

DEPT. OF INDUSTRY, LABOR & HUMAN RELATIONS 3

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 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 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) **FACE 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,

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(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 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 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.

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

(f) For 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; 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.

**Ind 4.04 Approval of plans.** (1) Every manufacturer, manufacturer's representative or distributor who furnishes elevator, power dumb-waiter, 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.** (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.

**Editor's Note:** When Industry, Labor and Human Relations Department filed the amendment it said that section Ind 4.00 (1) (d) was being amended. This seems to have been an error and we are showing the change at this point: *Dr*

(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 Wis. Adm. Code section Ind 4.06.) *Am*  
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(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. *10*

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. *10*  
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(3) 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.

(4) The department may revoke the certificate for operation if said equipment is found to be in non-compliance with the applicable safety rules. *10*

(5) 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 4.09, 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.

**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.

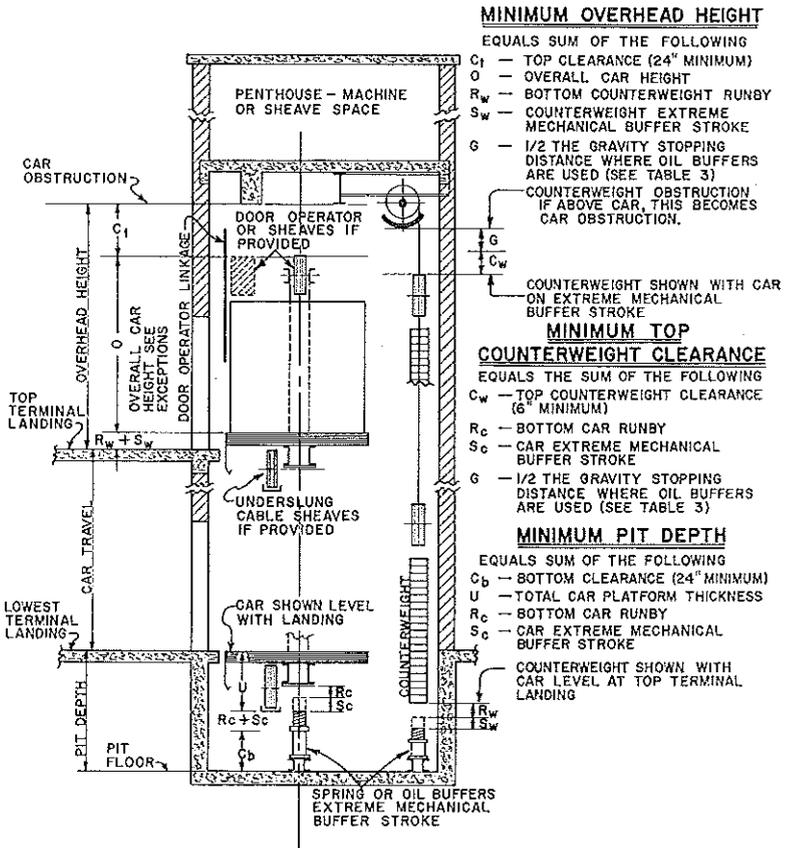
(c) Where a passenger or freight elevator or power dumbwaiter is installed in a building which includes a *theatre or assembly hall* the hoistway enclosure shall be not less than 2-hour, fire-resistive construction. (See Wis. Adm. Code sections Ind 4.31, 4.38 and 4.79 for hoistway landing doors.)

(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.

- 3. S. dim.—Car extreme mechanical buffer stroke.
- 4. G dim.— $\frac{1}{2}$  the gravity stopping distance taken at 115 percent of rated speed. (See table 7.)

(b) In existing buildings where footings and sewer lines prevent sufficient pit depth to satisfy minimum top counterweight clearance, and the elevator is of generator field control type, the bottom car runby may be reduced where spring return oil type buffers are used. The car buffer may be compressed up to 25% of its stroke when the car is level with the lowest terminal landing.

