NEW ZEALAND POWER LIFT RULES 1980

AMENDMENT NR 1

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Note : Rules amended are 24.18 and 24.19.

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3.87 OPERATING DEVICE

A car switch, push-button, wheel, lever or other device employed to actuate the control equipment.

3.88 OPERATION

The method of actuating the control equipment.

3.89 OPERATION, CAR SWITCH (ATTENDANT CONTROLLED)

A method of operation by which the movement of the lift car is directly under the control of an attendant.

3.90 OPERATION, DUAL (PASSENGER AND ATTENDANT CONTROLLED)

A method of operation which can be switched to provide for either passenger control or attendant control.

3.91 OVERHEAD STRUCTURE

All the structural members, platforms, etc., supporting the lift machinery, sheaves and equipment at the top of the liftwell.

3.92 PASSENGER

A person other than an attendant who is carried by a passenger lift.

3.93 PASSENGER CONTROLLED LIFT

A lift in which the operation is designed to be under the control of a person other than an attendant.

3.94 PIT

The space in the liftwell below the level of the bottom landing sill.

3.95 PLATFORM

The structure which forms the floor of the car and which directly supports the load.

3.96 POSITION INDICATOR

A device situated at the lift landings and/or in the car, which indicates the position of the car in the liftwell.

3.97 RATED LOAD

The load which the lift is designed to carry.

3.98 RATED SPEED

The speed at which the equipment is designed to operate.

3.99 REGISTERED ENGINEER

An engineer who is registered under the Engineers Registration Act, 1924 and holds a current annual practising certificate.

3.100 RELAY

An electro-magnetically operated switch for making or breaking a control or auxiliary circuit.

3.101 RE-OPENING DEVICE

Is a device which when actuated causes power-operated doors to stop closing and fully re-open.

3.102 RETIRING CAM

A lock operating cam, usually attached to the car and arranged to retract automatically from its operating position.

3.103 SAFETY GEAR

A mechanical device attached to the car frame or to the counterweight, to stop and hold the car or counterweight to the guides, in case of predetermined overspeed or free fall.

3.104 SHALL AND SHOULD

The word 'shall' is to be understood as mandatory, and the word 'should' as advisory.

3.105 SLING MEMBERS

The vertical members of a car frame connecting the bow and buffer members.

3.106 SWITCH, DERAILMENT

A device actuated by the derailment of the counterweight at any point in the liftwell to provide information to the control that the counterweight has left its guides.

3.107 SECONDARY FLOOR.
THAT FLOOR IMMEDIATELY BELOW THE MACHINE ROOM FLOOR AND USED TO HOUSE SHEAVES AND/OR AUXILIARY EQUIPMENT.

3.10/8 SWITCH, FINAL LIMIT

An emergency switch operated by the movement of the car, to stop the lift by causing the power to be removed from the lift motor and brake, in the event of the car travelling a predetermined distance beyond a terminal landing.

3.10/9 SWITCH, SLACK ROPE

A switch or combination of switches arranged to stop the lift if any of the hoist ropes slacken by a predetermined amount.

3.10/9 TELARC

The testing Laboratory Registration Council of New Zealand established under the Testing Laboratory Registration Act, 1972.

3.11/1 TELARC, APPROVED SIGNATORY

An officer approved by the Telarc Council, to sign test documents bearing the Council's endorsement.

3.11/2 TRAVEL

The vertical distance between the top and bottom landings serviced by the lift.

AS 1237	Flat Metal Washers for General Engineering Purposes.
AS 1252.	General Grade High-Strength Steel Bolts with Associated Nuts and Washers for Structural Engineering (ISO Metric Series).
AS 1427	ISO Metric Machine Screws

NOTE: See Notes for rule 4.2.4.1.

4.3 CASTINGS

4.3.1 Steel Castings. Carbon steel castings shall comply with.

AS G22	Steel Castings for General Engineering Purposes.
BS 3100	Steel Castings for General Engineering Purposes.

4.3.2 Grey Iron Castings. Grey iron castings shall comply with the following standards.

AS G8	Grey Iron Castings
BS 1452	Grey Iron Castings

4.3.3 Malleable Castings. Malleable iron castings shall comply with the following standards.

AS G11	Whiteheart Malleable Iron Castings
AS G12	Blackheart Malleable Iron Castings
AS G14	Pearlitic Malleable Iron Castings
BS 309	Whiteheart Malleable Iron Castings
BS 310	Blackheart Malleable Iron Castings
BS 3333	Pearlitic Malleable Iron Castings

4.3.4 Spheroidal or Nodular Graphite Iron Castings. Iron castings with spheroidal or nodular graphite shall comply with.

AS G9	Iron Castings with Spheroidal or Nodular Graphite.
BS 2789	Iron Castings with Spheroidal or Nodular Graphite.

In designing components to be made of spheroidal or nodular graphite cast iron and subject to shock stress, account shall be taken of the fact that the nominal impact strength of spheroidal graphite iron is only one-third of that of cast mild steel; in particular the design and machining of components shall be such as will avoid excessive stress concentrations or notch effects in any region.

4.4 TIMBER

Timber shall not be used for any of the structural parts.

4.5 CONCRETE

All cement or concrete shall comply with the appropriate requirements of the relevant New Zealand Standards.

4.6 WELDING

All welding used in the construction of lift installations shall comply with NZS .....Code For Metal Arc Welding of Steel Structures.

All welding shall be carried out by welders who have passed the relevant tests specified in NZS 4711 : 1973 - Qualification Tests for Manual Metal-arc Welders, and have been certified by a TELARC approved signatory.

SECTION 7 - MACHINE ROOMS

7.1 CONSTRUCTION

Machine rooms shall be enclosed by walls or partitions having a fire resistant rating not less than that required by the New Zealand Building Bylaws.

7.2 EQUIPMENT IN MACHINE ROOM

The driving machine control mechanism and all parts of the equipment of a lift (other than those parts which must necessarily be placed elsewhere to perform their function effectively) shall be housed in the machine room.

Piping, conduit ducts or other equipment not associated with the lift installation shall not be installed in a lift machine room (including secondary floor or sheave room), except where for fire protection reasons an automatic fire sprinkler system is installed. The lift installation must then comply with the additional requirements of rule 25.9.

Where the lift machinery and control equipment are not located at the top of the liftwell, a separate machine room complying with the requirements of this Section shall be provided.

7.3 LIMITATIONS TO THE USE OF THE MACHINE ROOM

A machine room shall not be used for purposes other than those connected with the lift and shall not be used as a means of gaining access to any other part of the building. No material of any description shall be stored in a machine room, with the exception of spare parts for lift machinery.

7.4 MACHINE ROOM ENTRANCES

7.4.1 Doors and Locking of Machine Rooms. All entrances to machine rooms shall have a clear opening of minimum height 2000 mm and minimum width 600 mm, and shall be provided with a door. The design and shape of the door and its frame shall not reduce this clear opening. Such doors shall be provided with a night type latch that can be opened from without only by the use of the key and shall not require a key to open it from within the machine room.

The owner of a lift shall appoint a person to take custody of the keys and be responsible for the machine room door being kept locked.

If the access to the machine room is by way of an area containing other machinery or equipment associated with the operation of the building, the machine room door shall be of the self-closing and self-locking type.

7.4.2 Restrictions to Persons Entering Machine Rooms. The entering of persons to lift machine rooms shall be restricted to Engineer Surveyors and authorised persons. The following notice in permanent characters shall be exhibited in a prominent position adjacent to every machine room door:

DANGER
ENTRY OF UNAUTHORIZED PERSONS PROHIBITED

The word DANGER shall be printed in 50 mm high letters and the remainder of the notice in letters at least 25 mm high.

The notice shall be displayed in such a manner that it is not obscured when the door is in the open position.

7.5 MEANS OF ACCESS TO MACHINE ROOMS

7.5.1 General. Stairways complying with AS 1657, SAA Code for Fixed Platforms, Walkways, Stairways and Ladders shall be provided for access to every machine room from the top floor served by the lift to the machine room floor level.

Headroom clearance not less than 2000 mm shall be provided on stairs, landings, doorways and passageways. Where a beam or other fixed object is vertically above any part of a stair tread, the clearance of 2000 mm shall be measured vertically from the next tread above, to the underside of such beam or other fixed object. Where such fixed object is within 230 mm, measured horizontally, from the nosing of the lowest tread, the clearance of 2000 mm shall be measured vertically above that nosing.

Where the machine room floor is not more than 1250 mm above or below the adjoining floor or roof structure, and is remote from the main access stairs, an inclined rung type ladder complying with AS 1657 may be used.

Where it is found impracticable to provide stairways complying with AS 1657, stairways at an angle not exceeding 50 degrees and complying with the following requirements may be used.

