

MARINE DEPARTMENT, NEW ZEALAND

Instructions to Engineer Surveyors

POWER LIFTS

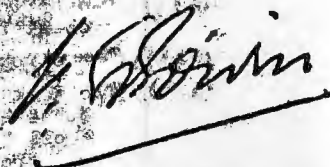
**Departmental Rules Governing the Design,
Construction, Maintenance, Testing, and
Operation of Power Lifts**

(Issued by the Authority of the Marine Department)

1958

Foreword

These Rules were issued in 1955. They are now (1958) reprinted with amendments intended to bring the Department's requirements for power lifts into agreement with sound contemporary practice. The specifications and rules of other authorities over as have been consulted. Acknowledgment of assistance is given especially to the British Standards Institution, the American Society of Mechanical Engineers, and the Standards Association of Australia.



V. G. Boivin
Chief Engineer Surveyor
Marine Department
New Zealand

12 March 1958

MEMORANDUM for:

Engineer Surveyors

POWER LIFT RULES

1. Scope

These Rules shall apply to the design, construction, maintenance, inspection, testing, and operation of power lifts subject to the Boilers, Lifts, and Cranes Act 1950, but shall not apply to the following machinery:

- (a) Lifts used solely in connection with the construction, alteration, repair, renewal or demolition of a building.
- (b) Stacking machines and similar portable devices.
- (c) Conveyors used for the handling of goods such as swing trap elevators, bucket conveyors, and similar appliances.
- (d) Skip hoists.
- (e) Amusement devices.
- (f) Lifts or winding apparatus used for raising or lowering men or material in mines inspected by the Mines Department.
- (g) Power driven lifts the motive power of which does not exceed one horse-power.
- (h) Hand power lifts.

Note:

In some recent lift installations exempt from the provisions of the Boilers, Lifts, and Cranes Act 1950 because the horsepower is one or less, there are definite hazards to the safety of persons likely to use them. Where such a case comes to the notice of an Engineer Surveyor he should report the facts of the hazard to the owner and recommend the necessary alterations to remove the risk. Where oral advice to do this is unheeded the Engineer Surveyor should send the owner the appropriate advice and recommendations in writing. Particulars of the deficiencies of any such installations noted by the Engineer Surveyor should be forwarded to Head Office so that if any amendment to the Act is found desirable the Department will have factual evidence to support the case for the amendment.

2. Existing Lifts

These Rules shall apply to every existing lift to the extent considered necessary by an Engineer Surveyor to enable him to be satisfied that the lift is securely guarded and is in good repair and may be safely used for the purpose for which it is then used or intended to be used. Whenever any existing lift is re-erected or is subject to material alterations it shall comply fully with these Rules.

* These amendments are as given in Circulars 1957/18, 89 & 125, which are now cancelled, together with Circular 1952/29.

"Material alteration" means an alteration requiring a reconstruction of the major part of a lift such as a conversion from goods to passenger lift, an extension of travel by addition of a new floor or floors, an increase in the carrying load requiring a new hoisting machine and new ropes, a conversion of hydraulic or belt driven lift to electric drive, etc. Where any doubt exists as to the application of these Rules the matter should be referred to the Chief Engineer Surveyor.

Subject to the preceding paragraph the reconditioning or modernisation of an existing lift whereby the general standard of safety is raised shall not be considered a "material alteration", nor shall the change-over in power supply from direct current to alternating current or vice versa, with either the existing or a new machine, be considered a "material alteration", provided that if an increase of speed requested by the owner is approved by the Department the increase shall not exceed 10 per cent.

3. Power to Exempt

Where the Chief Engineer Surveyor is of opinion that owing to the special circumstances of a lift any of the requirements of these rules are not necessary, he may by certificate in writing (which he may in his discretion revoke) exempt such lift from such requirements subject to such conditions as may be specified in such certificates.

4. Date of Application

These Rules shall apply to every new lift built or constructed and to every existing lift materially altered after 31 December 1949, provided that when satisfactory evidence is furnished by the owner showing that a lift was constructed for on or before 31 December 1949 such modifications of these Rules as appear to be practicable and reasonable will be permitted.

