

existing install

Chapter Ind 4

ELEVATOR CODE

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History: Chapter Ind 4 as it existed on October 31, 1964 was repealed and a new chapter Ind 4 was created effective November 1, 1964.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

(14) **CLEARANCE, TOP CAR.** Top clearance of the elevator car is the shortest vertical distance between the lowest part of the overhead structure or any other overhead obstruction, directly above the car and the uppermost point of the elevator car and its appurtenances

except, guide shoes, leveling devices, car gate posts and car door or gate opening and closing linkage.

Note: The intent is to restrict any further exceptions other than noted above. For overhead height see section Ind 4.001 (59).

(a) *Clearance, top counterweight.* The top counterweight clearance of every powered elevator is the vertical distance from the top uppermost part of the counterweight structure, except guide shoes, to the lowest point of the overhead structure or any other overhead obstruction, directly above the counterweight in the elevator's related hoistway when the car is resting on its buffers at their extreme mechanical down limit of travel.

(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 which serves two or more landings of a building or structure.

(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) *Gravity elevator.* An elevator utilizing gravity 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 type of elevator used exclusively for handling materials as part of a material distribution system and utilizing automatic or semi-automatic 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 of equipment that has been completed or for which the contract was let before the effective date of any applicable rule change.

(27) **NEW INSTALLATIONS**. Every installation of equipment for which the contract has been let on or after the effective date of any applicable rule change.

(a) This shall include every installation of equipment that is changed from the approved installation on record.

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

(29) **MOVING WALKS AND MOVING RAMPS**.

(a) *Landing*. See section Ind 4.001 (58).

(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 Wis. Adm. Code, chapters Ind 50-59, Building and Heating, Ventilating and Air Conditioning.

(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 direction of travel after the buttons have been pressed. With this type of operation, all "Up" landing calls are answered when the car is traveling in the "Up" direction and all "Down" landing calls are answered when the car is traveling in the "Down" direction.

(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) **LANDING.** That portion of a floor, balcony, or platform used to receive and discharge passengers or freight.

(a) *Terminal.* The highest and lowest landing served by the elevator.

(59) **OVERHEAD HEIGHT.** The overhead height of an elevator is the vertical distance from the top terminal landing level to the lowest point of the overhead structure or any other overhead obstruction directly above the car in the elevator's related hoistway.

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; am. (26), r. and recr. (27), Register, December, 1967, No. 144, eff. 1-1-68; r. and recr. (14); am. (25) intro. par., and recr. (25) (a) and (29) (a); am. (58), cr. (59), Register, October, 1970, No. 178, eff. 11-1-70.

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, tiering or piling machines when not serving more than the floor level 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.

(c) Mechanical lifts serving only the floor level on which the lift is located.

(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 Wis. Adm. Code, chapters Ind 35, Safety in Construction and Ind 44, Personnel Hoists.

(e) For belt manlift requirements, see Wis. Adm. Code, chapter Ind 1, Safety.

(f) For employment of minors under 18 years of age see Wis. Adm. Code, chapters Ind 70-78, Labor Standards.

History: Cr. Register, October, 1964, No. 106, eff. 11-1-64; r. and recr., Register, September, 1967, No. 141, eff. 10-1-67; am. (1) (a) and (c), Register, December, 1970, No. 180, eff. 1-1-71; am. (1) (b), (d), (e), and (f), Register, May, 1971, No. 185, eff. 6-1-71.

Ind 4.04 Approval of plans. (1) Every manufacturer, manufacturer's representative or distributor who furnishes elevator, power dumbwaiter, material handling elevator, moving, walk, moving ramp or escalator equipment, shall submit 3 complete plans (See subsection Ind 4.04 (3)) with 2 completed copies of Form SB-22 "Application for Erection or Remodeling" to the Department of Industry, Labor and Human Relations for any new installation or major alteration to existing equipment installations.

Note: Application Form SB-22 may be obtained from the Department of Industry, Labor and Human Relations, Division of Industrial Safety and Buildings, Post Office Box 2209, Madison, Wisconsin 53701.