(a) The angle of inclination of the stairway shall not exceed 50 degrees from the horizontal and the stairway shall be not less than 600 mm clear width between the handrails.

(b) The rise of a stair shall be not less than 220 mm nor more than 250 mm.

(c) The height of rises shall not change unless an intermediate platform not less than 600 mm in length is provided at the change.

(d) The tread shall have a non-slip surface which shall be not less than 200 mm wide for open or closed stair construction with a minimum projected tread of 175 mm.

(e) Every stairway shall be provided with a substantial handrail and midrail on both sides where the stairway is not constructed between adjacent walls; where the stairway is so positioned, one handrail will be acceptable.

Such handrail shall be fixed at a convenient height but not less than 760 mm nor more than 900 mm measured vertically from the nosings. Handrails shall be so supported as to allow unrestricted movement of the hand along its upper surface, and there shall be a hand clearance of not less than 65 mm around the handrail. Handrails shall be continuous on stairways, landings and platforms.

(f) All platforms from which an object could fall a distance of 2000 mm or more, shall be provided with toe boards not less than 100 mm high.

(g) Flights of stairs over 5000 mm slant height shall be provided with intermediate landings.

7.5.2 Access Across Roofs. Where passage over a roof is necessary to reach the means of access to machine rooms or machinery spaces, the following requirements shall apply:

(a) Where access is across roofs, walkways complying with AS 1657 shall be provided, except where the roof has been designed as a public area.

(b) Where the walkway is over any roof having an unprotected parapet, the walkway shall be provided on both sides with handrails complying with AS 1657.

7.5.3 Lighting of Stairways, Walkways, etc. Stairways, walkways, corridors and any access to machine rooms shall have artificial illumination available at all times.

Stairways shall be provided with illumination not less than 75 lx, and walkways and corridors with not less than 20 lx. The illumination shall be controlled from both ends by either a two-way switch, or by reliable time-delay switching at both ends with an adequate time-delay.

7.6 HEADROOM IN MACHINE ROOMS

There shall be sufficient height in every machine room to enable any portion of the machinery or apparatus to be raised clear for dismantling and in no case shall the clear height from the highest part of the driving machinery to the underside of the lifting beam be less than 1250 mm.

The minimum headroom from the machine room floor shall be 2000 mm. This clearance shall be over any area that is necessarily used for access to equipment, and shall be measured to any fixtures or projections which may be present, e.g. monorails lighting fixtures, ducts, fire detectors.

7.7 MACHINE ROOM EQUIPMENT-ACCESSIBILITY AND CLEARANCES

7.7.1 General. The machine room shall be of such size as will afford effective access and working space for the purpose of inspection and maintenance of any machine and equipment located therein, and for any dismantling necessary for repairs.

7.7.2 Clearance Between Machine and Walls. On at least two sides of the machine there shall be a minimum of 600 mm between any part of the machine and an adjacent wall.

Where there is any part of the machine that requires adjustment, maintenance or inspection on either or both the other two sides of the machine, a clear accessway at least 380 mm wide shall be provided to and between any wall or column or any portion of the building structure, and the item requiring adjustment. Such accessway may be attained by a decking provided at bedplate level.

Where it is not practicable to provide the clearance way specified above, the Inspecting Engineer Surveyor may permit smaller clearances; provided however that there shall be at least sufficient access to permit removal and replacement of the thrust bearing of a geared machine.

NOTES:

1. Accessways to equipment in machine room. A clear accessway at least 450 mm wide shall be provided from the machine room door entrance to the machine, controller, circuit-breaker, motor generator and floor controller or selector.

   A clear accessway at least 380 mm wide shall be available to any main current overtravel switch, governor, or junction box for travelling cables. (See rule 24.11).

2. Clearance adjacent to equipment in machine room. The clear space available adjacent to equipment shall be:

   (a) Floor controller or selectors-1000 mm at the accessway thereto and 380 mm on two other sides. If the accessways to other equipment pass the floor controller or selector, 450 mm should be provided at that side.

   (b) Motor generators-450 mm facing the commutator and 450 mm on one side, either of which may include the approach access. (See also Note 3).

   (c) Main current overtravel switch-If the operating handle is not on top of the main current over-travel switch or does not face into the accessway a 180 mm clearance shall exist on the handle side.

   If the only access to a governor or machine adjustment is past a main current overtravel switch, 380 mm clearance shall exist on that side of the switch.

   (d) Junction box for travelling cables-450 mm at the front of the junction box.

   (e) Governors-

   (i) Pawl type-380 mm at accessway side and 180 mm at two other sides. If the only access to a main current overtravel switch or machine adjustment is past this type of governor, 380 mm clearance shall exist at that side of the governor.

(ii) Flyball type-480 mm facing accessway, 380 mm on rope grip jaws side and 180 mm on one other side. If the only access to a main current over-travel switch or machine adjustment is past this type of governor, 450 mm clearance shall exist at that side of the governor.

3. Access to brush gear. Convenient access shall be provided for inspection and maintenance of brush gear. There shall be a minimum clearance of 230 mm between any wall or fixed equipment and the nearest part of the brush gear of any lift machine, driving motor or generator.

7.8 LOADING ON MACHINE ROOM FLOOR (INCLUDING PLATFORMS AND SECONDARY FLOORS)

A metal, or concrete floor shall be provided in the machine room.

The floor shall be designed to carry a uniformly distributed live load of not less than 5 kPa over the whole area and a concentrated load of 6.7 KN on any square of 0.3 m side. Such floor shall be capable of sustaining any other load which may be imposed on it during periods of normal operation and during dismantling or repair of the lift machine, including those of rule 6.2.1 where applicable.

7.9 HATCHES IN MACHINE ROOM FLOORS

Hatches in machine room floors shall comply with the following requirements:

(a) Covers shall be hinged; provided however that where conditions render the use of hinged covers impracticable, other forms of cover may be used at the discretion of the inspecting Engineer Surveyor.

Loose or detachable covers of single or multiple panel construction which could be dropped diagonally through the hatch opening may be used, provided that hinged metal safety guards designed to sustain a falling cover are installed immediately under such loose sections.

(b) Where a lifting beam is not provided directly above the hatch or hatches, removable covers shall not exceed 70 kg unless alternative mechanical means for lifting are provided.

(c) Hatches shall have flush covers so designed and supported that they can carry a uniformly distributed live load of 5 kPa over the whole area.

(d) Hinges and lifting attachments shall be arranged to eliminate tripping hazards, either by flushing within 3 mm, or by splaying or fairing.

(e) Hatch covers shall have suitable means of lifting, such as eyes, rings, or keys, and shall be situated clear of any access door.

(f) When situated near an access door suitable guarding shall be provided when the hatch is open. This guarding, where practicable, shall be an integral part of or an extension of the hatch cover.

(g) All hatch covers, other than concrete, shall be secured in the closed position when not in use.

7.10 PROTECTION OF FLOOR OPENINGS

Openings for ropes through machine room floors, secondary floors and platforms shall be as small as practicable and shall be fitted with coamings having a height not less than 50 mm.

7.11 DIFFERENCE IN FLOOR LEVELS IN MACHINE ROOMS

Differences in level of machine room and machinery-space floors shall be avoided wherever practicable. Where there is an unavoidable difference in level, the following shall apply:

(a) For differences in level between 300 mm and 600 mm, a step shall be provided.

(b) For differences in level exceeding 600 mm but not exceeding 1500 mm, a guard railing and a ladder or steps in accordance with AS 1657 shall be provided.

(c) For differences in level of 1500 mm or more, a guard railing and a stairway in accordance with AS 1657 shall be provided.

7.12 MACHINE ROOM STOP SWITCH

A stop switch complying with rule 26.7 shall be located in a convenient position adjacent to or on any equipment or machinery with moving parts that may cause injury to a person, such as a lift machine, motor generator, or floor selector, if such equipment is -

(i) in a secondary floor space; or

(ii) within any area whose floor is more than 600 mm above or below the floor on which a person would stand to operate the circuit-breaker.

Such a stop switch shall be clearly marked and connected in the control circuit of the equipment or machinery for which it is required.

If a control-circuit stop switch is provided under this rule for a motor generator set, and if the motor generator set is out of sight of the circuit-breaker, the following notice shall be mounted adjacent to the switch:

THIS SWITCH DOES NOT ISOLATE THE ELECTRIC SUPPLY. SECURE CIRCUIT-BREAKER OPEN BEFORE WORKING ON THE EQUIPMENT.

7.13 PLATFORMS (OTHER THAN MACHINE ROOM FLOORS) AFFORDING ACCESS TO OVERHEAD SHEAVES AND OTHER EQUIPMENT

7.13.1 Access to Sheaves, Dead-ends and other Equipment above Liftwells.

7.13.1.1 Lift Machine above Liftwell. Where the lift machine is above the liftwell, the following provisions shall apply:

(a) For the lubrication of sheaves, safe and convenient access to the lubricating point shall be available from the machine room, secondary floor or a platform unless the lubrication point is within safe reach from and not more than 2000 mm vertically above the roof of the car or the car crosshead, as appropriate, when the platform is level with the top landing.