5. Statutory Obligations

Boilers, Lifts, and Cranes Act 1950: Abstracts of the Law Relating to Lifts

Section 2(1): "Lift" means an appliance used for raising and lowering persons or goods by means of a car or platform the movement of which in a vertical or approximately vertical direction is maintained by guides; and includes the supports, wall, enclosures, car and the whole of the mechanical and electrical apparatus required in connection with the operation and safety of a lift.

Section 11(3): Any certificate issued under this section to the owner of a lift may contain such condition in respect of the number of passengers or the load that may be carried by the lift, as the Minister thinks fit.

Section 18: The owner or other person at whose request the first inspection of any boiler, lift or crane is made shall, not later than the date of making application for that inspection, forward to the Chief Surveyor a drawing of the boiler, lift or crane accompanied by the prescribed fee and containing all such dimensions and other particulars as may be necessary to enable the Chief Surveyor to determine whether or not the Chief Surveyor's requirements have been complied with.

Section 19(2): Lifts shall be inspected at least once in every six months.

Section 28(1): Except for the purpose of a test required and witnessed by a Surveyor, no person in charge of a lift shall permit to be carried on the lift any number of passengers, or any load, greater than that stated in the certificate given under section eleven of this Act in respect of the lift.

(2) No person shall wilfully damage a lift or remove or interfere with any safeguard, fence or safety device of a lift.

(3) The owner of a lift shall keep the lift and all of its safety devices in a good and safe condition during the currency of the certificate given in respect of the lift.

(4) The owner of a lift shall, before making any material alteration or repair to the lift, give to the Surveyor notice in writing setting forth full particulars of the proposed work.

Section 30(2): No lift of any kind, other than an automatically controlled passenger lift that may be brought into operation by the pressure of a button which causes the lift car to start and to stop automatically at the landing corresponding to the button pressed, shall be worked unless it is in the charge of a male attendant of at least eighteen years of age or a female attendant of at least twenty years of age. For the purposes of this subsection an attendant shall mean a person who has been specially employed or authorized in that behalf by the owner of the lift or his agent.

6. Fees

The fees payable in respect of the examination of drawings of lifts shall be in accordance with those prescribed hereunder:

In respect of a drawing of a -

Passenger lift	£4. 0. 0
Passenger and goods lift	£4. 0. 0
Goods lift (includes goods-attendant lift)	£3. 0. 0
Drawings which are copies of drawings of a lift for which the prescribed fee has been paid	One-quarter of the appropriate fee

7. Definitions

"Lift" for the purpose of these Rules means a machine the motive power of which exceeds one horse-power, and the supports, enclosures, car and the whole of the mechanical and electrical apparatus for its operation, which is intended to be used for the purpose of raising or lowering persons and/or goods or material by means of a car or platform which moves in guides in a vertical or approximately vertical direction.

"Passenger lift" means a lift designed and certificated for the purpose of carrying passengers.

"Passenger-goods lift" means a lift designed and certificated for the purpose of carrying passengers, or goods and one attendant, but not passengers and goods together.

"Goods-attendant lift" means a lift designed and certificated for the purpose of carrying goods or materials and in which one attendant may travel for the purpose of operating the controls from the car, except that, if specified, an additional attendant will be permitted to assist with the load.

"Goods lift" means a lift designed and certificated for carrying goods or materials only and which is operated only from the floors or landings. No person shall travel in a goods lift.

"Service lift" means a lift, the car of which has a floor area not exceeding 9 square feet and a height not exceeding 4 feet, certificated to carry goods or material only, and which is operated from the landings only.

"Electric lift" means a lift in which the motion of the car or platform is obtained through an electric motor coupled to the winding element.

"Hydraulic lift" means a lift in which the motion of the car or platform is obtained through the action of a liquid under pressure acting on a piston or ram.

"Hoist" means -

(a) a machine, the motive power of which exceeds one horsepower, and the supports, enclosures and apparatus required in connection with its operation, used for the purpose of raising or lowering goods or materials in a vertical or approximately vertical direction by means of a hook and sling or platform;

(b) a direct acting plunger type lift in which the under side of the car or platform is directly attached to the ram or plunger and which has a travel not greater than one floor of a building or approximately 14 feet and used for the conveyance of goods or materials only;

(c) a hoist block used for transporting loads on a fixed monorail or wire;

(d) a lift used in connection with the construction, alteration, repair, renewal or demolition of a building;

(e) a stacking machine or similar portable device.