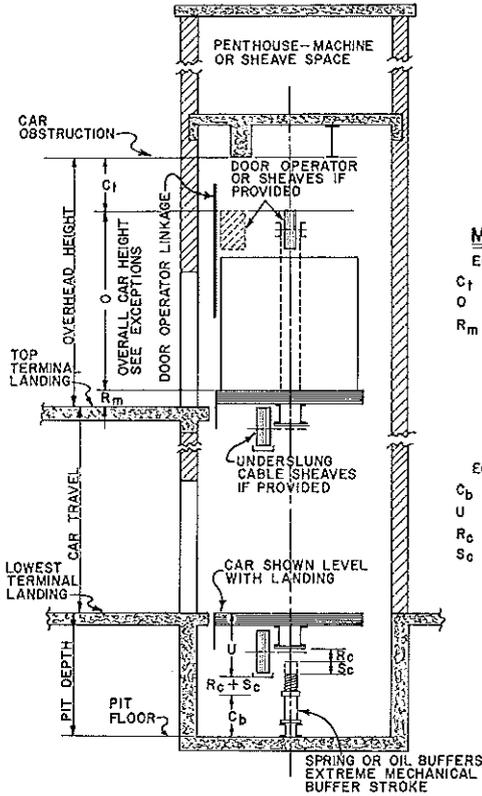
**History:** Cr. Register, October, 1964, No. 106, eff. 11-1-64; r. and recr. Register, October, 1970, No. 178, eff. 11-1-70.



IND. 418

PIT DEPTH, OVERHEAD HEIGHT AND COUNTERWEIGHT CLEARANCE FOR ALL TYPES OF CABLE DRIVEN, COUNTERWEIGHTED ELEVATORS

FIGURE 1  
 3-20-70



**MINIMUM OVERHEAD HEIGHT**

EQUALS SUM OF THE FOLLOWING  
 $C_t$  — TOP CLEARANCE (24" MINIMUM)  
 $O$  — OVERALL CAR HEIGHT  
 $R_m$  — OVERTRAVEL ABOVE LANDING TO MACHINE AUTOMATIC CUTOFF

**MINIMUM PIT DEPTH**

EQUALS SUM OF THE FOLLOWING  
 $C_b$  — BOTTOM CLEARANCE (24" MINIMUM)  
 $U$  — TOTAL CAR PLATFORM THICKNESS  
 $R_c$  — BOTTOM CAR RUNBY  
 $S_c$  — CAR EXTREME MECHANICAL BUFFER STROKE

IND 4.18

PIT DEPTH AND OVERHEAD HEIGHT FOR CABLE DRIVEN,  
 UNCOUNTERWEIGHTED, WINDING DRUM TYPE ELEVATORS

LIMITED TO  
 MAXIMUM CAPACITY ————— 2500 LBS.  
 MAXIMUM SPEED ————— 50 FEET PER MINUTE  
 MAXIMUM TRAVEL ————— 35 FEET  
 REFER TO IND. 4.6(I)

FIGURE 2  
 3-20-70

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

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 33¾% 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; am. (1) (a), Register, October, 1970, No. 178, eff. 11-1-70.

**Ind 4.20 Hoistways, machine rooms and pits. Restrictions. New and existing installations.** (1) Wires, cables, pipes or conductor enclosures shall not be installed in any hoistway nor machine room immediately offset and an integral part of the 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 only be elevator and/or dumbwaiter equipment located in the machine room.

(a) Adjoining areas connected with the machine room shall be separated by the following method:

1. A fixed partition not less than 6 feet in height located not less than 3 feet from elevator equipment.

2. On new installations, wires, cables, pipes, or conductor enclosures above the machine room area shall be separated from the machine room area by a fixed unpierced ceiling whose height shall satisfy installation of elevator equipment but in no case be less than 7 feet above the machine room floor.

3. On new installations hazardous piping such as noxious gases, water or steam lines with pressures exceeding 15 pounds per sq. in. shall be isolated from the machine room area by the following means:

a. Unpierced walls, ceiling and entrance door construction.

b. Ceiling height shall satisfy installation of elevator equipment but in no case be less than 7 ft. above the machine room floor.

c. Entrance door sill shall be no less than 6 inches above machine room floor.