(b) For the adjustment of dead-end anchorages of multiple-rope lifts, safe and convenient access shall be available from the machine room, secondary floor or a platform unless the adjusting nuts are within safe and convenient reach from and not more than 2000 mm above the roof of the car or the car crosshead, as appropriate, when the counterweight is fully supported by its buffer.

NOTE: A spring buffer is not necessarily fully compressed when fully supporting the stationary counterweight.

(c) For the repair and/or replacement of sheaves where the sheave is not within the machine room, secondary floor or platform space, special bond-blocks, inserts or permanent brackets shall be provided in the liftwell for the support of temporary staging as required to afford safe access for such work; provided however that such provision is not required for an overhead sheave that can be safely dismantled in the machine room either for attention in the machine room or for lowering down the liftwell.

(d) For the replacement of ropes of multiple-roped lifts, special bond-blocks, inserts or permanent brackets shall be provided in the liftwell for the support of temporary staging, as required to afford safe access to dead-end anchorages, unless these are wholly accessible from the machine room.

7.13.1.2 Lift Machine not above Liftwell. Where the lift machine is not above the liftwell, a platform affording a safe access to sheaves, dead-end anchorages and other necessary equipment shall be installed above the liftwell in all cases except for underslung cars where the centres of sheave shafts and dead-end anchorages are not in excess of 2300 mm from the uppermost landing served.

Where sheave shaft centres and dead-end anchorages are more than 2300 mm above the upper-most landing served, a gallery, either internal or external to the well and with access thereto complying with the relevant parts of this section, shall be provided. When the overspeed governor is not accessible from this access platform or gallery, an access door to the governor complying with the following requirements shall be provided:

(a) The door shall not be installed in the path of movement of any horizontal sliding door.

(b) The door shall provide a minimum clear opening at least 600 mm x 600 mm.

(c) Where practicable the face of the door shall be parallel to the face of the governor sheave.

(d) The door shall be located so that the governor is to one side of the opening, so as to provide a maximum clearance for working on the rope grip device of the governor.

(e) The door shall be locked by a cylinder type lock which is self-locking, and shall be provided with a contact connected in the control circuit. Provision shall be made to lock the doors securely before final contact is made. In opening the door, the electric contact shall be positively opened.

(f) The bottom of the opening shall be level with the base of the governor.

(g) The centreline of the governor shall not be higher than 1500 mm from the nearest floor or platform surface.

7.13.1.3 Devices above Liftwell but not in Machine Room. Platforms or flooring, or other approved access means, shall be provided for access to governors, floor controllers, selectors and similar devices located above the liftwell but not in a machine room. The requirements for access shall comply with the relevant parts of this section.

7.13.2 Extent of Platform or Flooring. The platform or flooring shall fill the entire liftwell when the cross-sectional area of the liftwell is 9 m^2 or less. When the cross-sectional area of the liftwell exceeds 9 m^2, the platform shall extend not less than 600 mm beyond the general contour of the sheaves or equipment, and to the entrance to the liftwell at or above the level of the flooring. It shall be guarded on all sides by handrails, midrails and 150 mm high toeboards, or shall have other equivalent protection (see rule 7.10).

7.13.3 Means of Access. Suitable means of access from outside the liftwell shall be provided to all platforms and floorings. Such access shall comply with rule 7.4 and 7.5.

Where access is provided from within a machine room to a secondary floor and structural difficulties prevent a stairway being provided, a fixed rung type ladder, complying with AS 1657 and inclined at an angle of between 65 and 75 degrees to the horizontal may be used provided that the following conditions apply:

(i) The vertical height from floor to floor does not exceed 2800 mm.

(ii) A clear space of 600 mm exists between the foot of the ladder and any equipment.

(iii) No obstruction shall be within 760 mm of the foot of a ladder inclined at 75 degrees, increasing proportionately to 960 mm for a ladder inclined at 65 degrees.

(iv) Where equipment is installed in close proximity to the foot of the ladder, the emergency stop switch for such equipment shall be located adjacent to the foot of the ladder. In all cases, stop switches shall be located in a readily accessible position.

Where major equipment such as motor-generator sets and floor selectors are installed in this secondary floor space, a machinery hatch complying with rule 7.9 shall be provided in the machine room or secondary floor space floors, together with suitable lifting means, to facilitate the removal of the equipment when required for maintenance, replacement or repair.

7.13.4 Ceiling Height of Secondary Floors and Platforms. Platforms or secondary floors provided for sheaves and auxiliary equipment for a lift installation shall have a ceiling height of not less than 1700 mm; beams projecting from such ceiling shall have at least 1200 mm clearance from the floor.

However where there is no governor in the secondary floor space, the ceiling height shall not be less than 1370 mm, and the beams projecting from such ceiling, shall have at least 1070 mm clearance from the floor, otherwise alternative access shall be provided.

Where major equipment, such as a motor-generator, selector or floor controller is located in a secondary floor space, a minimum ceiling height of 2000 mm shall be provided where necessary for adequate servicing of such equipment.

7.13.5 Sheave Room (or Platform) Stop Switch. A stop switch complying with rule 26.7 shall be provided in a convenient position adjacent to sheaves that are located in a sheave room or accessible from a platform.

7.14 LIGHTING OF MACHINE ROOMS (INCLUDING PLATFORMS AND SECONDARY FLOORS)

Permanent electric light shall be provided in all machine rooms and machinery space to illuminate the equipment effectively, including the front and rear of the control panel. The illumination shall be not less than 200 lx measured at floor level and at a distance of 600 mm from any major obstruction such as a machine or control panel. Switches for such lighting shall be installed in the machine room in an accessible position, convenient and adjacent to the entrance.

7.15 PROTECTION OF MACHINE ROOMS AGAINST WEATHER

Every machine room shall be so located as to afford permanent protection against all weather.

Any louvre type openings shall be so constructed and protected as to prevent the ingress of driving rain.

7.16 GENERAL PURPOSE POWER POINT IN THE MACHINE ROOM

At least one general purpose power point shall be provided, conveniently located, in each machine room.

7.17 VENTILATION OF MACHINE ROOMS

7.17.1 General. Every machine room shall have permanent means of ventilation, sufficient to ensure that an adequate volume of air, free of palpable moisture, is passed through the machine room in an effectively distributed manner, to remove heat produced by the equipment and keep the temperature rise of the equipment within designed limits, and to ensure safe and reliable operation of the lift or lifts.

7.17.2 Temperature Limit. The ventilating means shall be such as will limit the temperature, in the working space of the machine room, to a value not more than 8 degrees C above the shade temperature of the outdoor surroundings, having regard to the heat emission from lift machinery and associated equipment and conduction and solar heat gain of the building structure. At no time shall the temperature in the machine room exceed 40 degrees C.

7.17.3 Natural Ventilation. Where a machine room is ventilated by natural means, any doors, windows, etc., that can be closed and any holes communicating between the machine room and liftwell shall not be counted as ventilating means.

If ventilation panels are required they may be of wire mesh. If below a height of 2000 mm, such panels shall be protected by fixed louvres designed to restrict the passage of a 13 mm diameter rod, or they shall be protected with a firmly supported crimped wire mesh of 12 mm X 2 mm diameter or its equivalent.

7.18 MACHINE ROOM LIFTING BEAMS

A beam or beams shall be provided for lifting all machine parts, the beam being adequately fixed and supported.

The special area or areas designated for the temporary storage of machinery, etc., shall be under the run of the lifting beam or beams.

Sufficient clearance shall be allowed for fitting of the hoist and the hoisting of any of the machine components that may need maintenance or repair.

SECTION 8 - MACHINES

8.1 GENERAL

lift machines shall be of a type approved construction.

8.2 TYPES OF DRIVING MACHINES

All driving machines shall be of the traction type, provided however that drum machines may be used subject to the following conditions:

(i) They shall not be provided with counter-weights.

(ii) The rated speed of the lift shall not exceed 0.25 m/s.

(iii) The lift travel shall not exceed 15 m.

8.3 ASSUMED LOADINGS

Lift machine members in bending, shear, tension and compression shall be designed for the actual computed static load coming upon them, with rated load in the lift car. Members subject to torsional stress shall be designed for twice the actual static out-of-balance load with rated load in the lift car, and shall take adequate account of the inertia forces associated with the moving masses of the lift system.