"Push button automatic control" means a form of control by buttons in the car and at the landings, the momentary pressing of which will cause the car to start and automatically stop at the floor corresponding to the button pressed.

"Car switch control" means a form of control wherein the movement of the car is directly and solely under the control of the lift attendant by means of a switch in the car.

"Semi-automatic control" means either -

(1) (Up, Down and Stop): A form of control by means of Up, Down and Stop buttons in the car and at each intermediate landing, Down and Stop buttons at the bottom terminal landing, and Up and Stop buttons at the top terminal landing. The momentary pressure of a button, either in the car or on the landing, causes the car to move in the direction indicated, whilst pressure on a Stop button stops the car; or

(2) (Constant Pressure): A form of control by Up and Down buttons in the car and at the landings which requires a button to be held manually in contact to keep the car in motion.

Note No passenger, passenger-goods or bed-passenger lift shall be operated by semi-automatic control, nor shall this form of control be used for lifts having a speed of travel exceeding 150 feet per minute.

"Dual control" means a system whereby the lift is arranged to be operated either as a push button automatic control lift through landing and car push buttons, or by car switch control through a manually operated switch in the car. A special change-over switch shall be provided whereby the conversion of control from car switch to automatic and vice versa is effected. The change-over switch shall be placed in such position as to be not readily available to unauthorised persons.

"Drum drive" means a drive in which the ropes are secured to and wind on a drum.

"Traction drive" means a drive in which the sheave is so grooved as to impart its motion to the ropes by friction.

"Lift car" means the load-carrying unit and includes the car platform, frame and enclosures.

"Car gate" means the gate or door of a lift car ordinarily used for entrances and exit.

"Enclosure" means the guarding structure around a lift well.

"Enclosure door" means a door or gate in an enclosure.

"Approved" means approved by the Chief Engineer Surveyor.

"Contract load" means the maximum load the lift is required to carry.

8. Drawings and Particulars to be Submitted

For the purpose of approval of the layout and particulars of a new lift the owner or other person at whose request the first inspection of a lift is made shall, not later than the date of making application for such inspection, forward to the Chief Engineer Surveyor a drawing of the lift containing all necessary dimensions and other particulars (Boilers, Lifts, and Cranes Act 1950, section 18).

Before an inspection is carried out in respect of a lift which has been re-erected, or to which additions or material alterations have been made, particulars of the work shall be approved by the Chief Engineer Surveyor.

It is desired that the necessary drawings, wiring diagram and particulars should be submitted before the erection or re-erection of a lift, or material alterations or additions thereto are commenced, in order to avoid any questions arising which might cause delay, expense and inconvenience to owners.

Details required:

Owner of lift:	Name and address
Maker of lift:	Name and address
Erector of lift:	Name and address
Class of service:	
Contract load (lbs.):	
Method of control:	
Speed (feet per minute):	
Total travel (feet):	
Number of floors served (above ground floor):	

Machine

Name and address of maker:	
Power: A.C. or D.C.	Volts:
Control: A.C. or D.C.	Volts:
Traction or drum drive:	Weight:
H.P. and speed of motor:	Gear ratio:
Diameter of hoisting sheaves:	
" " " drum:	
" " sheave or drum shaft:	
" " worm shaft:	
" " diverting sheave:	
Is a speed governor fitted?	Diameter of sheave pin:
	Maker:

Overhead Beams

Car

Gross weight: Floor length and width:
Entrance(s): Number, clear height and width:
Type of gate:
Is an electric contact fitted to gate?
Materials of walls and roof:
Sectional dimensions of car components: Bow:
Vertical side members: Platform frame: Safety gear
bearers:
Type of safety gear:
Is an emergency slack rope switch fitted?
Guides, diameter or sectional dimensions:
Spacing of guide supports:
Buffers, Type:
Over-run, Top: Bottom:
Clearances, between sides of car and well enclosures;
between car floor nosing and landing thresholds:
Is a retiring cam fitted?

