable switches. (1) Every drum type power elevator with a mechanical brake shall be provided with a mechanical slack cable device which will automatically stop the machine in the event the hoist cables loosen or break.

(2) A slack cable switch shall be provided for every drum type power elevator equipped with an electric brake which will automatically shut off the power and stop the machine in the event the hoist cables loosen or break. This switch shall not reset automatically when the slack in the cable is removed.

History: Cr. Register, October, 1964, No. 106, eff. 11–1–64.

Ind 4.63 Limit stops. New and existing installations. (1) Every elevator hereafter installed shall be equipped with final limit switches. These switches shall automatically interrupt the power circuit and stop the car in case of overtravel at each terminal of travel.

Exception. Electric oil hydraulic elevators.

(a) The operation of final limit switches shall prevent movement of the car by normal operating controls in both directions of travel. (See Wis. Adm. Code section Ind 4.72 (2).)

(b) Final limit switches shall be located in relation to oil buffers so that the engagement of the buffer and the opening of the final limit switches will occur as near simultaneously as possible; to cause the electric power to be removed automatically from the elevator driving-machine motor and brake after the car has passed the terminal landing. For spring buffers, the final limit switches shall be opened before the buffer is engaged.

(c) Final limit switches shall be mounted to the guide rails and directly operated by a cam attached to the car. The cam shall be of

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(8) Every friction type rope governor shall be replaced with an approved type governor to conform with subsection (6) (a) and (b) as outlined in this subsection.

Note: A friction type rope governor is dependent upon the pinch of the rope in the sheave groove.

(a) A safety test shall be made in accordance with subsection (13).

(b) A report shall be submitted to the industrial commission giving the information as follows:

1. Type, number and design of governor.
2. Governor tripping speed.
3. Type, number and design of car safety device.
4. Type and size of guide rails.
5. Car speed.
6. Car capacity.

History: Cr. Register, October, 1964, No. 106, eff. 11–1–64.

Ind 4.66 Brakes. (1) Every electric elevator hereafter installed shall be equipped with an electrically released and spring applied brake so designed, installed and maintained so as to stop and hold the car with contract load when applied.

(a) No brake shall be arranged to be released until power has been applied to the machine-driving motor.

(b) No single ground, short-circuit, motor field discharge or countervoltage shall prevent the action of the holding brake magnet or motor from allowing the brake to set in the intended manner during normal operation or during emergency stops.

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

(3) Every hand-power elevator shall be equipped with a brake to operate in either direction of motion of the elevator. When the brake has been applied it shall remain locked in position until manually released.

(4) Every hand-power elevator which does not have a limit stop at the top terminal landing, shall be provided with a solid footing for the counterweight to rest when the car is not more than 6 inches above the top landing.

History: Cr. Register, October, 1964, No. 106, eff. 11–1–64.

Ind 4.70 Control mechanism. (1) An externally operated circuit-breaker or disconnecting fused switch opening all lines shall be installed separately in the supply circuit of every elevator, escalator or moving walk or moving ramp. This breaker or switch shall be of the enclosed type, and shall be provided with proper over-current protection, 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. The switch shall be a horsepower rated motor circuit switch for motors up to and including 50 H. P.

(2) An externally operated circuit-breaker or disconnecting fused switch opening all lines, shall be installed separately in the supply circuit of every *power dumbwaiter* hereafter installed. This breaker or switch shall be of the enclosed type and shall be provided with

proper overcurrent protection and shall conform with the requirements as outlined in this subsection.

(a) Where the hoisting machine is located in the hoistway, directly above or below the dumbwaiter, the controller and circuit breaker or switch shall be mounted on the outside of the hoistway, on the adjacent hoistway wall at the machine location.

(b) Where a machine room is provided and isolated from the hoistway enclosure, the circuit breaker or fused disconnect switch shall be mounted adjacent to the controller to conform with subsection (1).

(3) Elevators hereafter installed where the travel exceeds 14 feet shall be provided with car top operating switches of the enclosed type, externally operable and permanently mounted vertically on the car crosshead and shall conform with the following:

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

(b) An "Up" and "Down" button or switch which will enable the car to be operated in either direction as long as the button or switch 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 switch shall be so arranged and connected that when operative, the movement of the car shall solely be under control of this device.

(4) 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.

(5) Every hand cable controlled elevator shall be equipped with a properly adjusted centering rope which shall be accessible from the car and so arranged to be easily and safely used at any point of the car travel.

(a) *Exception.* Hydraulic elevators.

(6) 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.

(a) *Exception.* Existing sidewalk elevators.

(b) *Exception.* Elevators equipped with an emergency stop switch in the car or electric contacted gates, provided they comply with subsection (4). (See Wis. Adm. Code section Ind 4.72 (5).)