8.4 FACTORS OF SAFETY

The factor of safety used in the design of driving machines shall be based on the loading specified in Rule 8.3 and shall be not less than -

(i) 2 for steel, based on yield stress, if elongation is 14 percent or more in a guage length of 50 mm; 2.5 for steel, based on yield stress, if elongation is less than 14 pecent in a gauge length of 50 mm;

(ii) 2.5 for other ductile metals, based on the yield stress (i.e. those with an elongation of 14 percent or more in a gauge length of 50 mm);

(iii) 5 for grey cast iron in compression and 6 for grey cast iron in tension or bending, both figures based on tensile strength.

Materials of gear teeth shall meet the strength requirements specified in Rule 8.9.2

NOTE: The above factors of safety provide for the abnormal and infrequent stresses resulting from safety gear and buffer engagement, which are included in the loadings specified in Rule 8.3. Components designed with these factors of safety are normally considered to have adequate reserve strength from the fatigue aspect.

8.5 TRACTION SHEAVES AND DRUMS

8.5.1 Materials. The sheave or drum shall be of steel or cast iron.

8.5.2 Grooving, The sheave or drum shall have machined rope grooves and shall be provided with suitable flanges in compliance with rule 18.1.

8.5.3 Diameter. The diameter of sheave or drum shall comply with the requirements of rule 18.3.

8.5.4 Overhung Sheaves. Where sheaves are overhung there shall be -

(a) effective means to retain the sheave on the shaft independent of reliance on the fit on the shaft;

(b) effective means to prevent the sheave and/or ropes from carrying away in the event of breakage of the shaft or of any rope leaving the sheave;

(c) effective means to prevent the sheave moving more than two rope diameters in the direction of the load, if the shaft fails.

8.6 BOLTS TRANSMITTING TORQUE

Bolts or other means used to transmit torque between the driving sheave and the gearing and their supports, shall be tightly fitted without play. Set screws or threaded portions of bolts or screws shall not be used to transmit torque.

(b) Where a terminal speed checking and stopping device complying with rule 27.4 installed so as to limit the speed at which the car or counterweight can strike its buffer, the buffer stroke shall be based on at least 115 percent of such reduced striking speed and on an average retardation not exceeding 9.80 m/s^2. In no case shall the stroke used be less than 50 percent of the stroke required in (a) above, or less than 1740 mm, whichever is the greater.

TABLE 10.5

MINIMUM STROKE OF OIL BUFFERS

Rated speed m/s	115 percent of rated speed m/s	Minimum stroke mm
1.0	1.15	68
1.125	1.285	86
1.25	1.44	106
1.50	1.725	152
1.75	2.0	207
2.00	2.30	270
2.25	2.57	342
2.50	2.875	422
3.00	3.45	608
3.50	4.025	827
4.00	4.60	1080
4.50	5.175	1367
5.00	5.75	1687
5.50	6.325	2042*
6.00	6.9	2430*
6.50	7.475	2851*
7.00	8.05	3307*
7.50	8.625	3796*

*For rated speeds in excess of 5 m/s, a terminal speed checking and stopping device may be used as an alternative to a buffer having a stroke specified in rule 10.5.2.

10.5.3 Retardation. The maximum retardation developed shall not exceed 24.5 m/s^2 over a period exceeding 0.04 s with any load in the car from rated load to a minimum load of 68 kg when the buffers are struck at an initial speed of not more than -

(a) 115 percent of rated speed for buffers conforming to rule 10.5.2(a).

(b) 115 percent of the predetermined reduced speed for buffers conforming to rule 10.5.2(b).

10.5.4 Factor of Safety for Oil Buffer Parts. The factor of safety of parts of oil buffers, based on the yield point for compression members and on the tensile strength and elongation for other parts, at gravity retardation with the maximum load for which the buffer is designed, shall be not less than the following:

(a) 3 for materials having an elongation of 20 percent or more in a gauge length of 50 mm.

(b) 3.5 for materials having an elongation of from 15 to 20 percent in a gauge length of 50 mm.

(c) 4 for materials having an elongation of from 10 to 15 percent in a gauge length of 50 mm.

(d) 5 for materials having an elongation of less than 10 percent in a gauge length of 50 mm, except that cast iron shall have a factor of safety of 10.

10.5.5 The slenderness ratio (L/R) for Members of Oil Buffers under Compression as Columns. The L/R ratio of members of oil buffers under compression as columns shall be not more than 80.

10.5.6 Plunger-Return Requirements. Oil buffers shall be so designed that:

(a) The buffer plunger of gravity-return and spring-return type oil buffers shall, when released after full compression, return to its fully extended position within 90 s.

(b) The plunger of a spring-return type oil buffer with a 9 kg weight resting on it shall, when released after being depressed 50 mm, return to the fully extended position within 30 s.

10.5.7 Means of Determining Oil Level. Oil buffers shall be provided with means for determining that the oil level is within the maximum and minimum allowable limits. Glass sight gauges shall not be used.

10.5.8 Approval of Oil Buffers. (Refer to last paragraph of Rule 2.6). Oil buffers shall be approved by the Chief Engineer Surveyor. Such approval shall be based on the following:

SECTION 11 - PITS

11.1 PROVISION OF PITS

A pit shall be provided at the bottom of every lift well for every power lift. The pit shall extend over the entire area of the lift well.

11.2 PIT FLOORS

The floor of the pit shall be approximately level (sufficient slope shall be allowed for drainage), except for the unavoidable projection into the pit of portions of structural footings.

The floor of the pit shall be capable of withstanding all expected loadings.

11.3 PIT MAINTENANCE

Pits shall be maintained in a clean and dry condition.

11.4 GUARDS BETWEEN ADJACENT PITS

Guards of substantial STEEL construction, not less than 1800 mm high, at any point between pits, shall be provided between adjacent pits. Where wire mesh, etc., is used the openings shall not exceed 50 mm. The guards may be omitted where the clearance between the underside of the car frame, when resting on the fully compressed buffer, and the bottom of the pit is not less than 2150 mm; and provided that where counterweights are located between pits they shall be guarded on the side away from the lift they serve, even though they may have compensating ropes or chains.

11.5 ACCESS TO PITS

11.5.1 General. Safe and convenient access shall be provided to all pits. Access may be by means of a separate pit access door or from the bottom landing door. Each pit of multiple lift installations shall have a separate means of access except where a separate pit access door is provided and guards between pits are not required (see rule 11.4).

11.5.2 Access Doors. Where the access to the pit is by way of a separate pit door, the door shall comply with the following requirements.

(a) the door way shall not be less than 2000 mm high or less than 600 mm wide (clear opening)

(b) the door shall be self-closing and locking, and shall be provided with a contact connected in the control circuit. Provision shall be made to lock the doors securely before final contact is made. In opening the door, the electrical contact shall be positively opened (see rule 26.1.16).

(c) the full height of the door shall be unobstructed by either of the adjacent cars when resting on the fully compressed buffer.

(d) where the difference in height between adjacent pit floors or the depth below the sill of the pit access door to the pit floor exceeds 600 mm a ladder shall be provided between the levels. The ladder shall comply with rule 11.5.3.

11.5.3 Access from the Bottom Landing Doors. When access to the lift pit is obtained from the bottom landing door, then each lift pit shall be provided with a permanent fixed access ladder of non-combustible material in accordance with rules 11.5.3.1 and 11.5.3.2.

11.5.3.1 Ladder Mounted on Side of Liftwell (at right angles to sill line). Access ladders mounted at right angles to the sill line shall comply with the following requirements:

(a) Ladders shall be accessible from the bottom landing of every lift.

(b) Ladders shall extend not less than 1150 mm above the sill of the landing door, or hand grips shall be provided to the same height. The hand grips shall be mounted above the centreline or above both sides of the ladder.

(c) Ladder width between stiles shall be not less than 380 mm; provided however that the width may be reduced to a minimum of 300 mm where structural difficulties obtain.

(d) Rungs shall extend to the height of the top of the stiles.

(e) Rungs shall be spaced not less than 250 mm nor more than 300 mm apart and there shall be a rung approximately at the level of the lowest landing door sill.

(f) The minimum clearance behind ladder rungs shall be 100 mm.

(g) The minimum clearance at the sides of stiles shall be 65 mm.

(h) Stiles of mild steel shall have cross-sectional area of not less than 480 mm^2 and shall be not less than 50 mm wide and not less than 6 mm thick or, if of tube, shall be not less than 40 mm and not more than 60 mm outside diameter. Other metals may be used provided the stile is of equivalent strength to the mild steel stile. All stiles shall be securely fastened to supports.

(i) Rungs of mild steel shall be solid and not less than 20 mm diameter. The rungs shall be securely fastened to the stiles. In corrosive areas the rungs shall be completely sealed at the point where they enter into or contact the stiles. The point of attachment to the stile shall be smooth and free from projections liable to cause damage to the hands.

(j) The ladder shall be secured at intervals of not more than 3500 mm where flat metal stiles are used. For other types of stile the design of the ladder shall determine the distance apart of fastenings. The fastenings should be on the back of rung-type ladders and should be designed to provide the necessary hand clearance.