Counterweight

Weight: Guides: Diameter or sectional
dimensions:
Spacing of guide supports: Buffers, Type:
Over-run, Top: Bottom:

Ropes

	Number	Circumference	Construction Strands Wires	Breaking Load Each Rope	Maker
Car Counter- weight Governor					

Roping: 1 to 1 or 2 to 1

Lift Well Enclosure and Doors

Materials of enclosure:
Height of enclosure doors:
Type and material of enclosure doors:
Make of interlock fitted to each door:
Distance between lift well side of doors opposite the
car entrance and the edge of the landing thresholds:

Terminal Stopping Devices

Final terminal stopping device: Type: Where fitted:
Normal terminal stopping device: " " "

Hydraulic Lifts

Water pressure: Maximum:
Cylinder: Internal diameter: Thickness:
Thickness of cover: Number: diameter & pitch
Circle of cover bolts:
Diameter of piston rods:
Particulars of crosshead:
" " control valve:

Also particulars of overhead sheave beams, lift well enclosure,
car, ropes, etc., as required for electric lifts, where applic-
able.

Vee Belt-Driven Lifts

Particulars and number of belts:

9. Lift Carrying Capacity

The machine, supporting structure, car and all parts and equipment of a lift shall be designed and constructed to safely carry a contract load not less than:

- (a) In the case of a passenger, passenger-goods, or bed-passenger lift, the load in pounds given in Fig. 1 or Fig. 1A corresponding to the car floor area disregarding any seat;
- (b) In the case of a goods-attendant lift, or a goods lift, a load in pounds equal to the car floor area in square feet multiplied by 75, except that the Chief Engineer Surveyor in his discretion may permit a lesser contract load in a case where an exceptionally large car is necessary for the carriage of vehicles or other specified purpose.

Note

A conspicuous load plate bearing the contract load of the lift shall be fitted in each lift car.

- (1) For passenger, passenger-goods and bed-passenger lifts the contract load shall be given in persons and pounds in accordance with Fig. 1 or Fig. 1A.
- (2) For goods-attendant and goods lifts the contract load shall be given in pounds or other convenient units.

10. Overhead Beams and Their Supports

(a) The equivalent static load on the overhead beams and their supporting structure shall be assumed to be equal to twice the maximum rope loads obtaining when the lift is stationary, plus all other loads imposed on the beams and supporting structure.

(b) Beams directly supporting machines or sheaves over which lifting ropes or governor ropes pass shall be of steel or reinforced concrete.

(c) Beams supporting the beams which carry the machine or sheaves shall be of steel or reinforced concrete.

(d) The factor of safety for the overhead beams and supporting structure, based on the ultimate strength of the material and the load assumed in (a) shall be not less than 5 for steel and 7 for reinforced concrete.

(e) When concrete beams are used a drawing shall be submitted showing particulars of the concrete mixture and the steel reinforcement, and a certificate to the effect that the beams have been constructed in accordance with the drawing shall be supplied by the person in charge of the work.

(f) The deflection of the overhead beams shall not exceed 1/1500 of the span of the beams.

(g) If an overhead beam is spliced, such splice shall be in a readily accessible position to facilitate inspection.