(5) Access to the machine room or penthouse for elevators here-

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after installed shall not be through any toilet room, sleeping room or private quarters.

**History:** Cr. Register, October, 1964, No. 106, eff. 11-1-64; r. and recr. (1) Intro par. and (4), Register, September, 1967, No. 141, eff. 10-1-67.

**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) *Exception:* Providing there are no other access openings from outside the hoistway, a floor or grating is not required where the governor and sheaves can be serviced while standing on top of the car or car structure, and the governor is of a type that can be released by movement of the car in the up direction.

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

(c) 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 is 4 feet or more above the roof, a stairway-type ladder shall be provided to the access door.

(d) Access to the roof shall be by means of a stairway in compliance with 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; r. and recr. (4), Register, September, 1967, No. 141, eff. 10-1-67; am. (4) (a), Register, October, 1970, No. 178, eff. 11-1-70; cr. (4) (d), Register, December, 1970, No. 180, eff. 1-1-71.

**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 hereinafter installed, access to the machine room or penthouse shall be made from outside the hoistway by means of an unobstructed stairway (with handrails), inclined not more than 60 degrees with the horizontal and the treads shall not be less than 24 inches in width. 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 penthouses 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 substantial 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; am. (4), Register, October, 1970, No. 178, eff. 11-1-70.

**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.

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  $\frac{3}{4}$  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 suspended by wire ropes shall have a car frame.

**Note:** See Ind 4.001 (11).

(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.

1. Where wood is used, the underside exposed wood surface shall be covered with one of the following:

a. Not less than No. 26 U.S. gauge sheet steel.

b. An approved fire-retardant paint having a flame spread rating not over (25) applied in accordance with instructions of the manufacturers. Such ratings shall be based on the test procedure specified in A.S.T.M. E84-61. (Available for inspection at the offices of Industry, Labor and Human Relations, the Secretary of State, and the Revisor of Statutes, or may be procured for personal use from American Society for Testing and Materials, 1916 Race St., Philadelphia, Pennsylvania 19103.)

(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; r. and recr. (9) (d), Register, September, 1967, No. 141, eff. 10-1-67; r. and recr. (1) and (9) (d), Register, October, 1970, No. 178, eff. 11-1-70.

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**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  $\frac{3}{4}$  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  $\frac{1}{8}$  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  $\frac{1}{2}$  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 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.

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, and arranged to be opened from the top of the car only.

(b) The exit openings shall be so located as to provide a clear pas-

sageway 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; r. and recr. (6) (a) 1., Register, September, 1967, No. 141, eff. 10-1-67; r. and recr. (6) (a), Register, October, 1970, No. 178, eff. 11-1-70; cr. (6) (a) 1., Register, December, 1970, No. 180, eff. 1-1-71.

**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) Elevators in buildings where occupancies require handrails in corridors, shall have handrails provided in car to satisfy the following requirements:

(a) Handrails shall be provided on each side, except on the entrance side or sides.

(b) Handrails shall be located approximately 3½ feet above the floor of elevator.

(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.

(6) Apparatus or equipment, other than that used in connection with the operation of the elevator, shall not be installed on or within any elevator except for lighting, heating, ventilating or sealed air conditioning systems.

**History:** Cr. Register, October, 1964, No. 106, eff. 11-1-64; r. and recr. (2), cr. (6), Register, October, 1970, No. 178, eff. 11-1-70.

**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.

(a) Where car gates are permitted they shall be of the horizontal sliding type.

1. The gate when closed shall guard the full opening.

2. The gate shall be provided with a gate electric contact. (See exception under a. below.)

a. Movement of the car is permitted within the leveling zone with the car gate open.

(b) A car door of the horizontal sliding type shall be provided at each entrance to elevator car where the car speed exceeds 100 feet per minute.

1. The door when closed shall guard the full opening.

2. The door shall be provided with a door electric contact. (See exception under subsection (1) (b) 2. a. below.)

a. Movement of the car is permitted within the leveling zone with the car gate open.

(2) Passenger elevators installed in a hoistway having separate landings used exclusively for passengers and other landings for freight

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shall not have car gates guarding openings regardless of elevator car speed. (See also, section Ind 4.31 (8)).