11.5.3.2 Ladder Mounted on Front Face of Liftwell (parallel to sill line). Where the distance from the inside edge of the landing door jamb to a ladder stile would result in more than 900 mm if the ladder were located on the side of the liftwell (e.g. centre-opening doors), then consideration should be given to a ladder mounted to the front face of the liftwell.

When a ladder is mounted on the front face of the liftwell, the requirements of rule 11.5.3.1(c), (d), (e), (i) and (j) shall be met and, in addition, the ladder shall comply with the following requirements:

(a) The ladder shall be located so that the horizontal distance to the ladder stile from the inside edge of the landing door jamb shall be not more than 750 mm.

(b) The ladder shall extend at least 1150 mm above the sill line, but may be further extended to provide an easy reach to door locks, etc.

(c) There shall be a minimum clearance of 6 mm between the stile and the landing door, and a minimum clearance of 40 mm between the inside of the rungs and the landing door when open. The ladder shall be positioned so as not to reduce the minimum clearances specified in rule 15.1.2.

(d) There shall be a minimum clearance of 100 mm behind ladder rungs which are located below the landing sill and a minimum clearance of 75 mm behind ladder rungs in all other places.

(e) Ladder rungs shall be so positioned in relation to the sill line as to obtain one rung not less than 125 mm nor more than 175 mm below the sill and one rung not less than 75 mm nor more than 125 mm above the sill.

(f) The landing door sill extension shall be cut back to at least the inside line of the open landing door to reduce interference with hands when gripping the rungs.

(g) Ladder stiles shall be so designed as to discourage their use as hand grips.

11.6 LIGHTING OF PITS

The pit of each lift shall be provided with at least one 100W incandescent or 40W fluorescent light to provide general illumination of the pit. The light fitting shall be protected against possible accidental damage. The switch for the light shall be located at the normal entrance to the pit.

11.7 PIT STOP SWITCH

A pit stop switch, complying with rule 26.7 shall be installed in the pit of every lift. The switch shall be located at the normal entrance to the pit.

11.8 MINIMUM DEPTH OF PITS

The pit depth shall be not less than is required for the installation of the buffers, compensating sheaves, if any, and all other lift equipment to be located therein, and to provide the minimum clearance at bottom of car (see rule 9.1) the minimum car buffer clearance (see rule 9.2), and the minimum counterweight buffer clearance (see rule 9.4).

11.9 DRYNESS OF PITS

Every pit shall be constructed and designed to be waterproofed before installation of the lift equipment by the use of tanks, membranes or other positive means, and shall have a covered sump located therein. Such cover shall be of a non-slip type, and shall not be easily displaced. The sump shall not be connected to any closed drainage system, but may connect into an open ended drain which is below the sump level and which cannot be flooded.

If in addition, pumps are required, they shall be installed outside the liftwell. Any pump so installed outside the liftwell shall be effectively partitioned from the liftwell, and shall have separate access for maintenance. The level of any external sump shall be such that water cannot flow back into the liftwell.

Drains shall not be run into pits.

NOTE: Pumps should be of a type which do not rely on valves or priming of a suction line for effectiveness.

11.10 POWER POINT IN PIT

Every lift pit shall be fitted with an electrical power point.

11.11 PITS NOT EXTENDING TO THE LOWEST FLOOR OF THE BUILDING

Where the space below the liftwell is used for a passageway or may be occupied by persons, or if unoccupied is not secured against unauthorized access, cars and counterweights shall comply with the following requirements.

(i) Counterweights shall be provided with safety gear complying with rule 29.5.

(ii) The cars and counterweights shall be provided with spring or oil buffers meeting the requirements of rules 10.4 and 10.5, as appropriate, except that when spring buffers are used they shall not be fully compressed when struck by the car with its rated load or by the counterweight at 125 percent of rated speed or at governor tripping speed where a governor-operated safety gear is used.

(iii) Car and counterweight buffer supports shall be of sufficient strength to withstand, without permanent deformation, the impact resulting from buffer engagement at governor tripping speed, or at 125 percent of rated speed where no governor is provided.

NOTES: Impact on Buffer Supports.

1. Oil buffers. The following formulae give the buffer reaction and the impact on the car and counterweight oil buffer supports resulting from buffer engagement:

$$R = M \left(g + \frac{v^2}{2S} \right)$$

$$P = 2R$$

2. Spring buffers. The following formula gives the buffer reaction and the impact on the supports of car and counterweight spring buffers which do not fully compress under the conditions outlined in subsection 11.11(ii):

$$R = 2M \left(g + \frac{v^2}{2S} \right)$$

where

R = buffer reaction, in N
P = impact, in N
M = mass of car plus rated load, in kg
v = speed, in m/s, at impact
S = buffer stroke, in m
g = 9.8 m/s^2.

11.12 SAFE ACCESS TO ELEVATED EQUIPMENT IN THE LIFT PIT AND ON THE UNDERSIDE OF THE CAR

Where the pit floor is more than 2500 mm below the bottom lift landing, or where the means of checking the oil level in oil buffers is more than 2000 mm above the pit floor, means of access shall be provided to elevated equipment within the general guidelines of AS 1657 SAA code and to the satisfaction of the inspecting Engineer Surveyor.

SECTION 13 - CAR AND LANDING DOORS

13.1 DOORS REQUIRED

All liftwell enclosures and car entrances shall be provided with doors which shall guard the full height and width of the entrances but shall not open beyond the internal height and width of the lift car. Door tracks shall be kept clear of the lift car entrance. Passenger lifts shall not have more than two entrances.

NOTE The width of lift entrances and the access thereto should conform to the requirements of NZS 4121 : Part 1, Design for Access by Handicapped Persons - Public Buildings and Facilities, where these facilities are required by the Disabled Persons Community Welfare Act, 1975.

13.2 TYPES OF DOORS ALLOWED

(a) Sliding doors of the unperforated panel type on all lifts.

(b) Shutter doors on goods lifts or when manually operated on passenger lifts.

NOTE: Lattice gates shall not be used.

13.3 CONSTRUCTION OF DOORS

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13.3.1 Design. All doors shall be of metal and fire resistant construction not less than that required by the New Zealand Building Bylaws. The doors and their ancillary equipment shall be designed to withstand without distortion or displacement an accelerating force as determined by Rule 2.2, in any horizontal direction. Where doors consist of more than one panel, each panel shall be treated as a door.

13.3.2 Projections and Recesses - Panel Doors.

(i) The interior of car doors and the landing side of landing doors shall be flush faced without projections or recesses other than those for vision panels. Recesses for this purpose shall not exceed 4 mm in depth and shall be bevelled at the edges. Door panels may have textured surfaces but the maximum depth of indentations must not exceed 1 mm.

(ii) Liftwell Side. No devices other than those provided for operation and locking of the doors shall project into the liftwell beyond the line of the landing sill.

13.3.3 Guides. Doors shall have continuous guides on both the sliding edges. Guides and guide shoes shall be made of/or reinforced by fire resistive material.

13.3.4 Counterweights. Used in conjunction with door closing or balancing shall be guided and enclosed through their full length of travel. Bottom stops shall be provided and shall be capable of withstanding safely the impact of the door counterweight, (in case of failure of the suspension means) without allowing the weight to leave the guides or the enclosure.

13.4 MANUALLY OPERATED DOORS

Manually operated doors shall be provided with:

(i) A vision panel.

(ii) Hand Grips which allow for a positive hold. They must be so designed and located as to preclude all possibility of injury to the user.

13.5 POWER OPERATION REQUIRED

Doors for entrances greater than 2200 mm high and/or 2500 mm wide shall be power operated.

13.6 REQUIREMENTS FOR VISION PANELS

Landing door vision panels shall comply with the following requirements:

(i) The area of any single vision panel shall be not less than 325 sq.cm and the total area of one or more vision panels in any landing door shall be not more than 650 sq.cm.

(ii) Panel openings shall be glazed with clear wired glass not less than 6 mm thick.

(iii) The centre of the panel shall be located not less than 1400 mm nor more than 1700 mm above the landing.

SECTION 15 - CLEARANCES IN LIFTWELLS AND ENCLOSURES

15.1 CLEARANCES AT CAR OPENINGS

15.1.1 General. The inside face of the liftwell opposite the path of travel of the car sill for a width at least equal to the clear car opening plus 25 mm on each side, shall form a flush surface within the limitations set out in rules 15.1.2 to 15.1.5. When metal flushing is used, the edges shall be returned or rolled to provide a smooth surface.

15.1.2 Clearance between Car and Landing Sills.

The landing sills shall be not more than 40 mm or less than 13 mm from the car sill.