(7) The car of every electrically driven elevator shall be provided with an emergency stop switch located in or adjacent to the car operating panel. When opened, this switch shall cause the electric power to be removed from the elevator-machine-motor, brake or solenoid valve and shall conform with the following:

(a) Be of the manually opened and closed type.

(b) Have red operating handles or buttons.

(c) Be conspicuously and permanently marked "stop".

(d) Be positively opened mechanically and the opening shall not be solely dependent on springs.

1. *Exception.* Existing hand cable controller elevators.

(8) The car switch or hand lever on every power elevator 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. The switch handle or lever shall return to the neutral position and automatically latch when released.

History: Cr. Register, October, 1964, No. 106, eff. 11–1–64.

Ind 4.71 Control and operating circuits. (1) The design and installation of the control and operating circuits, shall conform with the requirements outlined in this subsection.

(a) If springs are used to actuate switches, contactors or relays to break the circuit to stop an elevator at terminal landings, they shall be of the compression type.

(b) The completion or maintenance of an electric circuit shall not be used to interrupt the power to the elevator driving-machine motor or brake at the terminal landings nor to stop the car when the emergency stop switch is opened or any of the electrical protective devices operate.

1. *Exception.* Dynamic braking, nor to speed control switches.

(c) The failure of any single magnetically operated switch, contactor or relay to release in the intended manner, or the occurrence of a single accidental ground, shall not permit the car to start to run if any hoistway-door interlock is unlocked or if any hoistway-door or car-door or gate contact is in the open position.

(d) Where generator-field control is used, means shall be provided to prevent the generator from building up and applying sufficient current to the elevator driving-machine motor to move the car when the elevator-motor control switches are in the "off" position. The means used shall not interfere with maintenance of an effective dynamic-braking circuit during stopping and standstill conditions.

(e) Motor-generators driven by direct current motors used to supply direct current for the operation of elevator machine motors shall be provided with an overspeed switch which will automatically remove the power from the elevator machine-motor and brake should the motor-generator overspeed more than 125% of its rated speed.

(f) The installation of condensers, the operation or failure of which will cause an unsafe operation of the elevator, is prohibited. No permanent device shall be installed, except as provided in this code, which will make any required safety device inoperative.

History: Cr. Register, October, 1964, No. 106, eff. 11–1–64.

Ind 4.72 Electrical protection. (1) Every automatic operation elevator hereafter installed having polyphase alternating current power supply shall be provided with means to prevent the starting of the elevator motor if:

(a) The phase rotation is in the wrong direction, or

(b) There is a failure of any phase.

1. *Exception.* Additional protection shall not be required in the case of generator-field control having alternating current motor-generator driving motors, providing a reversal of phase will not cause the elevator driving-machine motor to operate in the wrong direction, nor in the case of controllers whose switches are operated by polyphase torque motors providing inherent protection against phase failure or reversal.

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(2) Every existing 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 Wis. Adm. Code section Ind 4.63 (1), or

(b) A reverse phase relay which will prevent starting the motor if the phase rotation is in the wrong direction, or there is failure in any phase.

(3) If an overload circuit breaker is used for a direct-current 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 cable type elevator hereafter installed shall be provided with an elevator potential switch which will cause and maintain interruption of power to the main circuit during failure of supply voltage, and the operation of any of the emergency stopping switches.

(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.

(6) Every elevator which is changed from hand cable control to car switch, automatic or continuous pressure operation shall comply with the requirements of new installations.

(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 replaced or renewed shall comply with the requirements of new installations.

History: Cr. Register, October, 1964, No. 106, eff. 11–1–64.

Ind 4.73 Wiring and electrical protection. (1) VOLTAGE LIMITATIONS. The nominal voltage used for elevators, power dumbwaiters, escalators and moving walks or moving ramps for operating control and signal circuits, operating equipment, driving-machine motors, machine brakes, and motor-generator sets shall not exceed the requirements as outlined in this subsection.

(a) For operating control and signal circuits and related equipment including door operator motors: 300 volts, except that higher potentials may be used for frequencies of 25 through 60 cycles alternating current or for direct current, provided the current in the system cannot, under any conditions, exceed 8 milli-amperes for alternating current or 30 mill-amperes for direct current.

(b) Driving-machine motors, machine brakes, and motor-generator sets: 600 volts, except that higher potential may be used for driving motors of motor-generator sets.

(2) LIVE PARTS. All live parts of electrical apparatus in the hoistways, at the landings, or in or on the cars of elevators and power dumbwaiters or in the well-ways or the landings of escalators, moving walks or moving ramps shall be enclosed to protect against accidental contact.