(a) The submission of plans for installation of equipment described in subsection (1) shall be the responsibility of the building owner when the manufacturer, manufacturer's representative or distributor do not satisfy requirements of subsection (1).

(b) Minor alteration or remodeling of existing equipment installations requiring no plan submission, will require two completed copies of Form SB-22 to be submitted to the Department of Industry, Labor and Human Relations before commencing work.

(2) Plans for any new equipment installation or major alteration to existing equipment installations shall be approved before commencing work on installation of equipment.

(3) Complete plans shall include:

(a) Sectional plan of car and hoistway, showing all running clearances.

(b) Section through hoistway, machine room, pit and car showing all necessary applicable dimensions required by section Ind 4.18. All landings shall be clearly shown, indicating types of hoistway doors or gates used.

(c) Plan of machine and machine supports showing reaction loads, material and sizes of beams.

(e) The size and weight per foot of guide rails and details of their support, also their reinforcement where required.

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

(5) Subsection (1) shall not apply in cities where permits are issued by the city in the manner approved by the Department of Industry, Labor and Human Relations.

History: Cr. Register, October, 1964, No. 106, eff. 11-1-64; r. and recr., Register, October, 1970, No. 178, eff. 11-1-70.

Ind 4.05 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; renum. from Ind 4.08 to be Ind 4.05, Register, October, 1970, No. 178, eff. 11-1-70.

Ind 4.06 Inspection fee. A charge in accordance with the fee schedule established by Wisconsin Adm. Code, chapter 69, Fee Schedule, will be made by the department of industry, labor and human relations 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; renum. from Ind 4.07 to be Ind 4.06, Register, October, 1970, No. 178, eff. 11-1-70; am. Register, December, 1970, No. 180, eff. 1-1-71.

Ind 4.07 Registration numbers. (1) All new elevators, dumbwaiters, escalators, moving walks and ramps shall be assigned a unit number.

(2) The registration number shall be located as follows:

(a) For elevators—on the car crosshead.

(b) For dumbwaiters—in or on dumbwaiter car structure.

(c) For escalators, moving walks or ramps—in the machine room at a location easily recognized from access opening.

(3) The registration number shall be on a metal plate, which shall include state of Wisconsin identification.

(4) All existing elevators, dumbwaiters, escalators, moving walks or ramps shall retain unit number previously assigned and in existing locations.

History: Cr. Register, October, 1970, No. 178, eff. 11-1-70.

Ind 4.08 Inspection by cities. In any city which provides a competent inspector, the department of industry, labor and human relations will accept inspections by such city, provided the conditions of subsections Ind 4.09 (2) (a), (b), (c), (d) and (e) are complied with, substituting "city" for "insurance company".

History: Cr. Register, October, 1964, No. 106, eff. 11-1-64; renum. from Ind 4.06 to be Ind 4.08, Register, October, 1970, No. 178, eff. 11-1-70; am. Register, December, 1970, No. 180, eff. 1-1-71.

Ind 4.09 Inspections; existing installations. (1) The authorized inspectors of the department, upon presenting appropriate credentials to the owner, operator, or agent in charge, are authorized—

(a) To enter without delay and at reasonable times any factory, plant, establishment, construction site, or other area, workplace or

environment where work is performed by an employee of an employer; and

(b) To inspect and investigate during regular working hours and at other reasonable times, and within reasonable limits and in a reasonable manner, any such place of employment and all pertinent conditions, structures, machines, apparatus, devices, equipment, and materials therein, and to question privately any such employer, owner, operator, agent or employee.

(2) The inspector before making his inspection shall contact a representative of the employer and a representative authorized by his employees who shall be given an opportunity to accompany the inspector during the physical inspection of any workplace under subsection (1) for the purpose of aiding such inspection.

(a) Where there is no authorized employee representative, the inspector shall consult with a reasonable number of employees concerning matters of health and safety in the workplace.