(a) Where vertical sliding or vertical biparting hoistway landing doors are permitted under section Ind 4.31 (3) for car entrances used exclusively for freight, either vertical or horizontal sliding solid panel car doors guarding entire opening shall be used.

(3) Electric contacts shall be provided on all elevator car doors or 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.

(4) 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.

(5) 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 ( $\frac{1}{3}$ ) of the clear gate opening, and in no case more than 10 inches.

(6) 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.

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

(8) 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.

(9) 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.

(10) 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.

(11) 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.

(12) 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 reopen 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 reopening device.

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

**Ind 4.31 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  $\frac{3}{4}$  hour. Wood doors of solid flush type  $\frac{1}{4}$  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  $1\frac{1}{2}$  hours. The doors shall be marked or identified to indicate that the entrance construction meets the fire rating requirements 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  $\frac{3}{8}$  inch.

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

(3) Vertical sliding or vertical biparting doors shall not be used to protect passenger landing openings.

(a) Passenger elevators used also for freight may have vertical sliding or vertical biparting doors at landing openings used exclusively for freight providing:

1. The car freight door is equipped with a zone interlock and;

landing side will not cause the gate panel to move into the hoistway if the guide shoes become loose.

4. Every gate guide post or track shall be securely fastened to withstand the lateral pressure as applied to the gate as specified in subsection (4)(a) 1. The use of wood plugs and/or metal expansion bolts in brick, tile or plaster walls for fastening guide posts or tracks is prohibited.

5. Every gate shall be properly counterbalanced from 2 sides and hung with substantial sash cord, flexible cable or chain over pulleys not less than 3 inches in diameter.

6. The gate counterweights shall be boxed in or shall run in metal guides to prevent being dislodged. The bottom of the boxes or guides shall be of such construction that the counterweights will be retained if the suspension means break.

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

**Ind 4.38 Freight elevator hoistway landing doors. (1) EXISTING INSTALLATIONS. (a) Hoistway landing doors where provided shall conform with the requirements outlined in this subsection.**

1. Every semi-automatic door for power elevators shall be equipped with an approved lock so arranged that the door cannot be opened unless the car is at the landing. This lock shall be so constructed and located that it cannot be easily reached from the floor when the door is closed. For elevators equipped with an electric brake see subsection (1) (a) 5.

2. Where electric contacts are provided on hoistway landing doors, the lock or latch and contact shall be so arranged as to insure the door being in a position to be locked or latched before the contact is closed.

3. Hoistway landing door electric contacts shall be positively opened by the movement of the door and shall be maintained in the open position and shall be so located that they are not readily accessible from the landing.

4. On hoistway landing doors, 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.

5. Every hoistway landing door shall be provided with electric contacts and approved locks or interlocks on all elevators having electric brakes.

6. Full automatic doors at terminal landings are prohibited where the car speed exceeds 100 feet per minute.

7. For every freight 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 securely fastened cover. (See a. below for exception.)

a. Where keys are of special design for opening the hoistway door and their operation cannot be duplicated with common tools.

b. The emergency operating key for unlocking hoistway doors shall be located adjacent to the lowest landing or be on the premises and made readily available by the building owner or his authorized representative. The key shall be kept in a receptacle having a breakable red cover. The receptacle shall be clearly marked "Fire Department and Emergency Use Only."

8. Single or multi-section vertically sliding doors shall be so counterweighted and vertically sliding, bi-parting counterbalanced doors shall be so counterbalanced that they will not open or close by gravity.

9. Suspension means and their connections for vertically sliding bi-parting counterbalanced doors and for the counterweights of vertically sliding counterweighted doors, shall have a factor of safety of not less than 5. Fastenings shall be provided to prevent the detachment or dislodgment of counterbalancing weights of doors.

10. Each door panel 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 panel, without causing the panel to break or to be permanently deformed.

(2) DOORS. NEW ELEVATOR INSTALLATIONS. (a) Hoistway landing doors where provided shall conform with the requirements outlined in this subsection.