(3) CONDUCTORS. The insulation of conductors installed in connection with elevators, power dumbwaiters, escalators, moving walks or moving ramps, shall comply with the following:

(j) A slack cable switch shall be provided which will automatically shut off the power to the motor in the event the hoist cables or chain loosen or break.

(k) Directional limit switches shall be provided at each terminal of travel, and shall be operated by the movement of the car and shall stop the car approximately level at each terminal landing. These switches shall be mounted to the guiderails and directly operated by a cam attached to the car.

(m) Every installation shall be equipped with an electrically released and spring applied brake so designed, installed and maintained so as to stop and hold the car with capacity load.

(n) An enclosed, externally operated disconnecting fused switch opening all lines shall be installed separately in the supply circuit. This switch shall be located adjacent to the hoistway and readily accessible.

(o) All wiring shall be installed in rigid conduit or electrical metallic tubing, except that flexible metal conduit not over 3 feet in length may be used between risers, limit switches and push buttons.

(p) The entire equipment shall be effectively grounded as a unit.

(q) The car shall be provided with illumination of an intensity of not less than 5 foot-candles.

History: Cr. Register, October, 1964, No. 106, eff. 11–1–64.

Ind 4.85 Hydraulic elevators. (1) Hydraulic elevators hereafter installed shall be of the direct plunger type and shall conform with the applicable requirements for power elevators, including the requirements outlined as follows:

(a) An anti-creep up direction leveling device shall be provided for every elevator which shall cause the electrical power unit to compensate for the creeping of the car away from the landing.

(2) The plunger shall be of uniform diameter and of approximately uniform thickness and shall be finished on the outside.

(a) Gray cast iron or other brittle material shall not be used for the plunger or connecting couplings. Gray cast iron, where used in other portions of the plunger assembly, shall have a factor of safety of at least 10.

(b) The plunger shall be attached to the car with fastenings of sufficient strength to support the weight of the plunger with a factor of safety of not less than 4.

(c) Where the plunger is subjected to eccentric loading, shall conform with the requirements as follows:

1. The plunger connection to the car shall be so designed and constructed as to transmit the full eccentric moment into the plunger with a factor of safety of not less than 4.

2. The plunger and plunger connection to the car shall also be so designed and constructed that the total vertical deflection of the leading edge of the car platform due to eccentric loading of the car shall not exceed ¾ inch.

(d) Plunger assembly shall be designed with a factor of safety of not less than 5 based on the ultimate strength.

(e) Plungers shall be provided with solid metal stops to limit the car travel and to prevent the plunger from traveling beyond the limits of the cylinder. Stops shall be so designed and constructed as to stop the plunger from maximum speed in the up direction under

full pressure without damage to the hydraulic system. For rated speeds exceeding 100 feet per minute, means other than the normal terminal stopping devices shall be provided to retard the car to 100 feet per minute before striking the stop.

(3) Cylinders and their components shall have a factor of safety of not less than 5.

(a) Cylinders and their components of gray cast iron, if used in the cylinder assembly, shall have a factor of safety of not less than 10.

(b) Clearance shall be provided at the bottom of the cylinder so that the bottom of the plunger assembly will not strike the bottom of the cylinder when the car is resting on its fully compressed buffer.

(c) Cylinders shall have a reservoir or drip ring provided and located below the packing gland at the top of the cylinder to collect oil leakage and to automatically return the oil back to pump unit reservoir.

(4) Valve, piping and fittings shall not be subjected to working pressures exceeding those recommended by the manufacturer for the type of service used.

Note: Threads of valves, piping and fittings to conform to American Standard Pipe Threads.

(a) Piping shall be so supported as to eliminate undue stresses at joints and fittings.

(b) Cast iron fittings are prohibited.

(5) Each pump or group of pumps shall be equipped with a relief valve to conform with the requirements outlined as follows:

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

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

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

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

(6) A check valve shall be provided and so installed that it will hold the elevator car with rated load at any point when the pump stops, or the maintained pressure drops below the minimum operating pressure.

(7) The supply tanks shall be so designed and constructed to support the total weight when completely filled.

History: Cr. Register, October, 1964, No. 106, eff. 11-1-64.

ESCALATORS

Ind 4.90 Escalators. (1) Escalators hereafter installed shall conform with the requirements outlined in this subsection.

(2) The rate of speed measured along the angle of inclination shall be not more than 90 feet per minute.

(3) The angle of inclination of an escalator shall not exceed 30 degrees from the horizontal.

(h) *Sidewalk elevators.* A freight elevator, the hoistway being located partially outside the building and having no opening into the building at the upper terminal landing.

(j) *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.

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

(m) *Grade level elevators.* 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.