Note: The department policy is not to give advance notice, but in the scheduling and in the act of inspecting it may not always be possible to avoid advance notice or to obtain accompaniment as, for example, inside boilers or in precarious locations of elevator installations, but otherwise these rules will be diligently observed.

(3) **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.

(4) **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 department. If it then becomes necessary for the department to make an inspection, the statutory fee for each unit inspected will be charged. (See section Ind 4.06.)

(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. Evidence of approval noted under subsection (2) (e) shall be confirmed on form SB-12 "Certificate of Competency Elevator Inspector"

issued by the department to qualified inspectors after their competency has been examined and approved.

(5) A certificate for operation will be issued by the department of industry, labor and human relations upon finding said equipment meeting the applicable safety standards covered in this code.

(a) Certificates shall be effective for one year following the date of issuance.

(6) The department may revoke the certificate for operation if said equipment is found to be in non-compliance with the applicable safety rules.

(7) Whenever the department under the authority of subsection (4) revokes a certificate, the department shall immediately notify the owner, defined in section 101.01 (13), Wis. Stats., of the equipment in writing and shall afford him an opportunity for a hearing within 30 days time after revocation of certificate.

History: Cr. Register, October, 1964, No. 106, eff. 11-1-64; renum. from Ind 4.05 to be Ind 4.08, Register, October, 1970, No. 178, eff. 11-1-70; am. (2) (d), cr. (3), (4) and (5), Register, December, 1970, No. 180, eff. 1-1-71; am. (2) (d) and recr. (2) (e) 1., Register, May, 1971, No. 185, eff. 6-1-71; renum. (1), (2), (3), (4) and (5) to be (3), (4), (5), (6) and (7) and cr. (1) and (2), Register, April, 1973, No. 208, eff. 5-1-73.

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 4.81 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.

while closing. Where the hoistway door and the car door are closed in such a manner that stopping either one manually will stop both.

(2) Power operation of vertically rising or vertically bi-parting hoistway doors or gates shall conform with the requirements outlined in this subsection.

(a) Both hoistway door or gate and car door or gate shall be of the vertically sliding type and:

1. Power opening of the car door or gate shall occur only when the car is stopping or is leveling, or is at rest.

2. Power opening of the hoistway landing door or gate shall occur at the landing where the car is stopping within the leveling zone.

3. Where power hoistway doors are automatically opened as the car is leveling, the car shall be at rest or substantially level with the landing before the hoistway door is fully opened.

4. Where a car door or gate of an automatic operation elevator is closed by power, or is of the automatically self-closing type, and faces a manually operated or self-closing hoistway door, the closing of the car door or gate shall not be initiated unless the hoistway door is in the closed position.

(b) Power closing of vertically sliding hoistway doors or gates shall be by means of continuous pressure operation from the car and/or at the landing where the car is stationed.

(c) The operation of the closing means shall not close the hoistway door or gate or car door or gate when the elevator is at any other landing.

(d) For elevators having more than one hoistway opening at any landing level, a separate closing means shall be provided in the car for each car door or gate and its adjacent hoistway door or gate. Any closing means at a landing shall close only that hoistway door or gate and the car door or gate at the side where such means is located.

(e) Power-operated hoistway landing gates shall be not less than 5½ feet in height.

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

Ind 4.41 Factors of safety for cables. New and existing installations.
(1) The factor of safety based on static loads for cables for passenger and freight elevators shall be not less than the values given in Table 8 corresponding to the contract speed of the car.

TABLE 8
FACTORS OF SAFETY FOR HOISTING CABLES

Car Speed in Feet Per Minute	Elevators
50 or less.....	7.60
100.....	7.95
200.....	8.60
300.....	9.20
400.....	9.75
500.....	10.25
600.....	10.70
700.....	11.00
800.....	11.25
900.....	11.45

Note: Intermediate car speeds and factors of safety can be obtained by interpolation.