For vertically sliding landing door panels that slide down to open, the sill side of the truckable sill of the panel shall be deemed to be the landing sill for the purpose of this rule.

15.1.3 Flushness of Liftwell

15.1.3.1 Flushing distances. The liftwell surface shall be flush and plumb with the landing sill for a distance of at least 75 mm below the sill. Where self-levelling or manual inching can occur with doors open, the flushing shall extend below the landing sill for a distance equal to the levelling or inching zone plus 75 mm. Where the distance from the landing sill to the door hanger recess below is less than 150 mm, the following conditions shall be fulfilled.

(a) The car shall be provided with a self-levelling device.

(b) The car doors shall be power operated and shall not commence to open until the car sill is opposite the flush section of the liftwell face under the landing sill.

(c) The car shall level in the 'up' direction only whilst the car and landing doors remain closed. The car may relevel in the 'up' direction with doors open, if the car sill is opposite the flushed portion of the liftwell.

The distance between any part of the liftwell surface and the car sill, other than recesses over landing doors for the location of suspension and locking equipment, shall not exceed 125 mm except that for goods lifts with vertically bi-parting doors the distance may be 150 mm; provided however that the distance may be increased to 200 mm for goods lifts with vertically bi-parting doors, if the car door is mechanically latched closed, until the car is within the flushed levelling zone.

15.1.3.2 Recesses or ~~projections~~ Ledges. Reccesses in any face of the liftwell enclosure, other than those specifically provided for lift maintenance or repair, shall not be permitted. Beams, floor slabs or other building construction shall not project or be set back more than ~~50~~ 30 mm inside the general line of the liftwell unless the top surface of the projection or setback is bevelled at an angle of not less than 75 degrees to the horizontal. Trimmer beams between adjacent lifts are not required to have bevels.

~~However, at floor landings it is permitted to have recesses for door frame assemblies not more than 250 mm from the sill line.~~

Any projection extending inwards from the general surface of the wall of a liftwell and which faces a car entrance shall be bevelled on the underside at an angle of not less than 15 degrees or more than 30 degrees from the vertical. The bevelled surfaces may be integral with the liftwell wall, as in a concrete wall, or may be constructed of rigid metal plate.

15.1.3.3 Overtravel. That portion of the liftwell opposite a car entrance shall comply with Rule 15.1.3.2 for the full distance that the car entrance can overtravel above the top landing or below the lowest landing, when the buffers are fully compressed.

15.1.4 Vertical Bi-parting Doors. Where vertical bi-parting doors are fitted inside the enclosure, the lower edge of the bottom section of the doors shall be bevelled at not less than 15 degrees nor more than 30 degrees from the vertical. In addition, where levelling or inching can occur without the car door being closed, the inside face of the landing door shall be continued flush below the landing sill level, when the landing door is closed, for a distance equal to the length of the levelling or inching zone.

(ii) Each span of the rail where there are no tie brackets (see rule 20.8) shall be considered as a beam having ends supported, such as to result in a deflection formula of -

$$\frac{WL^3}{96EI} \times 10^4 \text{ (mm)}$$

and a stress formula of

$$\frac{WL}{6Z} \times 10^3 \text{ (MN/m}^2\text{)}$$

where

W = load on guide rail (N)

L = vertical distance between centres of fastenings to the building structure (mm). When rule 20.8 is complied with then this distance shall be divided by 1.5.

E = modulus of elasticity of material (2×10^5MPa unless certified otherwise), MPa.

I = minimum moment of inertia of guide rail (or of rail and its reinforcement), cm^4.

Z = sectional modulus of the rail, or of the rail and its reinforcement, about a line at right angles to a line passing through the pair of rails, (cm^3).

(a) Car Guide Rails:

The stress and deflection shall not exceed 124 MPa and 6 mm respectively for the rail loaded as defined in rule 22.10.

(b) Car and counterweight guide rails:

For the purpose of determining the deflection and stresses of guides during an earthquake, the loaded car or counterweight shall be assumed to be suspended in any position of travel and acted upon by a continuous horizontal acceleration (in any direction) as determined by Rule 2.2. The stress and deflection shall not exceed 85 percent of the minimum specified yield stress and 12 mm respectively.

20.7 STRESSES AND DEFLECTIONS IN COUNTERWEIGHT GUIDE RAILS

For counterweights without safety gear where the two guides are secured one to the other (See rule 20.8) between points of substantial support, the distance between points of substantial support may be increased to 270 times the least radius of gyration of the rail for steel guides, provided the stresses and deflections do not exceed those specified in rule 20.6.

20.8 INTERMEDIATE TIE BRACKETS FOR COUNTERWEIGHT RAILS

Intermediate steel tie brackets, not required to be tied to the building structure shall be provided between guide rails at mid-span should the distance between fixings exceed 3 metres.

The tie brackets shall be designed to distribute the load such that there is no relative deflection at the point of attachment of the tie brackets to the rails under the various loading conditions, including earthquakes, with the load acting along a horizontal line passing through both rails.

The following formula shall be used to determine the section modulus of the tie bracket.

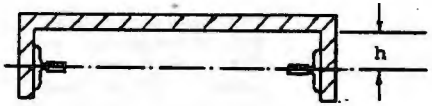
$$Zyy = \frac{9.8\ mh}{210 \times 10^3}$$

where,

Zyy = modulus of section of tie bracket in cm^3.

m = mass of counterweight in kilograms.

h = height of tie bracket in mm, measured from the centre line of the guide rail to the heel of the tie bracket section.



Rolled sections which must be fabricated, should have full strength welds along the entire cross-section of each joint.

24.17 EARTHING OF BELL AND INDICATOR TRANSFORMERS

One side of the secondary circuit of bell and indicator transformers, and their cases if of metal, shall be earthed.

24.18 ELECTRICAL SUPPLY

Refer to the current edition of the Electrical Wiring Regulations.

24.19 IDENTIFICATION OF SWITCHGEAR

Where an installation comprises more than one lift, all switches, circuit-breakers and fuses used in connection with each lift shall be identified by appropriate word or words and/or identification numbers as required by rule 28.4.

24.20 POSITION OF CIRCUIT-BREAKERS

Circuit breakers shall be installed in the machine room in an accessible position, convenient and adjacent to the entrance.

Where the machine, generator and controller are not in clear view of a person operating the circuit-breaker, isolation arrangements shall be provided as required by Electrical Wiring Regulations 1976. (see also rule 7.12).

24.21 WIRING

All wiring, unless specifically exempted in these Rules shall comply with the requirements of the Electrical Wiring Regulations 1976.

The following general requirements shall be observed in the installation of electrical wiring:

(i) All cables (other than trailing cables) installed for any purpose in a lift shall be armoured, or be enclosed in steel conduit, duct, or trunking, or be of the mineral insulated metal-sheathed type or the aluminium sheathed type. Super high impact P.V.C. conduit is acceptable (refer circular survey No. 1974/10). Multicore control cables sheathed with non-flammable thermo-plastic material may be installed on the side of a suitable wood batten if they are mechanically protected by a metallic casing to the satisfaction of the inspecting engineer surveyor.

NOTE: The provisions of this Section apply also to wiring for auxiliary or additional equipment, such as telephones or alarm systems, reticulated music, etc. Reticulated music systems shall be provided with a shut-off switch in or on the car, to close down the system whilst the lift is being maintained.

(ii) Metal trunking may be used with clip, screw or rivet-on lids or inspection covers; provided however that where fixed to the liftwell the lids and inspection covers shall be of the screw-on type. In addition, a minimum of two rivets to every 2000 mm length of trough cover used in the liftwell shall be provided. Such rivets shall be located at the highest point of the cover.

Covers in the liftwell shall be arranged to preclude the entry of oil.

Inspection covers shall be provided at each point where conduits enter or leave troughing, and at branches of troughing. Trunking and fittings in liftwells and machine rooms shall be constructed from steel of minimum gauge 1.6 mm, provided however that troughing having a maximum cross-sectional area of 120 cm^2 may be constructed from steel of minimum gauge 1.0 mm, for use in machine rooms and on the lift car.

(iii) Where trunking is laid in the floor, covers shall be of a robust and non-slip type, and shall be flush within 3 mm of floor level.

24.22 PRECAUTIONS IN WIRING OF CARS

The securing of all flexible connections, conduit and fittings shall be mechanically sound, with due regard to the conditions created in the running of the car, the operation of the safety gear, the landing of the car and the need for the roof of the car to be used for purposes of maintenance and inspection. (see rule 22.14).

24.23 TRAVELLING CABLES TO CARS

24.23.1 Length. Travelling cables used for connections to lift cars shall be of such length that they will not come into contact with the bottom of the liftwell when the lift car is at its lowest point of normal travel. All travelling cables shall comply with AS C307, Flexible Travelling Cables for Lifts or BS6977 : 1969 Braided Travelling Cables for Electric and Hydraulic Lifts.