CURVE SHOWING PASSENGER-CAR CARRYING CAPACITY
CORRESPONDING TO CAR FLOOR AREA

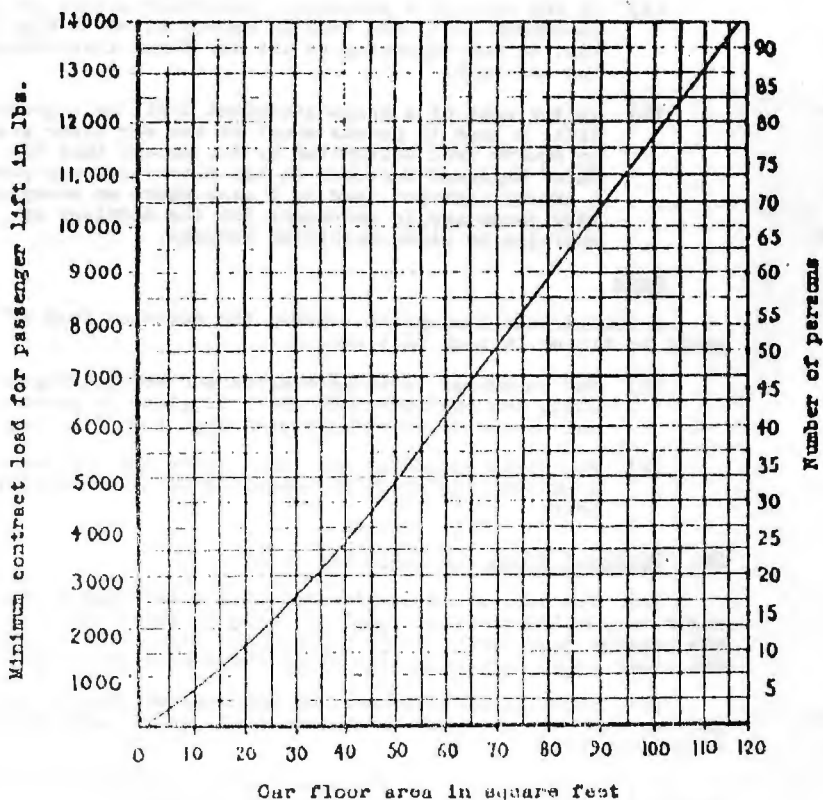


FIG. 1

(See Fig. 1A. next page)

NOTE: For passenger cars having a car floor area exceeding those given above, the contract load shall be based on not less than 120 lb. per square ft.

THIS CURVE REPRESENTS THE LOWER PORTION OF
CURVE IN FIG. 1 TO A LARGER SCALE

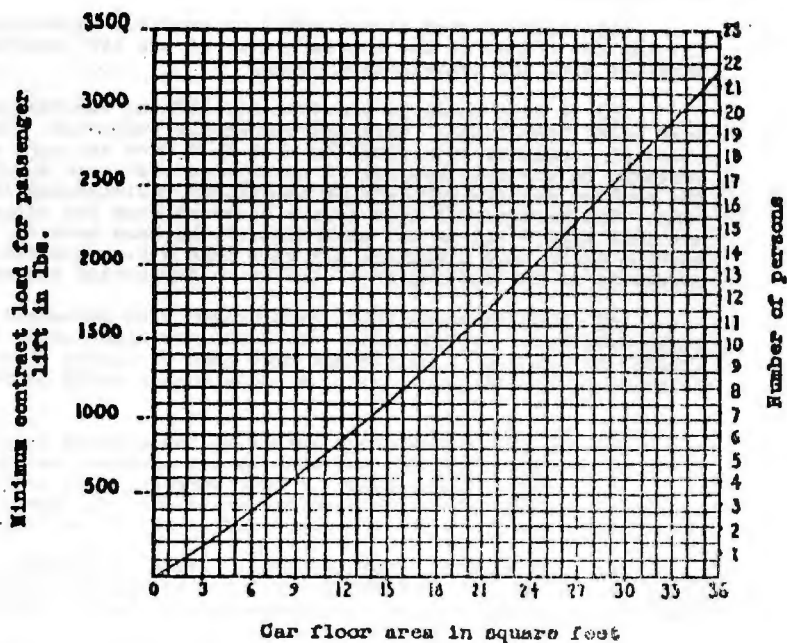


FIG. 1A

11. Machine Rooms

(a) The winding machine control mechanism and all parts of the equipment of a lift, other than those parts which must necessarily be placed elsewhere to effectively perform their functions, shall be housed in a machine room. The machine room shall be constructed so as to afford permanent protection against all weather with provision for adequate permanent ventilation. Doors and windows that can be closed shall not be regarded as permanent means of ventilation.

(b) Machine room floors shall be provided capable of sustaining the weight of the heaviest unit of the lift machinery, together with any superimposed loads.

(c) A beam shall be provided for lifting machine parts, the beam being permanently fixed and adequately supported. The dimensions of a machine room shall be such that free and safe access is provided to the satisfaction of an Engineer Surveyor to all parts of the machine for the purposes of inspection, maintenance and dismantling. The headroom of such access measured from the floor shall be not less than 7 ft. to the underside of the beam used for lifting machine parts, and elsewhere not less than 6 ft. measured to the underside of the ceiling or of the beams supporting the ceiling.

(d) Machine rooms shall be provided with permanent and adequate artificial illumination. At least one light shall be controlled by means of a switch not more than 18 inches from the lock jamb side of the entrance door. A 3-pin socket shall be provided.

(e) Safe and convenient access to the machine room entrance shall be provided. If the entrance to the machine room is more than 5 ft. above the adjacent floor or roof surface, safe access shall be provided by means of an inclined ladder or stairs. Where the difference in level is 5 ft. or less, ladders may be vertical.