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

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

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

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

CABLE SPECIFICATIONS

Kind of Cable	Number of Cables	Diameter in Inches	Rated Ultimate Strength	Date of Installation
Hoisting				

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

CABLE INSTALLATION DATA

Diameter of Cables _____
 Material and Type of Cable _____
 Rated Ultimate Strength _____
 Date Installed _____

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

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

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

Ind 4.44 Number and size of cables required. (1) Every elevator which requires hoisting cables shall have not less than 2 hoisting cables.

(a) *Exception.* On existing installations a single hoisting cable will be permitted providing the factor of safety is not less than 10.

(2) Every traction elevator hereafter installed shall have not less than 4 cables.

(a) *Exception.* For 2 to 1 roping where the capacity does not exceed 2500 pounds and the speed does not exceed 100 feet per minute 3 cables may be used.

(b) *Exception.* When the capacity does not exceed 1200 pounds 3 cables may be used.

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

- (a) Where rope is used it shall be of the hawser laid type.
- (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; cr. (7) (a), Register, September, 1967, No. 141, eff. 10-1-67.

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.

2. *Exception.* Electrically operated hydraulic elevators.

(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; cr. (1) (b) 2., Register, September, 1967, No. 141, eff. 10-1-67.

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 milli-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:

(a) Conductors from panels to main circuit resistors shall be flame-retardant and suitable for a temperature of not less than 90° C. (194° F.). All other wiring on control panels shall be flame-retardant, moisture-resistant.

(b) Traveling cables used as flexible connections between the elevator or dumbwaiter car and the hoistway shall be Type E, E0, or ET elevator cable or other approved types and shall have a flame-retardant, moisture-resistant outer covering.

(c) All other conductors in the raceways and in or on the cars of elevators and dumbwaiters and in the wellways of escalators and moving walks or moving ramps and in the machine room of elevators, dumbwaiters, escalators and moving walks or moving ramps shall have flame-retardant and moisture-resistant insulation.

(d) The thickness of the insulation of all conductors shall be suitable for the voltage to which the conductors are subjected.

(4) **SIZE.** The minimum size of conductors used for elevators, dumbwaiters, escalators, and moving walks or moving ramps wiring except for conductors which form an integral part of control equipment shall conform with the following:

(a) *Traveling cables.*

1. For lighting: No. 14, except that No. 18 or larger conductors may be used in parallel provided the carrying capacity is equivalent to at least that of No. 14 wire.

2. Operating, control and signal circuits: No. 18.

(b) *Other wiring.* All operating control and signal circuits: No. 18.

(5) **LOCATION.** Conductors and cables located in elevator and dumbwaiter hoistways and escalator and moving walks or moving ramp wellways, in or on elevator and dumbwaiter machine and control rooms, not including the traveling cable connecting the car and hoistway wiring and all wiring through floors and walls shall be installed in rigid conduit, electrical metallic tubing or raceways.

(a) *Exception 1.* Flexible metal conduit not over 3 feet in length may be used in hoistways and in escalator and moving walk or moving ramp wellways, between risers and limit switches, interlocks, operating buttons, and similar devices if securely fastened in place.

(b) *Exception 2.* Flexible metal conduit not over 3 feet in length may be used on cars where so located as to be free from oil and if securely fastened in place.

(c) *Exception 3.* Approved types, S, SO and ST cords may be used as flexible connections between the fixed wiring on the car and the switches in connection with the safety devices on the car doors.

(d) *Exception 4.* Where motor-generators and machine motors are located adjacent to or underneath control equipment, and are provided with extra length terminal leads not exceeding 6 feet in length, may be grouped together and taped or corded without being installed in raceways. Such leads may be extended to connect directly to controller terminal studs. Auxiliary gutters may be used in machine rooms between controllers, starters and similar apparatus.

(6) **WIRING.** The wiring of elevators in hazardous locations shall comply with the requirements of the Wisconsin Electrical Code, Wis. Adm. Code, Chs. E 500 to E 503, inclusive.

(7) **RACEWAYS.** Metal raceways, rigid metal conduit, flexible metal conduit or electrical metallic tubing shall be installed to conform with the requirements outlined in this subsection.