(n) *Material-handling elevators.* A type of elevator used exclusively for handling materials as part of a material distribution system and utilizing automatic or semiautomatic means for loading or unloading.

(p) *Machine room.* The machine room is that room or enclosed portion of an area of a building intended and used for the elevator and/or dumbwaiter equipment only.

(26) EXISTING INSTALLATIONS. Every installation installed before November 1, 1964.

(27) NEW INSTALLATIONS. Every installation for which the contract was let after November 1, 1964.

(a) Every elevator or power dumbwaiter, escalator which, after November 1, 1964, is moved to a new location.

(b) Any part of an existing installation that is replaced shall comply with the applicable provision of this code.

(c) 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 November 1, 1964.

(d) Every elevator or power dumbwaiter which is enlarged or the travel extended.

(28) ESCALATOR. A power-driven, inclined, continuous arrangement of steps used for raising and lowering passengers.

(29) MOVING WALKS AND MOVING RAMPS.

(a) *Landing.* The stationary area at the entrance or exit from a moving walk or moving ramp.

(b) *Moving walk or moving ramp.* A type of passenger-carrying treadway on which passengers stand or walk and in which the passenger-carrying surface remains parallel to its direction of travel and its movement is uninterrupted.

(c) *Moving walk or moving ramp, belt type.* A power-driven continuous belt treadway.

(d) *Moving walk or moving ramp, belt pallet type.* A series of connected and power-driven pallets to which a continuous treadway is fastened.

(e) *Moving walk or moving ramp, pallet type.* A series of connected and power-driven pallets which together constitute the treadway.

(f) *Moving walk or moving ramp, roller type.* A belt supported by a succession of rollers with their axes at right angles to the direction of the treadway motion.

(g) *Moving walk or moving ramp, slider-bed type.* A treadway sliding upon the supporting surface.

(h) *Moving walk, system.* A series of moving walks on an end to end or side by side relationship.

(j) *Pallet.* One of a series of rigid platforms which together form an articulated treadway or the support for a continuous treadway.

(k) *Treadway.* The exposed passenger-carrying member of a moving walk or moving ramp.

(m) *Moving walk.* A moving walk having a slope or angle not exceeding 3 degrees with the horizontal.

(n) *Moving ramp.* A moving ramp having a slope or angle exceeding 3 degrees with the horizontal.

(o) *Threshold comb.* The toothed portion of a threshold plate designed to mesh with a grooved treadway surface.

(p) *Threshold plate.* That portion at the entrance or exit to the treadway consisting of one or more stationary or slightly movable plates.

(30) EMERGENCY STOP SWITCH. An emergency stop switch (safety switch) is a device in the car used manually to cut off the power from the elevator machine independently of the operating devices.

(31) FACIA PLATE. A metal plate not less than $\frac{1}{8}$ inch 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.

(32) FIRE-RESISTIVE CONSTRUCTION.

Note: Refer to Building Code, Wis. Adm. Code, section Ind 51.05.

(33) FULL-AUTOMATIC DOOR OR GATE. A vertically moving door or gate which is opened directly by the motion of the elevator car approaching the terminal landings and closed by gravity as the car leaves the landing.

(34) HOISTWAY, ELEVATOR OR POWER DUMBWAITER. A shaftway for the travel of one or more elevators or power 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.

(35) 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.

(36) HOISTWAY ACCESS SWITCH. Switches located at the lower and upper terminal landings to permit access to the pit and top of the car. The car travel limited to a zone sufficient for the full door opening.

(37) HOISTWAY DOOR OR GATE. (a) *Door.* A hoistway landing door is one which completely fills the door opening giving access to the elevator or dumbwaiter 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.

tion 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.

(47) SINGLE AUTOMATIC OPERATION. An 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.

(48) CAR-SWITCH OPERATION. An 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.

(49) CAR-SWITCH AUTOMATIC FLOOR-STOP OPERATION. An 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.

(50) CONTINUOUS-PRESSURE OPERATION. An 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.

(51) DUAL OPERATION. 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, buttons may, however, be used to signal the operator that the car is desired at certain landings.

(52) PRE-REGISTER OPERATION. An 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.

(53) SIGNAL OPERATION. An 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.

(54) 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.

(55) RACEWAYS. Any channel for holding wires, or cables, which is designed expressly for, and used solely for, this purpose. Raceways shall be of metal and this term includes rigid metal conduit, flexible metal conduit or electrical metallic tubing.

(56) SAFETY, CAR OR COUNTERWEIGHT. A mechanical device attached to the car or frame to stop and hold the car or counterweight in case of predetermined overspeed, free fall, or slackening of the cables.

(57) SLACK-CABLE SWITCH, ELEVATOR. A slack-cable switch is a device for automatically cutting off the power in case the hoisting cables become slack.