Inclined ladders or stairs shall have a substantial handrail fixed at a convenient height on the outer stringer. Platforms and landings shall be provided with handrails at least 3 ft. high.

Where the entrance door to a machine room opens outwards, a landing having a length not less than the width of the door plus 2 ft., and not less than 2 ft. wide, should be provided.

Vertical ladders shall be fixed at least 6 inches clear of any wall, beam, or obstruction and shall extend at least to the landing level. Above the landing level and for a height of at least 45 inches, either the ladder stringers shall be extended or suitable hand grips shall be provided.

Where the access to a machine room is through a manhole in the floor, the manhole shall be of such size as to provide a minimum clear dimension of 2 ft. in all directions. All manholes in machine room floors shall be enclosed on three sides by a handrail at least 3 ft. high and provided with a midrail and toeboard or equivalent protection.

(f) A machine room shall not be used for purposes other than those connected with the operation of the lift or the installation of other approved permanent equipment. No material of any description shall be stored in a machine room. The entrance to a machine room shall be provided with a door having a lock which permits the door to be opened from the inside without a key. The owner of a lift shall appoint a person to take custody of the keys and to be responsible for the machine room door being kept locked. The following notice shall be exhibited in a prominent position adjacent to the entrance:

"DANGER - ENTRY OF UNAUTHORISED PERSONS PROHIBITED"

(g) Exposed gears, belts and other moving parts of machines shall be so guarded as to afford adequate protection to all persons who may be in the vicinity.

12. Over-run for Cars and Counterweights

(a) A clear space for the over-run of the car and the counterweight shall be provided at the top and bottom limits of travel of all lifts. Such over-run of the car at the top shall be the distance the car platform can travel above the level of the upper terminal landing before any part of the car or devices attached thereto meets an obstruction, and such over-run of the car at the bottom shall be the distance the car platform can travel below the level of the lower terminal landing before any part of the car or devices attached thereto meets an obstruction. The working stroke of the buffer shall be deemed to be included in the bottom over-run.

(b) The over-run of the counterweight at the top shall be the vertical distance between any part of the counterweight or any attachment thereto and any obstruction above it, when the car is landed upon its stops or fully compressed buffers. The over-run of the counterweight at the bottom shall be the distance the counterweight would require to travel to land, measured when the car platform is at the top terminal landing. The working stroke of the buffer shall be deemed to be included in the bottom over-run.

(c) The over-run provided for cars and counterweights shall be not less than that specified in the following table:

Minimum Over-runs for
Cars and Counterweights

Rated Speed ft./min.	Top Over-runs Car			Counterweight (with car landed)		Bottom Over-runs Car	
	Traction	Drum	Hydraulic	Traction	Drum	Traction and Drum	Hydraulic
	ft.	ft. in.	ft.	ft. in.	ft.	ft. in.	ft. in.
0-100	2	4 0	3	1 6	3	1 6	0 9
200	3	4 0	3	1 6	3	2 0	1 0
300	4	5 4	4	2 0	4	2 6	1 3
400	5			2 6		3 0	
500	6			3 0		3 6	

Note: Minimum over-runs for rated speeds exceeding 100 ft. per minute may be found by interpolation.

(d) Bottom over-run for counterweights:

(i) Traction Drive Lifts: The bottom over-run for the counterweight of a traction drive machine shall not be greater than one-half of the top over-run actually provided for the car. The final limit gear of the lift shall operate before the counterweight lands.

(ii) Drum Drive Lifts: The bottom over-run for the counterweight of a drum drive machine shall not be

greater than one-quarter of the top over-run actually provided for the lift car.

The counterweight of a drum drive machine shall not land in the normal operation of the lift.

13. Pits

(a) Every lift shall extend to solid earth except when the floor of the pit has adequate strength to withstand without failure the impact of the car with maximum load when it is descending at the rated speed, or at governor-tripping speed where a governor is fitted, and the pit is arranged that the counterweight will land on solid earth or an abutment constructed on solid earth.

(b) Lifts whose travel does not extend to solid earth shall have a minimum of six ropes and the ropes shall have a total factor of safety of 20.

(c) Every pit shall be constructed so as to remain dry and except for the unavoidable projection into the well of portions of structural footings the floor shall be substantially level.

(d) Where the depth of a pit, measured from the lower terminal landing, exceeds 3 ft. 6 in., and where no other means of access exists, a ladder shall be fixed permanently within reach of the lower enclosure door.