24.23.2 Connection. Travelling cables to the lift car shall be connected to an approved junction box or control fitting on the lift car.

24.23.3 Suspension. Travelling cables shall be so suspended at each end as to reduce the strain on the individual copper conductors to a minimum.

Travelling cables exceeding 30 m in length and which have steel supporting strands shall be suspended directly by such strands.

Where non-metallic fillers are used, the cables shall be suspended by being looped around approved supports on non-flammable material, shaped so as not to cause abrasions of the protective covering of the cable. A single core travelling cable may be supported by an approved clamp.

24.23.4 Hazardous Location. Travelling cables for use in hazardous locations shall be of a type specifically approved for the purpose, by the Chief Engineer Surveyor.

24.23.5 Location of and Protection for Cables. Travelling cable supports shall be so located as to minimize the possibility of damage due to the cables coming in contact with the lift car, the liftwell construction or equipment in the liftwell. Where necessary, suitable guards shall be provided to protect the cables against damage.

Travelling cables run on the side or top of the lift car shall be in screwed conduit or metal ducts.

24.24 LIFT CIRCUIT DIAGRAM IN MACHINE ROOM

A circuit diagram for each lift installation shall be provided in every machine room. Acceptable means include either of the following:

(i) the diagram shall be suitably glazed or finished with a durable surface and affixed to a rigid board.

(ii) where the diagram consists of a number of sheets, the sheets shall be suitably glazed, finished or protected and shall be collated in book form between durable covers and stored in the machine room.

(iii) The sheets comprising the diagram shall each be placed into a clear eyeletted envelope of polythene or similar plastic material. The envelopes shall be hung from a suitable support fixed to the machine room.

24.25 CERTIFICATE OF COMPLIANCE

A numbered drawing or drawings giving full details of the electrical installation of the lift shall be provided by the lift manufacturer to the Inspecting Engineer Surveyor at the time of the first inspection of the lift installation.

On completion of the installation of the lift, a certificate signed by a Registered Electrical Engineer, shall be submitted to the Chief Engineer Surveyor, stating that the electrical installation shown on the above-mentioned drawing or drawings and the actual installation itself comply in all respects with the requirements of Section 24 of the Power Lift Rules.

SECTION 25 - OPERATING DEVICES AND CONTROL EQUIPMENT

25.1 TYPES OF OPERATING DEVICES

All operating devices shall be of the enclosed electric type. Rod or operating devices actuated directly by hand, or rope operating devices actuated by wheels, levers or cranks, shall not be used to directly operate the controller or brake mechanism of an electric lift.

25.2 OPERATION BY CAR SWITCH

Handles of lever-type car switches shall be so arranged that they will return to the stop position and latch there automatically when the attendant removes his hand. If the car switch is of a type so arranged that its centring does not immediately stop the lift, an emergency switch shall be provided for this purpose. The car switch shall be situated adjacent to the car entrance and if of the swing type, shall be so connected as to cause down motion of the car when moved towards this entrance.

25.3 OPERATING DEVICE ON ROOF OF CAR

Means shall be provided to operate the lift from the roof of the car, for the purpose of inspection, maintenance and repair. The operating means shall comply with the following requirements:

(i) It shall be of the metal protected type, and shall be fixed between the car crosshead and that side of the car which is nearest to the landing door used for access, and shall be so designed or located that inadvertent operation is prevented.

(ii) It shall be of the continuous pressure button type, two of which must be pressed to operate the lift in either direction.

(iii) It shall operate the car at a speed not exceeding 0.7 m/s.

(iv) It shall operate the car only when the car door is in the closed position and when all landing doors are closed and locked.

(v) It shall incorporate a switch which, when operated, ensures that the movement of the car and operation of any power doors will be solely under the control of the above device and the device shall not be operable when the switch is in the 'off' position.

(vi) When under the control of this controlling device, the upward travel of the car shall be limited so that its roof does not approach closer than 1800 mm from the top of the liftwell. If necessary a supplementary terminal limit switch shall be provided in association with this controlling device to effect the required limitation of travel.

25.4 OPERATION IN LEVELLING OR MANUAL INCHING ZONE

25.4.1 General. The operation of a lift in the self-levelling or manual inching zone at any landing, by an automatic levelling or manual inching device when the landing doors and/or car doors are not in the closed position, is permissible subject to the following rules 25.4.2 to 25.4.7 inclusive.

25.4.2 Manual Inching Devices. A lift having a landing speed not exceeding 0.75 m/s may be provided with an inching device comprising continuous pressure type buttons. Such device shall enable the car to be inched to, but not away from, a landing with the car and landing doors open and shall operate only within the inching zone of any floor landing. It shall be so designed and installed that the lift car will not move out of the inching zone when a single short-circuit or fault occurs in the control circuit, or a mechanical breakdown occurs to the inching device. Each inching button or device shall be clearly and permanently labelled.

25.4.3 Self-levelling Devices. Self-levelling devices shall be so designed and installed that in the event of a single short-circuit or earth fault occurring in the levelling control circuit, or a mechanical breakdown of the levelling device occurring, the lift will not move out of the levelling zone.

25.4.4 Extent of Self-levelling and Inching Zone. The self-levelling zone above and below any landing shall not extend more than 750 mm where an automatic device is used, and the inching zone shall not extend more than 250 mm above and below any landing where a manual inching device is used.

25.4.5 Levelling Speed. An automatic levelling device shall not move the car at a speed exceeding 0.5 m/s.

25.4.6 Car Aprons. The length of car aprons shall be in accordance with rule 22.23.

25.4.7 Flushness of Liftwell Below Landing Sill. The extent of flushness below landing sills shall be in accordance with rules 15.1.3 and 15.1.4.

25.5 CAR CONTROL BUTTONS

Car control buttons shall be placed in the sequence of the landings served. The marking of the buttons shall correspond with the names or numbers of the landings served.

25.6 OPERATION OF LIFTS UNDER FIRE (WHEN NOT PROTECTED BY A FIRE SPRINKLER SYSTEM) OR OTHER EMERGENCY CONDITIONS (Excluding Earthquakes)

25.6.1 Application. This rule shall apply in all emergencies except under earthquake conditions (see rules 2.2 and ~~25.7~~ 25.8).

All Lifts having a travel of over four floors or exceeding 15 metres, whichever is the lesser shall conform with this rule. However its inclusion is recommended as a safety precaution for all lifts.

25.6.2 Requirements:

(a) Recall Switch - A two position key switch with the key removable in both the 'on' and 'off' positions, shall be provided at a nominated main floor of each single lift, each hospital lift and each group of other than hospital lifts.

The recall switch shall be located at a height between 1650 and 1700 mm from the floor, at the left hand side of the lift entrances at the main floor, and clearly and permanently marked EMERGENCY FIRE RECALL SWITCH together with the "off" and "on" positions. The switch shall be operated by a master key, duplicates of which shall be held by the Fire Brigade and the person in the building who is responsible for the supervision of lift operations. When this switch is in the 'on' position -

(i) all lifts which are not operating on inspection service, shall return non-stop to the main floor and remain parked with the doors open; during this procedure the following sign shall be illuminated in each car, 'LIFT RETURNING TO MAIN FLOOR';

(ii) a lift travelling away from the main floor shall reverse at the next available floor;

(iii) door reopening devices for power-operated doors shall be rendered inoperative;

(iv) All landing calls registered shall be cancelled and landing buttons shall be inoperative.

(v) when it is considered safe to do so, the lifts may be returned to normal service by moving the key switch to the 'off' position.

(b) The return to the main floor shall be initiated immediately on the operation of the recall switch or, for other than hospital lifts on the actuation of the sprinkler, heat, and/or smoke sensing devices in the building excepting those in the lift well or machine room (see Rule ~~25.9~~ 25.7)

(c) On any car returning to the main floor in accordance with sub-rules (a) or (b) the control shall be automatically switched so that:

(i) the lift is operable only by a person in the car;

(ii) it does not respond to landing calls;

(iii) passenger protective devices for power operated doors are rendered inoperative;

(iv) calls from the car may be registered;

(v) when a car call is registered, continuous pressure on a specific Door Close button shall cause the doors to close; the doors shall not close if the car call registered corresponds to the floor at which the car is standing;

(vi) if the Door Close button is released while doors are closing but before the car begins to move, the doors shall immediately reopen; the call shall remain registered;

(vii) as soon as the lift begins to move, the Door Close button may be released without interfering with the established sequence of operations;

(viii) if the lift is in motion, further calls to intermediate floors may be registered from within the car;

(ix) all calls registered from the car shall be cancelled when the car reaches its first stop;

(x) the doors shall only be opened by continuous pressure on a specific Door Open button when the lift is stopped at a floor. If the button is released while the doors are being opened, the doors shall immediately shut.