(58) TERMINAL LANDING. The highest and lowest landing served by the elevator.

History: Cr. Register, October, 1964, No. 106, eff. 11–1–64; r. and recr. (25) intro. par., and (25) (n); cr. (25) (p); r. and recr. (27) (b), Register, September, 1967, No. 141, eff. 10–1–67.

SCOPE

Ind 4.01 General scope. The requirements of this code shall apply to every elevator, power dumbwaiter, material handling elevator, moving walk or moving ramp, or escalator installed in public buildings and places of employment as defined by Wisconsin statutes. This requirement applies to both existing installations and those hereafter installed unless otherwise specified.

History: Cr. Register, October, 1964, No. 106, eff. 11–1–64.

Ind 4.02 Renewing of elevator, dumbwaiter, escalator, etc. Where part or parts of equipment of an elevator, power dumbwaiter, material handling elevator, moving walk or ramp or escalator are impaired through ordinary wear, damage or deterioration by fire or other causes, to 50% of the original condition, the equipment shall be repaired or rebuilt in conformance with the requirements for new installations.

History: Cr. Register, October, 1964, No. 106, eff. 11–1–64.

Ind 4.03 Exemptions. (1) This code does not apply to the following:

(a) Belt, bucket, scoop, roller or similar inclined or vertical freight conveyors, portable tiering or piling machines when not serving more than the floor on which the tiering or piling machine is located.

(b) Skip hoists, belt manlifts, mine hoists, wharf ramps or apparatus in kindred classes, amusement devices, stage curtain hoists or lift bridges, nor to elevators with a travel less than 56 inches.

(c) Mechanical lifts inclined not greater than 62½ degrees with the horizontal and serving not more than one story and a maximum vertical rise of 14 feet.

(d) 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 sections Wis. Adm. Code Ind 35.28 to 35.31 inclusive of the general orders on Safety in Construction and Wis. Adm. Code sections Ind 44.01 to 44.37 inclusive, Personnel Hoists, issued by the industrial commission.

the fully loaded car striking the buffer at governor tripping speed. The floor shall be approximately level.

(2) Where water cannot be kept out of a pit with ordinary construction, proper drains or sumps, with or without pumps, shall be provided with cover, or a pit tank shall be constructed of not less than ¼ inch steel plate.

(3) Where existing foundation footings are encountered in a new or altered installation and it is impractical to disturb the footings, the maximum permissible encroachment shall be not more than 15% of the cubic content of the pit.

(4) Where there is a difference in level of floors of adjacent pits greater than 8 inches, a solid guard of incombustible material shall be provided to separate such pits. Guards shall extend not less than 6 feet above the level of the higher pit floor.

(5) Access shall be provided to all pits to conform with Wis. Adm. Code sections Ind 4.31 (5) (a) and (6) (a) and Ind 4.38 (1) (a) 7. and Ind 4.38 (2) (b) 7. and 8., or by means of a separate pit entrance access door.

(a) Where separate access pit doors are provided the doors shall be at least 2 feet by 6 feet in size and equipped with self-acting locks, arranged to permit the doors to be opened from inside the pit without a key.

(6) A fixed ladder shall be provided in the pit of every elevator hereafter installed. This ladder shall be of incombustible material, located within reach of the access door and shall extend not less than 30 inches above the sill of the access door, or hand grips shall be provided to the same height.

(a) *Exception.* Where separate pit entrance access doors are provided.

(7) 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 accessible from the pit access door adjacent to the ladder when ladders are used and approximately in line with the pit access door sill. 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.

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

History: Cr. Register, October, 1964, No. 106, eff. 11–1–64.

Ind 4.18 Minimum pit depth and overhead clearance. (1) The pit depth for every power elevator hereafter installed shall be not less than the number of inches specified in the requirements outlined in Tables 2 and 3 of this section. The depth of trenches, depressions or foundation encroachments as of Wis. Adm. Code section Ind 4.17 (3) shall not be considered in determining the pit depth.

(a) For cable and hydraulic elevators the bottom runby for the car and counterweight shall be not less than shown in Table 1.

TABLE 1

Cable Elevators				Hydraulic Elevators		
Speed F.P.M.	Control	Buffers	Runby	Speed F.P.M.	Buffers	Runby
25 to 50	Rheostatic	Spring	6 inches	100 or less	Spring	3 inches
Between 51 and 100	Rheostatic	Spring	9 inches	100 to 300	Spring	6 inches
Over 100	Rheostatic	Spring	12 inches			
Up to 200	Generator Field Control	Spring	6 inches			
Over 200	Generator Field Control	Oil	6 inches			

1. Maximum bottom runby for car shall not exceed 12 inches.

2. The maximum bottom runby for counterweight shall not exceed 24 inches.

(b) The minimum pit depth for elevators hereafter installed requiring spring buffers shall be not less than shown in Table 2.