1. Where a 1-hour, fire-resistive constructed hoistway is required all hoistway landing doors or fire shutters shall have a minimum fire-resistive rating of  $\frac{3}{4}$  hour. Wood doors of solid flush type  $1\frac{3}{4}$  inches thick are acceptable.

2. Where a 2-hour, fire-resistive constructed hoistway is required all hoistway landing doors or fire shutters shall have a minimum fire-resistive rating of  $1\frac{1}{2}$  hours. The doors shall be marked or identified to indicate that the entrance construction meets the fire rating requirements. These identifying marks may be labels or certifications based on tests submitted from a recognized testing laboratory.

3. Where a fire-resistive constructed hoistway is required and hoistway landing gates are provided, each entrance opening shall be provided with an approved fire door or shutter which shall be equipped to close automatically in case of fire (see Wis. Adm. Code section Ind 4.10).

4. Hoistway doors shall be provided for elevators where the car speed exceeds 100 feet per minute.

5. Hoistway landing doors shall be equipped with electric contacts and locks or interlocks as outlined in this subsection.

a. Electric contacts and locks or interlocks where the car speed does not exceed 100 feet per minute.

b. Interlocks for all elevators where the car speed is in excess of 100 feet per minute.

c. Where interlocks are provided they shall conform with all requirements outlined in Wis. Adm. Code section Ind 4.32 (2) (a).

6. Hoistway landing door electric contacts shall be positively opened by the movement of the door and shall be maintained in the open position and shall be so located that they are not readily accessible from the landing.

7. Where electric contacts are provided on hoistway landing doors, the lock or latch and contact shall be so arranged as to insure the door being in a position to be locked or latched before the contact is closed.

(b) Each door panel 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 panel, without causing the panel to break or be permanently deformed.

1. Single or multi-section vertically sliding doors shall be so counterweighted and vertically sliding, bi-parting counterbalanced doors shall be so counterbalanced that they will not open or close by gravity.

2. Suspension means and their connections, for vertically sliding bi-parting counterbalanced doors and for the counterweights of vertically sliding counterweighted doors, shall have a factor of safety of not less than 5. Fastenings shall be provided to prevent the detachment or dislodgment of counterbalancing weights of doors.

3. Bi-parting counterbalanced hoistway doors shall have the lower edge of the upper door section provided with a fire-resistive, non-shearing, non-crushing member to provide a space of not less than  $\frac{3}{4}$  inch between the rigid members of the door sections when closed. Any rigid astragal overlapping the meeting edge and/or any fire-resistive astragal overlapping the door sections when closed is prohibited. Center latches are prohibited.

4. Manually operated vertically sliding bi-parting counterbalanced hoistway doors on elevators which can be operated from the landings shall be provided with pull straps on the inside and outside of the doors.

5. Horizontal sliding doors shall conform with the requirements of Wis. Adm. Code Ind 4.31 (1) (c) to (c) 4., inclusive.

6. Vision panels shall be provided in all hoistway landing doors; except where car position indicators are installed at each floor, or where car and landing doors are power operated. Where required or used, vision panels shall conform 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-resistive material and of substantial construction.

c. Panel openings shall be glazed clear wire glass not less than  $\frac{3}{4}$  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.

7. Every new freight elevator with counterbalanced doors and every car switch controlled elevator equipped with horizontally sliding doors, shall be equipped with an emergency key which cannot be easily duplicated, which will, irrespective of the position of the car, unlock the lowest terminal landing door. This emergency key shall be placed in a receptacle having a transparent breakable cover, clearly marked, "Elevator Door Key for Fire Department and Emergency Use Only", and shall be located at the lowest landing. Where an emergency key opening has been provided for opening a hoistway landing door, the key opening shall be provided with a cover fastened with Phillips head-type screws.

8. Emergency keys not easily duplicated, shall be provided to open certain hoistway landing doors from the landing side regardless of the car position. Emergency key opening shall be provided for landing doors for every automatic or continuous pressure push button

controlled elevator installed with horizontally sliding or swinging doors outlined as follows:

a. Single hoistway—at each floor.

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

c. All emergency key openings shall be provided with a cover fastened securely with Phillips head-type screws.