(xi) all security systems shall be overridden.

(d) A non-illuminated engraved notice shall be provided adjacent to or on each landing call button plate reading 'DO NOT USE LIFTS IN EVENT OF FIRE' in clearly legible letters not less than 8 mm high.

25.8
~~25.7~~ LIFTS ON SPECIAL SERVICE

To enable any lift to be operated individually on special service while other lifts in the group operate normally, in every lift car shall be provided a key operated switch clearly and permanently marked "SPECIAL SERVICE" together with the "off" and "on" positions. The key shall be removable in both the "off" and "on" positions. When the switch is in the "on" position the lift shall only be operational from inside the car, it shall not respond to lift landing calls and it shall be locked out of the 'Recall Switch' circuit as per Rule 25.6.2.

25.9.

~~25.8~~ OPERATION OF LIFTS UNDER EARTHQUAKE CONDITIONS

25.8.1 Major component displacement detector. All lifts with a travel exceeding 4 floors or 15 metres whichever is the smaller, shall be fitted with a counterweight derailment switch. This device (see fig. 25.1) shall be actuated when the displacement of the counterweight in any one direction of the horizontal plane exceeds 20 mm.

25.8.2 Operation. Upon operation of this device every lift shall:

(i) If in motion, immediately decelerate and stop at the next possible floor and remain stopped with the doors open;

(ii) If stopped at a floor, remain in that position with the doors open.

In a bank of lifts, all lifts shall follow this procedure if the device is operated by any one or more lifts in the bank.

NOTE: All lifts which have been stopped in this manner shall not be put back into operation until a thorough inspection of the lifts and liftwells has been carried out and certified to be satisfactory by a competent lift serviceman.

25.7

~~25.9~~ ADDITIONAL REQUIREMENTS WHERE MACHINE ROOMS AND/OR LIFTWELLS ARE PROTECTED FROM FIRE BY AN AUTOMATIC FIRE SPRINKLER SYSTEM

7

25.~~9~~.1 Application. This rule shall apply only to those lifts installed in buildings which are protected by an automatic fire sprinkler system. (see rules 7.2 and 12.5).

7

25.~~9~~.2 Requirements:

(i) An approved heat detecting fire alarm system which is proved to operate at least 11°C below the sprinkler head rating shall be fitted.

(ii) For each sprinkler head fitted a heat detector sensor shall be installed in its vicinity.

(iii) Sprinkler heads and heat detector sensors shall be protected from accidental damage by approved guards.

(iv) Operation of the heat detector (in ~~lift shaft~~ Lift Well or machine room) fire alarm shall take all lifts (not operating on special or inspection service) non stop to the main floor and then render them inoperative with the doors open.

(v) While returning to the main floor the following sign shall be illuminated in each lift car, "LIFT RETURNING TO MAIN FLOOR".

(vi) The lifts shall remain inoperative until such time as the power driving circuit is reset by a competent lift serviceman who has satisfied himself that the lift installation is safe.

MAJOR COMPONENT DISPLACEMENT DETECTOR

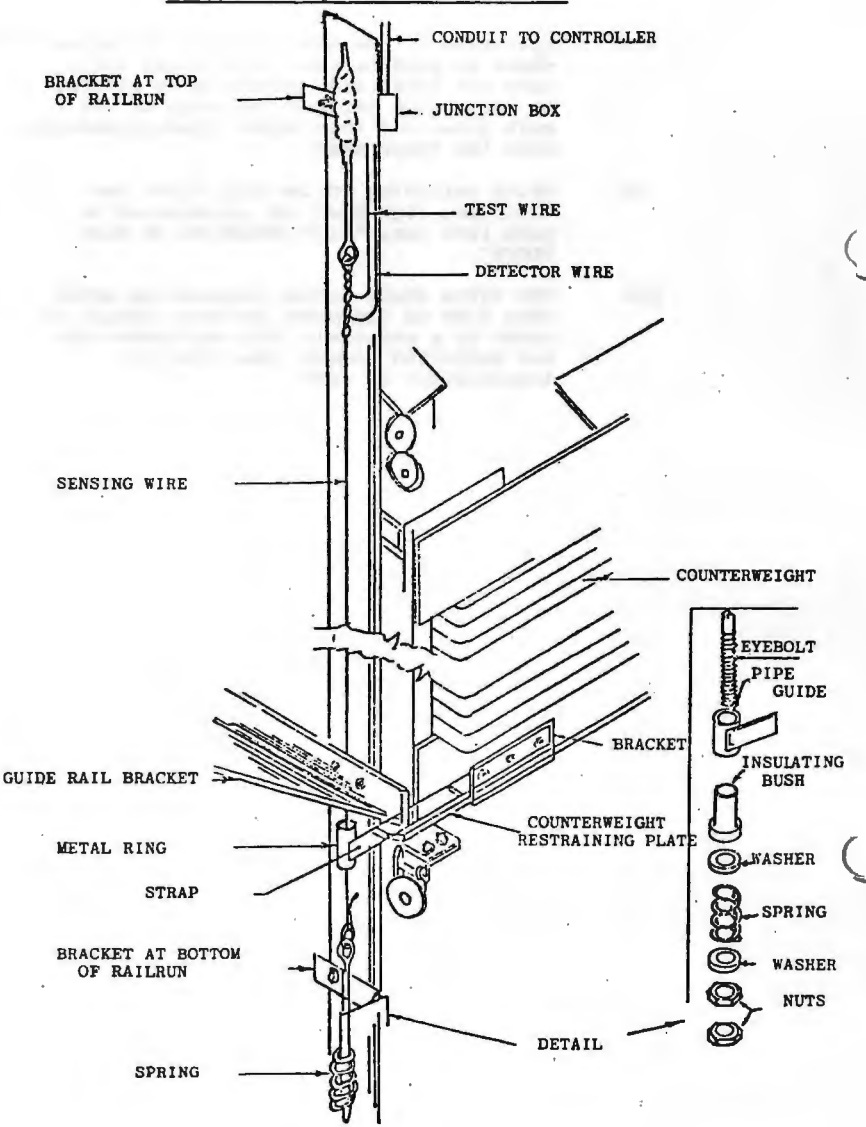


FIG. 25.1

SECTION 12 - LIFTWELL ENCLOSURES

12.1 CONSTRUCTION

Liftwells shall be completely enclosed, (except for landing doors, emergency doors and pit access doors) from the bottom of the pit to the ceiling of the well.

Enclosures shall be made of non-brittle material. The fire-resistant rating of enclosures and doors shall be not less than that required by the New Zealand Building Bylaws.

12.2 STRENGTH

Enclosures shall be so supported and braced as to deflect not more than 25mm when subjected to a force of 450 N applied horizontally on any square of 50 mm side. Enclosures shall not deflect into the minimum running clearance allowed between the lift car or counterweight and the enclosure.

The liftwell enclosure adjacent to the landing openings and the structure supporting the doors and their locks shall be of sufficient strength to support in true alignment the landing doors with their operating mechanisms and locking devices when these are subject to a seismic acceleration of 1.0g in any horizontal direction.

12.3 LIFTWELL VENTILATION

Lifts having a travel of over four floors or 15 metres whichever is the lesser shall conform with this Rule.

12.3.1 Type. Liftwells shall be provided with means of venting smoke and hot gases to the outer air in case of fire. The vents shall not be in the form of permanent openings.

12.3.2 Area. The area of the vents shall not be less than 3.5 percent of the area of the liftwell nor less than quarter of a square metre, whichever is the greater.

12.3.3 Control. Means of regulating the vents from the 'shut' to the 'open' position must be provided at a convenient location outside the liftwell on the main floor. They must be kept in a shut position at all times and are specifically meant for the use of firemen in case of emergencies (see rule 25.6).

12.3.4 Location. Vents shall be located:

(i) In the side of the liftwell enclosure directly below the floor or floors at the top of the liftwell and shall open directly to the outer air or through noncombustible ducts to the outer air; or

(ii) In the wall or roof of the penthouse or overhead machinery space above the roof.

12.4 PROJECTIONS INTO THE LIFTWELL

The liftwell enclosure shall be substantially flush on the inside, subject to the provision of landing sills and door tracks, etc., required by other sections of these Rules. Recesses shall not be allowed.

Beams, floor slabs, or other building construction shall not project more than 50 mm inside the general line of the liftwell unless the top surface of the projection is bevelled at an angle of not less than 75 degrees with the horizontal. Where setbacks occur in the enclosure walls, the top of the setback shall be bevelled at an angle of not less than 75 degrees with the horizontal.

12.5 PIPING ETC.

Piping conduit ducts or other equipment not associated with the lift installation shall not be installed in the liftwell, except where for fire protection reasons an automatic fire sprinkler system is installed. The lift installation must then comply with the additional requirements of rule 25.9.