(a) Only rigid conduit or electrical metallic tubing shall be permitted for wiring runs totally enclosed within a concrete floor slab.

(b) Conduit, metallic tubing and metal raceways shall be securely fastened to guide rails, walls or beams at least once in every ten (10) foot length of installation.

(c) All changes enroute of runs shall be completed through fittings or boxes which will permit pulling of wiring without injury to the wire covering.

1. Where boxes or metal raceways are used, proper raceway fittings shall be installed and a radius of not less than two (2) inches included to provide a smooth bending surface for the conductors.

(d) Where auxiliary runs of conduit, metallic tubing or flexible metallic conduit are connected into metal raceways, the connection shall be securely fastened to the metal raceway and the entrance of conductors from the raceway into the auxiliary run shall be through smooth surfaced bushings.

(e) Where conductors or cables leave conduit, electrical metallic tubing or metal raceways for connections to or routing through controller, signal panels or switchboards, the exit shall be through an insulated bushing.

1. Where conduits or tubing terminate upward through the floor, the end of the conduit or tubing shall terminate not less than 2 inches above the floor.

2. Where conductors or a cable leave the conduit or tubing, an insulating bushing shall be placed on the end of the conduit and the conductors or cables shall be grouped together and taped or corded from the conduit or tubing end to the controller, signal panel, or switchboard connections.

(f) A run of conduit between outlet to outlet, between fitting and fitting, or between outlet to fitting shall not contain more than the equivalent of 4 quarter bends (360 degrees, total), including those bends located immediately at the outlet or fitting.

(g) Metal raceways, and other metal enclosures for conductors, shall be metalically joined together into a continuous electrical conductor and shall be so connected to all boxes, fittings and cabinets as to provide effective electrical continuity. Raceways and cable assemblies shall be mechanically secured to boxes, fittings, cabinets and other enclosures.

(8) **NUMBER OF WIRES.** The number of wires or conductors run in rigid metal conduit, flexible metal conduit, electrical metallic tubing or raceways shall not exceed the requirements of this subsection.

(a) The sum of the cross section area of all the wires or conductors in conduit, metallic tubing or raceways shall not exceed 40% of the inside area of the conduit, metallic tubing, or raceways. The number of conductors shall be based on the area of conductors and conduits

as tabulated in Table 19 and Table 20 and the normal maximum number of conductors in a conduit when all are of the same size shall not exceed the number indicated in Table 21.

TABLE 19

Conduit	Total 100%	Useable 40%
$\frac{1}{2}$ -----	.30	.12
$\frac{3}{4}$ -----	.53	.21
1-----	.86	.34
$1\frac{1}{4}$ -----	1.50	.60
$1\frac{1}{2}$ -----	2.04	.82
2-----	3.36	1.34

TABLE 20

Wire Size	Square Inch Area* Rubber Covered	Square Inch Area* Thermo-plastic
18-----	.0167	.0088
16-----	.0196	.0109
14-----	.0230	.0135
12-----	.0278	.0172
10-----	.0450	.0224

*Area based on 2/64 inch insulation.

TABLE 21

Wire Size	$\frac{1}{2}$ Inch	$\frac{3}{4}$ Inch	1 Inch	$1\frac{1}{4}$ Inch	$1\frac{1}{2}$ Inch	2 Inch
18 Rubber-----	7	12	20	35	49	80
18 Thermo-----	12	21	34	68	90	146
16 Rubber-----	6	10	17	30	41	68
16 Thermo-----	9	17	22	48	73	118
14 Rubber-----	4	6	10	18	25	41
14 Thermo-----	7	13	23	38	52	80

(b) The percentage of the total interior cross sectional area of a raceway occupied by conductors shall be not more than will permit a ready installation or withdrawal of the conductors and dissipation of the heat generated without injury to the installation of the conductors.

(9) CONDUCTORS. Conductors for operating, control, power, signal, and lighting circuits of 600 volts or less may be run in the same traveling cable or raceway system provided that all conductors are insulated for the maximum voltage found in the cables or raceway system and all live parts of the equipment are insulated from ground for this maximum voltage. Such a traveling cable or raceway may also include a pair of telephone conductors for the car telephone provided such conductors are insulated for the maximum voltage found in the cable or raceway system.