*Exception.* Emergency key openings not greater than  $\frac{1}{2}$  inch in diameter which require the use of keys of the jointed design and the hinged action cause the release of the door interlocks.

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

9. An elevator installed in a single blind hoistway shall conform with Wis. Adm. Code section Ind 4.31(10).

(c) Every elevator shall have an access provided to its related hoistway at the lowest landing as required in section Ind 4.31 (6) (c) for purposes of emergency, inspection, maintenance or repairs.

1. Where additional access to hoistway is provided, such access shall be by a hoistway unlocking device as specified in section Ind 4.31 (6) (c).

(d) An elevator installed in a single blind hoistway shall conform with Wis. Adm. Code section Ind 4.31(10).

**History:** Cr. Register, October, 1964, No. 106, eff. 11-1-64; r. and recr. (1) (a) 7., and cr. (2) (c) and (d), Register, October, 1970, No. 178, eff. 11-1-70.

#### Ind 4.39 Power door operation. New installations.

(1) (a) Power operation of horizontally sliding car and hoistway landing doors shall conform with the requirements as outlined in this subsection.

1. Both the car and hoistway door shall be of the horizontally sliding type.

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

3. Power opening of the hoistway landing door shall occur only at the landing where the car is stopping within the leveling zone or is at rest.

4. 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.

(b) 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; and the closing mechanism shall be so designed that the forces necessary to prevent closing of a car door or gate from rest shall be not more than 30 pounds.

(c) A re-opening device shall be provided for every power-operated car door which will function to stop and re-open a car door and the adjacent hoistway door in the event that the car door is obstructed

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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.

(h) *Floorless elevators and dumbwaiters.* Elevators and dumbwaiters without platforms are prohibited.

(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 story of travel, and not to exceed 14 feet.

(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.

(n) A platform or equipment not required for the operation of the elevator shall not be located above the top of any elevator car.

**History:** Cr. Register, October, 1964, No. 106, eff. 11-1-64; cr. (1) (h); r. and recr. (2) (j), Register, September, 1967, No. 141, eff. 10-1-67; cr. (2) (n), Register, October, 1970, No. 178, eff. 11-1-70.

**Ind 4.61 Winding drum machines.** (1) Winding drum machines shall be used for freight elevators only; shall not have counterweights; and shall be limited to a capacity not to exceed 2,500 pounds. The speed shall not exceed 50 feet per minute and the travel not to exceed 35 feet.

(2) *Exception.* Material handling elevators.

**History:** Cr. Register, October, 1964, No. 106, eff. 11-1-64; r. and recr. Register, September, 1967, No. 141, eff. 10-1-67.

**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 land-

ing. 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 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) Every drum type elevator machine shall be equipped with an approved machine automatic terminal stopping device which will automatically 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 subsection (3) 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, r. (3); renum. (4) to be (3), Register, December, 1967, No. 144, eff. 1-1-68.

**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  $\frac{1}{2}$  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.

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(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*	Flexible Guide-Clamp Safety***
		Gradual-Wedge-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- 3
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.

(13) Every car safety device and speed governor shall be maintained in proper working condition and shall be subjected to a running test at intervals as outlined in this subsection.

(a) Safety tests for *type A, B and C safeties* shall be made with the contract load in the car, and at contract speed in the "down" direction, shall, by tripping the governor by hand stop and hold the car.

1. The governor tripping speed shall conform with requirements as specified in subsection (8)(b), Table 17.

(b) The test shall be made with all electric apparatus operative, except for the cutout switch as specified in subsection (7).

(c) Type B safeties shall stop the car with the contract load within the maximum stopping distances as specified in subsection (8)(b), Table 17.

(d) Tests as outlined in subsection (13) shall be made at every 5 year period thereafter.

(e) In the event the safety device or the governor fails to function as required, the owner or agent shall renew or replace any part or parts of the equipment and make a test or tests necessary to insure satisfactory operation of the safety device and governor.