TABLE 2

MINIMUM PIT DEPTH—ELEVATORS HAVING SPRING BUFFERS

Contract Speed F.P.M.	Capacity 0 to 3000	Capacity 3001 to 6000	Capacity 6001 to 10,000	Capacity 10,001 to 16,000	Capacity 16,000 and over
25 to 50	42 inches	48 inches	54 inches	60 inches	66 inches
51 to 100	48 inches	54 inches	60 inches	66 inches	72 inches
101 to 200	54 inches	60 inches	66 inches	72 inches	76 inches

(c) The minimum pit depth for elevators requiring oil buffers shall be not less than shown in Table 3.

TABLE 3

MINIMUM PIT DEPTH—ELEVATORS HAVING OIL BUFFERS

Contract Speed F.P.M.	Capacities up to 10,000 pounds	Capacities 10,001 pounds and over
201 to 300	76 inches	82 inches
301 to 400	88 inches	94 inches
401 to 500	104 inches	110 inches
501 to 600	120 inches	126 inches
601 to 700	138 inches	144 inches
701 to 800	150 inches	156 inches

Note: Interpolation may be used for intermediate speeds.

of this subsection. These identifying marks may be labels or certifications based on tests submitted from a recognized testing laboratory. (See Wis. Adm. Code section Ind 4.10.)

(c) The section of each hoistway door shall be so constructed as to withstand a constant force of 250 pounds applied at right angles to and at approximately the center of the door, without causing the door to break or to be permanently deformed.

1. Horizontally sliding doors shall be so hung and guided that the doors will not be displaced from their guides or tracks when in normal service. Bottom guide shoes shall be made of or reinforced with metal so that in case of fire the guide shoe will prevent the door from being displaced from its guides.

2. Hangers for horizontally sliding doors shall be provided with means to prevent the doors from jumping the tracks. Stops shall be provided to prevent the hanger from leaving the ends of the track. Hangers and tracks shall be so designed and installed as to support the door in case of fire.

3. The hangers, tracks and their supporting brackets and fastenings for horizontally sliding power operated doors shall be constructed to withstand without damage of appreciable deflection, an imposed load equal to 4 times the weight of the door as applied successively downward and upward at the vertical center line of the assembled door or of each door section.

4. The leading edge of all horizontally sliding doors shall be smooth and free of sharp projections. The meeting edges of center-opening doors may be provided with a fire-resistive member on one or both doors to form a shallow overlap. Single and two-speed doors shall lap the strike jambs but shall not close into pockets in the strike jambs. The clearance between the corridor face of the doors and the bucks and header, and the clearance between overlapping faces of two-speed doors shall not exceed ⅜ inch.

(2) Horizontally sliding or swinging doors of automatic operation elevators hereafter installed shall be provided with door closers.

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

(4) For existing installations, the upper sections of such doors may be solid metal or of wire glass provided the glass pane is not less than ¼ inch thick nor greater than 720 square inches and not more than 54 inches vertical and 48 inches horizontal dimension.

(5) Existing installations:

(a) Every elevator controlled from the car only, shall be provided with an emergency key, not easily duplicated, to open the lowest terminal landing door from the landing side regardless of the car position.

1. The emergency key opening shall be provided with a cover fastened securely with Phillips head-type screws.

(b) For every automatic operation elevator where an emergency key opening, or any similar means has been provided for opening a hoistway landing door, the key opening or similar means shall be provided with a cover fastened securely with Phillips head-type screws.

(c) 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".

(d) Emergency keys shall be provided to conform with subsection (6) for elevators installed after May 1, 1957 where the state registration number is 10959 or over.

(6) New installations:

(a) 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.

(b) Emergency key openings shall be provided for landing doors for every automatic push button controlled elevator outlined as follows:

1. Single hoistway—at each floor.

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

(c) Emergency key openings shall be provided at the lowest terminal landing for elevators controlled from the car only.

(d) All emergency key openings shall be provided with a cover fastened securely to the landing door with Phillips head-type screws.

1. *Exception.* Emergency key openings not greater than ½ inch in diameter which require the use of keys of the jointed design and the hinged action cause the release of the door interlocks.

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

(7) Hoistway access switches are not required, but, where installed shall conform with the requirements and operation outlined as follows:

(a) Hoistway access switches shall be installed at the top and/or bottom terminal landings. The top terminal landing car travel shall be limited to the full door opening to permit access to the top of the car; and the bottom terminal landing car travel shall be limited to the full door opening to permit access to the pit. These switches shall be located immediately adjacent to the hoistway doorways at these landings and shall not be installed at any other landings or in the car.