(10) TRAVELING CABLES. Traveling cables shall be so suspended at the car and hoistway end as to reduce the strain on the individual copper conductors to a minimum.

(a) Cables, exceeding 100 feet in length and which have steel supporting fillers, shall be suspended directly by the steel supporting fillers.

(b) Where non-metallic fillers are used, the cables shall be suspended by looping the cables around the supports.

(c) Traveling cable supports shall be so located as to reduce to a minimum the possibility of damage due to the cables coming in contact with the hoistway construction or equipment in the hoistway. Where necessary, suitable guards shall be provided to protect the cables against damage.

(d) All conductors run in vertical raceways shall be supported at intervals not to exceed 100 feet by one of the methods of supports or a method of equal effectiveness outlined as follows:

1. By clamping devices constructed of or employing insulating wedges inserted in the ends of the conduit.

2. By inserting boxes at the required intervals in which insulating supports are installed and secured in a satisfactory manner to withstand the weight of the conductors attached thereto, the boxes being provided with covers.

(11) **CONDUCTORS.** Conductor cables and wires of Nos. 18 and 16 used for control and operating circuits and signal circuits shall be protected by overcurrent devices not to exceed 6 ampere for No. 18 and 10 ampere for No. 16 wire.

(12) **CLEARANCES.** Clearance around control panels for elevators and power dumbwaiters shall be provided for safe and convenient access to all live parts. The minimum clear working space about live parts shall be not less than the following:

(a) In the front—36 inches to live panel parts.

(b) In the rear—24 inches to live panel parts.

(c) On one side of a panel or a group of panels 18 inches.

(d) Escalator, moving walk or moving ramp control panels shall be totally enclosed.

(e) Where escalator, moving walk or moving ramp control panels are not located in the same place as the driving machine, the control panel doors shall be capable of being locked in the closed position.

(13) **TERMINALS.** Motor terminals shall be enclosed in a metal box of substantial construction. The box shall be of ample size to make proper connections.

(14) **METALLIC TUBING.** Electrical metallic tubing shall not be laid on the penthouse floor or pit floor or in any other location subject to mechanical damage.

History: Cr. Register, October, 1964, No. 106, eff. 11-1-64; am. (8) (a) Table 21, Register, May, 1971, No. 185, eff. 6-1-71.

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

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

Ind 4.75 Signal system. New and existing installations. (1) Every existing hand cable operated power elevator or dumbwaiter shall be equipped with a warning bell so arranged that it can be safely and conveniently operated from any landing.

(a) *Exception.* Elevators or dumbwaiters equipped with hoistway landing door or gate electric contacts.

(2) Every automatic operated elevator shall be provided with an emergency electric call bell with a properly placarded push button in the car. This call bell shall be not less than 6 inches in diameter located inside the building and audible outside the hoistway. Only one bell is required for a group of elevators if operable from all cars in the group.

(3) All elevators located in acid towers, grain elevators and similar places, shall be provided with an emergency call bell or telephone to be used in case of emergency.

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

Ind 4.76 Lighting. (1) Lighting and convenience outlets shall be provided to conform with the requirements outlined in this subsection.

(a) Elevator cars shall be provided with illumination of an intensity of not less than 5 foot-candles at the edge of the car platform.

(b) Every elevator hoistway landing entrance within or in connection with an occupied building shall be provided with illumination of an intensity of not less than 5 foot-candles at the landing sill.

(c) Every machine room and penthouse shall be provided with uniform artificial illumination of an intensity of not less than 5 foot-candles at the floor. Every area about a ceiling-type machine, including overhead sheave rooms or lofts shall be amply lighted. Control of such lighting shall be at the approach to the machine room, penthouse or overhead equipment.