(f) A tag shall be fastened to the governor releasing carrier, upon completion of a satisfactory test of the car safety device and speed governor. Reports of tests as specified in subsection (13) shall be submitted to the industrial commission with complete information on Form SB-2E "Test Report of Safety Devices" and "Tags" furnished by the Industrial Commission, Post Office Box 2209, Madison, Wisconsin 53701.

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

**Ind 4.65 Speed governors.** (1) An approved speed governor shall be installed in connection with the required car safety for every power elevator as outlined in Wis. Adm. Code section Ind 4.64 (8) (a), (b), and (c).

(2) Every speed governor hereafter installed shall be of a type equipped with cable-grip jaws which will grip the governor cable. Governor jaws shall be of such shape and minimum length to prevent serious cutting, damage or deformation of the cable when the stopping action of the jaws in operating the safety device. The governor shall be located where it cannot be struck by the car or counterweight in case of overtravel. There shall be sufficient space for full movement of the governor parts.

(a) Governors for elevators with a contract speed in excess of 200 feet per minute and with type B safeties shall be equipped with spring loaded cable grip jaws. The maximum tension in the governor cable shall not exceed  $\frac{1}{8}$ th of the rated ultimate strength of the cable.

*Note:* For counterweight safeties see Wis. Adm. Code section Ind 4.20 (3).

(3) Speed governors for car safeties shall be set to trip at over-speeds as follows:

(a) At not less than 115% of the contract speed.

(b) At not more than the tripping speed listed opposite the applicable speed specified in Table 18, this subsection.

**TABLE 18**  
**MAXIMUM SPEEDS AT WHICH SPEED GOVERNOR TRIPS AND**  
**GOVERNOR OVERSPEED SWITCH OPERATES**

Rated Speed in Ft. per Minute	Maximum Governor Trip Speed in Ft. per Minute	Maximum Speed at Which Governor Overspeed Switch Operates Down Ft. per Minute
0-125 .....	175	175
150 .....	210	190
175 .....	250	225
200 .....	280	252
225 .....	308	277
250 .....	337	303
300 .....	395	355
350 .....	452	407
400 .....	510	459
450 .....	568	512
500 .....	625	563
600 .....	740	703
700 .....	855	812
800 .....	970	921

(4) Governors for elevators having a contract speed greater than 200 feet per minute shall be equipped with an overspeed switch. This switch shall be set to open in the "down" direction at a speed not greater than specified in Table 18, this subsection. This switch shall also be set to open in the "up" direction at not more than 100% of the speed at which the governor is set to trip in the "down" direction and shall, when operated in either direction, remove the power from the driving machine motor and brake and shall remain in the open position until manually reset.

(5) Speed governors, when provided for counterweight safeties shall be set to trip at an overspeed greater than, but not more than 10% above that at which the car speed governor is set to trip.

(6) Governor ropes (cable) shall be of iron, steel, monel metal, phosphor bronze, or stainless steel, of regular-lay construction and shall be not less than  $\frac{3}{8}$  inch in diameter. Tiller rope construction shall not be used. The factor of safety of governor cable shall be not less than 5.

(a) Governor sheaves shall be not less than 12 inches in diameter.

(b) The governor shall be marked for identification by a plate, which shall give the information outlined as follows:

1. Type .....
2. Tripping Speed .....
3. Cable Construction and Size .....
4. Cable Material .....
5. Manufacturer .....

(7) In replacing existing governor cable or rope they shall be of the same size, material and construction as the cable or rope originally furnished by the manufacturer.

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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%
1/4	.30	.12
3/4	.53	.21
1	.86	.34
1 1/4	1.60	.60
1 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	.0460	.0224

\*Area based on 2/64 inch insulation.

**TABLE 21**

Wire Size	1/2 Inch	3/4 Inch	1 Inch	1 1/4 Inch	1 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 Rubber	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.

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(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.

**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 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.

## 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.

(i) 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.

1. Vision panels shall be 1/4 inch clear wire glass mounted substantially flush with the surface of the landing side of the door.

(m) Access to the dumbwaiter machine room or penthouse shall not be through any toilet room, sleeping room or private quarters.

(n) The dumbwaiter circuit-breaker or disconnecting fused switch and controller shall comply with Wis. Adm. Code section Ind 4.70(2).