(b) The hoistway access switch shall be of the continuous-pressure spring-return type and shall be operated by a cylinder type lock having not less than a 5 pin or 5 disk combination with the key removable only when the switch is in the "off" position. The lock shall not be operable by any key which will operate any other lock or device which is used for any other purpose in the building. The key shall be available to and used only by inspectors, maintenance men, and repairmen.

(c) The operation of the hoistway access switch at either terminal landing shall permit movement of the car with the hoistway door at

this landing unlocked or open and with the car door or gate open, subject to the following:

1. The operation of the access switch shall not render ineffective the hoistway door interlock or electric contact at any other landing.

2. The car shall not operate at a speed greater than 100 feet per minute.

3. For automatic operation elevators the normal operation shall first be made inoperative by means other than the access switch and the power operation of the hoistway door and/or car door or gate shall be inoperative.

4. Automatic operation by a car-leveling device shall be inoperative.

5. The operating device on top of the car as of Wis. Adm. Code section Ind 4.70 (3) shall be inoperative.

(8) Vision panels shall be provided in all hoistway landing doors of every automatic operated elevator 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 requirements as described in this subsection.

(a) The total area of any single panel shall not be less than 25 square inches or more than 80 square inches, and no single glass panel shall have a width exceeding 6 inches.

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

(c) Panel openings shall be of glazed clear wire glass not less than ¼ inch thick, and shall be substantially flush with the surface of the landing side of the door.

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

(9) On existing installations where the glass vision panel is in excess of 80 square inches, mullion or division strips shall be provided and no single glass panel shall have a width exceeding 6 inches.

(10) Where an elevator is installed in a single blind hoistway there shall be installed in the blind portion of the hoistway an emergency door at every third floor but not more than 36 feet apart and shall comply with the requirements outlined in this subsection.

(a) It shall be not less than 30 inches wide and 6 feet 6 inches in height and easily accessible and free from fixed obstructions.

(b) It shall be either of the horizontally sliding or swinging type irrespective of the type of door installed at the other landings.

(c) It shall be self-closing and self-locking and shall be marked in letters not less than 2 inches high, "DANGER ELEVATOR HOISTWAY".

(d) It shall be provided with a hoistway door electric contact. It shall be unlocked only from the landing side through the use of a cylinder type lock having not less than a 5 pin or 5 disk combination. The cylinder lock shall:

1. Be located not less than 5 feet above the floor.

2. Not be unlocked by any key which will open any other lock or device used for any other purpose in the building.

3. Be so designed that the key shall be removable only in the locked position and shall be kept where it is accessible only to authorized persons.

History: Cr. Register, October, 1964, No. 106, eff. 11–1–64.

Ind 4.32 Passenger elevator, (hoistway landing door interlocks). (1) EXISTING INSTALLATIONS. (a) Interlocks, either mechanical or electro-mechanical shall be provided on the door of every passenger elevator installation as described in this subsection.

1. A mechanical interlock when provided shall prevent the operation of the driving machine by the normal operating device unless the hoistway landing door at that landing is locked within 4 inches of the fully closed position; and prevent the opening of a hoistway landing door from the landing side, except by means of a special key.

2. An electro-mechanical interlock (a combination of electrical and mechanical devices) when provided shall prevent the operation of the driving machine by the normal operating device unless the hoistway landing door at that landing is locked within 4 inches of the nearest face of the jamb and, provided that the door will eventually be closed and locked within ⅜ inch of the nearest face of the jamb; and prevent the opening of a hoistway landing door from the landing side, except by means of a special key.

3. The functioning of the landing door interlock shall prevent the movement of the car and shall not be dependent solely on the action of a spring or springs in tension, nor solely upon gravity, nor shall it be dependent on the closing of an electric circuit.

(2) NEW INSTALLATIONS. (a) *Interlock.* A hoistway door interlock shall be provided on the door of every passenger elevator installation as described in this subsection.

1. Interlock contacts shall be positively opened by the locking member or by a member connected to and mechanically operated by the locking member, and the contacts shall be maintained in the open position by the action of gravity or by a restrained compression spring, or by both, or by means of the opening member.

2. The interlock latching mechanism shall hold the door in the closed and locked position by means of gravity or by a restrained compression spring or by both, or by means of a positive linkage.

3. The interlock shall lock the door in the closed position before the driving machine can be operated by the normal operating device.

4. The interlocks shall prevent the operation of the driving machine by the normal operating device unless all hoistway doors are closed and locked within ⅜ inch of the fully closed position.

a. *Exception.* The interlock is not required to prevent the operation of the car when being moved within the leveling zone or by means of the access switch as described in Wis. Adm. Code in section Ind 4.31 (7).