(d) Every power elevator hereafter installed shall be equipped with work light and convenience outlets as follows:

1. Work light receptacle and convenience outlet on top of car.

2. Work light receptacle on underside of car platform.

3. Work light receptacle and convenience outlet located in the hoistway approximately level with the lowest terminal landing floor if hoistway landing doors are used.

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

Ind 4.77 Elevators not in use. (1) Elevators reported as not being used shall not be subjected to the annual inspection provided the installation conforms with the requirements listed as follows:

(a) All hoistway landing doors or gates shall be securely sealed on the inside to prevent opening from the landings.

(b) Fuses and wires to the disconnect switch shall be removed.

(c) For hand elevators, the car platform shall be substantially blocked; and the hoist cables removed from the car crosshead.

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

Ind 4.78 Maintenance. New and existing installations. (1) Elevators, dumbwaiters, escalators and moving walk or moving ramp equipment shall be kept in safe operating condition, properly lubricated and clean, including pits, penthouses and machine rooms.

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

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

History: Cr. Register, October, 1964, No. 106, eff. 11-1-64; am. (1), Register, May, 1971, No. 185, eff. 6-1-71.

POWER DUMBWAITERS**Ind 4.79 Power dumbwaiters. (1) NEW AND EXISTING INSTALLATIONS.**

(a) The hoistway landing openings of every power dumbwaiter shall be provided with doors or gates that cover the full entrance opening, so arranged that the dumbwaiter cannot be started unless all doors or gates are closed. The slats or bars for gates where used shall be vertical and the net width of an opening shall not exceed 3 inches. Collapsible gates are prohibited. Where a fire-resistive hoistway is required, all landing doors shall be of fire-resistive construction, (see Wis. Adm. Code section Ind 4.10).

(b) Every dumbwaiter shall conform with the requirements as outlined in this subsection.

1. The car platform area shall not exceed 9 square feet.
2. The car height shall not exceed 4 feet.
3. The capacity shall not exceed 500 pounds.
4. The car top and sides shall be solidly enclosed, except for the entrance openings.

a. *Exception.* Dumbwaiters installed before August 12, 1926.

(2) NEW INSTALLATIONS. (a) Power dumbwaiters hereafter installed shall be automatic or continuous pressure operation.

(b) Dumbwaiter machines 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.

1. *Exception.* Hydraulic dumbwaiters.

(c) Every dumbwaiter hoistway landing door or gate, shall be equipped with electric contacts and approved locks or interlocks.

(d) Power dumbwaiters with speeds greater than 100 feet per minute shall be equipped with interlocks.

(e) Power dumbwaiters shall be provided with limit switches to automatically stop the car at each terminal of travel. These switches shall be mounted to the guide rails and directly operated by a cam attached to the car.

(f) Power dumbwaiters equipped with winding drum machines shall be provided with a slack-cable switch, which will remove the power from the motor and brake if the car is obstructed in its descent.

(g) Where dumbwaiter hoistway landing doors are closed by power, the door operation shall conform with Wis. Adm. Code section Ind 4.39 (2) (b) or an audible signal shall be given for a minimum of 3 seconds before permitting the doors to close automatically.

(h) All terminal landing doors shall be provided with means to open the door irrespective of the position of the dumbwaiter car. The opening means shall be mounted adjacent to the door and shall be provided with a removable cover.

(j) Access shall be provided to the machines located in hoistways.

(k) Vision panels not less than 4 square inches nor more than 12 square inches shall be provided in hoistway doors where position indicators are not provided.

Editor's note: The department of industry, labor and human relations filed an amendment of section Ind 4.79 (2) (k) in which they quoted only subsection (k). Intro. par. Apparently they did not intend to affect the following material and we have therefore continued to print it:

(11) Enclosed balustrades shall be provided for each side of the moving walks and moving ramps and shall conform with the requirements listed as follows:

(a) Balustrades without moving handrails shall be designed so as to provide no surface which can be gripped by a passenger. The treadway side of the balustrade shall have no areas or moldings depressed or raised more than $\frac{1}{4}$ inch from the parent surface. Such areas or moldings shall have all boundary surfaces beveled unless parallel to the direction of travel. The balustrades shall extend at normal height at least 12 inches beyond the end of the exposed treadway. Glass panels if used, shall be approved safety type.