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

1. Cars shall be made of wood or metal and of solid construction.
2. Cars for power dumbwaiters shall be reinforced with metal from the bottom of the car to the point of suspension.
3. Metal cars shall be of metal sections rigidly riveted, welded or bolted together.

(p) Driving machines, car and counterweight suspension means, and overhead beams and supports shall be designed and installed to sustain the car with a structural capacity load not less than that specified in Table 22 based on the net inside platform area with the factors of safety as specified. The motive power shall not be required to be sufficient to lift the structural capacity load.

**TABLE 22**  
**ALLOWABLE STRUCTURAL CAPACITY LOAD CORRESPONDING**  
**TO NET INSIDE PLATFORM AREA**

Net Platform Area in Square Feet	Structural Capacity Load in Pounds
4.....	100
5.....	150
6.25.....	300
9.....	500

(q) A metal plate shall be fastened in a conspicuous place in the car and shall give the rated capacity in letters and figures not less than ¼ inch high, stamped, etched or raised on the surface of the plate.

(r) Driving machines and sheaves shall be designed with a factor of safety based on the static load (the rated capacity plus the weight of the car, cables, counterweights, etc.), of not less than:

1. Six (6) for steel, and
2. Nine (9) for cast iron and other metals.

(s) There shall be no thoroughfare under the hoistway of a dumbwaiter or its counterweight, unless one of the requirements are provided as follows:

1. A structure shall be provided under the hoistway to withstand without failure the impact of the car with contract load or the impact of the counterweight when either is dropped freely in its guides from the upper limits of travel, or:
2. Broken rope safeties shall be provided for car and counterweight.

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

(u) Counterweights for dumbwaiters having a capacity exceeding 100 pounds or having a speed exceeding 100 feet per minute shall be secured by at least 2 tie rods passing through holes in all sections, except where metal counterweight frames are provided. The rods shall have lock nuts secured by cotter pins.

(v) Cars and counterweights shall be suspended by one or more iron or steel-wire hoisting cables or chains secured to the car or counterweight or cable hitch by babbitted sockets or cable clamps.

1. *Exception.* Hydraulic dumbwaiters.

(w) The factor of safety, based on the static load, of car and counterweight suspension means of power dumbwaiters shall be not less than the value specified in Table 23 for the actual speed of the cable or chain corresponding to the rated speed of the dumbwaiters.

TABLE 23  
FACTORS OF SAFETY

Cable or Chain Speed Feet per Minute	Factor of Safety	
	For Cables	For Chains
50	4.8	6.0
100	5.2	6.5
150	5.5	6.9
200	5.9	7.4
250	6.2	7.8

(x) The clearance between any point of car travel and any stationary part shall be not less than  $\frac{1}{2}$  inch.

1. The clearance between the dumbwaiter car sill or gate threshold and hoistway landing sill or door threshold shall not exceed 2 inches.

(y) The minimum car and counterweight clearance at terminal landings shall be not less than 4 inches.

(z) Suitable guards shall be provided over the machines mounted in the pits to protect driving cable sheaves and drums from falling objects.

**History:** Cr. Register, October, 1964, No. 106, eff. 11-1-64; r. and recr. (2) (k), Register, October, 1970, No. 178, eff. 11-1-70.

**Ind 4.80 Sidewalk elevators. Existing installations.** (1) Every sidewalk elevator shall be covered at the top with hinged or vertical lifting type covers, which shall when closed be capable of sustaining a live load of 300 pounds per square foot. The surface of the covers shall be rough and no part of them shall project above the sidewalk when closed. Hinges of hatch covers shall be of sufficient strength and be securely fastened to withstand the service of normal operation.

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

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

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

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

(c) Every elevator traveling not more than 15 feet, or more than 1 story, shall comply with Wis. Adm. Code sections Ind 4.02, 4.05, 4.06, 4.07, 4.10(1), 4.12, 4.15 and sections Ind 4.37 and 4.38 (as applied to the lower landing), 4.73 (2), (3), (4), (5), (7), 4.74, 4.76 (1), 4.78.