(b) Interlocks, used with multi-section doors, shall conform with the requirements outlined as follows:

1. They shall lock all sections of the door, but may be applied to only one section of the door provided the device used to interconnect the door sections is so arranged that lockng one section will prevent the opening of all sections.

(c) Interlock systems employing a single master switch for more than one door is prohibited.

(d) Retiring cams used to actuate an interlock shall exert a force at least double the average force required to operate the interlock

sufficient length to maintain the switches in the open position to the extreme car travel.

(2) Every power elevator hereafter installed shall be equipped with directional limit switches at each terminal of travel. These switches shall function independently of the operation of the floor selector stopping devices; and operated by the movement of the car and shall stop the car approximately level at each terminal landing.

(a) Where final limit switches are not required, directional limit switches shall be mounted to the guide rails and directly operated by a cam attached to the car.

(3) 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.

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

(a) For alternating current drum type elevator machines hereafter installed, the terminal stopping device as outlined in Wis. Adm. Code section (4) shall also open the electric circuit to the motor and brake. This device shall be in addition to the final limit switches required in Wis. Adm. Code section Ind 4.63 (1).

History: Cr. Register, October, 1964, No. 106, eff. 11–1–64.

Ind 4.64 Car safety devices. (1) An approved car safety device capable of stopping and sustaining the car with contract load in the down direction 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.

(2) For speeds greater than 125 feet per minute Type B (sliding type) or Type C (combination instantaneous and oil-buffer) car safety device shall be required.

(3) Every car safety device shall be attached to and located within or below the lower members of the car frame (safety plank). 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 section.

(4) Multiple car safeties may be used subject to the approval of the industrial commission providing the lower safety shall be capable of developing not less than ½ of the force required to stop the entire car with rated load and the duplex safeties shall function simultaneously; these safeties shall be of the "B" type.

(5) Counterweight safeties, where required, shall meet the requirements of car safeties. (See Wis. Adm. Code section Ind 4.20 (3).)

(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 cable leaving the drum or sheave and shall be securely fastened directly to the car frame or by means of metal brackets.

(7) A cutout switch shall be provided on the car safety device of every elevator hereafter installed, which shall remove the power from the driving-machine-motor and brake; at the initial movement of the safety device before or at the time of application of the governor.

(8) Car safety devices shall be identified and classified on the basis of performance characteristics after the safety begins to apply pressure on the guide rails as outlined in this subsection.

(a) *Type A Safeties.* Instantaneous type safeties shall be limited to elevators where the contract speed does not exceed 125 feet per minute.

Note: Type A safeties develop a rapidly increasing pressure on the guide rails during the stopping interval, the stopping distance being instantaneous 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 eccentric dogs or rollers without any flexible medium purposely introduced to limit the retarding force and increase the stopping distance.

(b) *Type B Safeties.* Shall be provided where the contract speed exceeds 125 feet per minute. The safeties shall when operated, stop the fully loaded car within the maximum stopping distances as specified in Table 17 of this section on the basis of the governor tripping speed.

TABLE 17

MAXIMUM STOPPING DISTANCES—TYPE B CAR SAFETIES WITH RATED LOAD

Rated Speed in Ft. Per Minute	Maximum Governor Tripping Speed in Ft. Per Min.	Stopping Distance in Feet—Inches	
		Wedge-Clamp Safety* / Gradual-Wedge-Clamp Safety**	Flexible Guide-Clamp Safety***
0 to 125	175	6– 0	1– 3
150	210	6– 1	1– 4
175	250	6– 2	1– 7
200	280	6– 3	1–10
225	308	6– 5	2– 0
250	337	6– 8	2– 3
300	395	6–11	2– 9
350	452	7– 3	3– 4
400	510	7–10	4– 0
450	568	8– 3	4–10
500	625	8–10	5– 8
600	740	9–11	7– 7
700	855	11– 1	9–10
800	970	12– 4	12– 6

Note: B safeties of the sliding type are divided into 3 classes outlined as follows:

* Wedge-clamp is one where the wedges are applied against the rails through the unwinding of a cable-operated drum, and threaded screws, and the connections between the safety drum and the safety wedges are rigid and no elastic member is provided in the jaw assembly. Travel of the wedges increases the pressure on the jaws.

** Gradual-wedge-clamp is similar in design and construction as the wedge-clamp safety except that an elastic member such as spring or springs are provided on the safety device to obtain a predetermined constant retarding force.

*** Flexible-guide-clamp. Safeties of this type have vertical sliding wedge-type jaws, in which the retarding force is derived from the proportional to the pressure exerted by the compression of spring or springs, directly applying the jaws to the rails. The retarding forces are reasonably uniform after the safety is fully applied.