(b) The height of a balustrade shall be not less than 30 inches measured perpendicular to the treadway surface. At this height, the inner surface of the balustrade shall be located not more than 8 inches outside the vertically protected edge of the exposed treadway.

(c) The clearance between the top surface of the treadway and the underside of the balustrade shall not exceed $\frac{1}{2}$ inch.

(12) Where the intersection of the balustrade (deck board) and ceiling or soffit is less than 24 inches from the center line of the handrail, a solid guard shall be provided in the intersecting angle. The vertical face of the guard shall have a height of at least 7 inches and shall be rounded. Guards may be of glass, if of the approved safety type.

(13) The driving machine shall be connected to the main drive shaft by toothed gearing, a coupling or a chain.

(14) Each moving walk or moving ramp shall be provided with an electrically released, mechanically applied brake capable of stopping and holding the treadway with any load up to the load rating. This brake shall be located either on the driving machine or on the main drive shaft.

Exception. Slider bed and other moving walks which will not run in the down direction by gravity under any load condition up to their load rating with the power supply interrupted do not require brakes.

(a) Where a chain is used to connect the driving machine to the main drive shaft, a brake shall be provided on that shaft. It is not required that this brake be of the electrically released type if an electrically released brake is provided on the driving machine.

(b) Electrically released brakes shall stop the treadway automatically upon failure of power or when any of the safety devices specified in subsection (16) (b), (c), (d) and (e) operate. Brakes on the main drive shaft, if not of the electrically released type, shall be applied when the drive chain parts.

(15) Pallet propelling chains and drive components other than those specified shall have a factor of safety of not less than 10 based on the ultimate strength.

(16) Operating and safety devices shall be provided to conform with the requirements outlined as follows:

(a) A starting switch shall be of the key-operated type and shall be located within full sight of the moving walk or moving ramp treadway.

(b) Emergency stop buttons or other types of manually operated stop switches shall have red buttons or handles and shall be accessibly located at or near the top and bottom landings of each moving

walk or moving ramp, and shall be protected against accidental operation. The operation of either of these buttons or switches shall interrupt the power to the driving machine. It shall not be possible to start the driving machine by these buttons or switches.

(c) Moving walks and moving ramps equipped with a brake as required in subsection (14) and driven by a direct current motor, shall be provided with a speed governor which will cause interruption of power to the driving machine and brake, and where provided, the governor shall be set to trip at a speed not greater than 40% above the rated treadway speed.

Exception. A governor will not be required for moving walks or moving ramps which will not run by gravity under any load conditions up to their load rating and/or where driven by a low slip alternating current induction motor.

(d) A broken drive-chain device shall be provided to conform with subsection (14) (a).

(e) A treadway device shall be provided which will cause interruption of power to the driving machine and to the brake, if the connecting means between pallets or the treadway elongates excessively.

(17) An externally operated enclosed, fused disconnecting switch or circuit breaker shall be provided to conform with the requirements of Wis. Adm. Code section Ind 4.70(1).

(18) Control panels which are not located in the machine room shall conform with the requirements of Wis. Adm. Code section Ind 4.73 (12) (e).

(19) All electrical wiring shall conform with the requirements of Wis. Adm. Code section Ind 4.73.

(20) Grounding of electrical equipment shall conform with the requirements of Wis. Adm. Code section Ind 4.74.

(21) Every machine room shall be provided with permanent artificial illumination of an intensity of not less than 5 foot-candles. The lighting switch shall be so located that it can be operated without passing over or reaching under any other part of machinery.

(a) The entire run of moving walk or moving ramp shall be provided with permanent uniform artificial illumination of not less than 5 foot-candles.

(22) All floor openings shall be protected against passage of flame, smoke or gases in accordance with the requirements of Wisconsin Building Code.

(23) The sides and undersides of moving walks or moving ramps shall be enclosed with fire-resistive material.

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