(e) Where access to a pit is by means of a door in the wall of the pit, the door shall be provided with an electric interlock so arranged that the door must be closed and electric contact made independently by bolting the door before the lift can be operated. The door shall be provided with a lock and key to prevent the entry of unauthorised persons.

(f) For all lifts except service lifts the pit shall be fitted with a 3-pin socket. The socket shall be located inside the lift well in a position easily accessible from the point of entry into the pit.

14. Buffers and Stops for Cars and Counterweights

For the purpose of taking the impact upon landings, solid stops or approved spring buffers or approved oil buffers shall be provided as follows:

For cars of all lifts whose speed does not exceed 100 ft. per minute and for counterweights of all lifts whose speed does not exceed 200 ft. per minute

Solid stops,
spring buffers,
or oil buffers

For cars of all lifts whose speed exceeds 100 ft. per minute and for the counterweights of all lifts whose speed exceeds 200 ft. per minute

Spring buffers
or oil buffers

For cars and counterweights of all lifts whose speed exceeds 300 ft. per minute

Oil buffers only

15. Enclosure of Lift Wells

(a) Lift well enclosures shall be constructed of approved materials and be otherwise in accordance with the requirements of these Rules and the by-laws of the appropriate local authorities.

(b) Where fire-resistant construction is not required, lift well enclosures may be constructed of wire mesh, grille or other openwork, and shall extend for a height of not less than 7 ft. from

the floor on all sides not used for loading or unloading. Where a stairway surrounds a lift well the height of the enclosure shall not be less than 7 ft. measured vertically from the nosing of the tread of the step to the top of the enclosure. In all cases the entrance side or sides of the lift well shall be enclosed for the full width of the car opening throughout the travel of the car. The well enclosure shall also extend the full width of the counterweights throughout the whole of their travel and over-travel.

(c) The clearance between a car and lift well enclosure shall be not less than 1 inch, nor shall it exceed 5 inches on the entrance side of the car except when the doors are installed wholly within the lift wall, in which case the maximum distance shall not exceed $7\frac{1}{4}$ inches, provided that the clearance between the car floor nosing and the landing threshold shall be not less than $\frac{1}{4}$ inch or more than $1\frac{1}{4}$ inches. (See Clause 22(h)).

(d) The clearance between the counterweight and the enclosure shall be not less than 1 inch.

(e) The clearance between the car and the counterweight of a lift, or between the car or the counterweight and any ropes that normally move, or conductor cables, shall be not less than $1\frac{1}{4}$ inches.

(f) Where grille work or a similar type of construction is used for lift well enclosures the interspaces shall comply with the following requirements: (i) where any moving part of a lift is 3 inches or less from the inside of the enclosure the interspaces shall be not greater than $\frac{3}{8}$ " mesh; (ii) where this distance is more than 3 inches the interspaces shall be not greater than $1\frac{1}{4}$ inches.

(g) Every projection extending inwards from the general surface of the wall of a lift well and which faces a car entrance shall be bevelled on the underside. The angle of such bevels to the horizontal shall be not less than 60 degrees and preferably 75 degrees. The bevelled surfaces may be integral with the enclosure wall, as in a concrete wall, or may be rigid metal plates, or wood faced with sheet metal at least $\frac{1}{4}$ inch thick.

16. Piping, etc., in Lift Wells

Piping, conduit or other equipment not forming part of the lift installation shall not be installed in a lift well.

17. Enclosure Doors

(a) Landing openings in lift well enclosures shall be protected by sliding doors, combination sliding and swinging doors or by swinging doors.

(b) The doors shall be of approved materials and construction and shall withstand a force of 75 lbs. applied at right angles at any point without permanent deformation and without being sprung from their guides.

(c) Enclosure doors when fully open shall leave no portions of the lift well unprotected at the sides of the car and when closed shall guard the full width and height of the landing opening.

(d) Enclosure doors shall have a minimum height of 6ft. 6ins.

(e) Where enclosure doors of fire-resisting type or smoke-stops are required by the building by-laws of the local authority concerned, construction of the doors shall comply with the by-laws, except that nothing therein shall relieve the owner, contractor, or other responsible person from complying with these Rules.

Where doors of either of the above types are not required the doors may be of lattice, wire mesh, grille, or other openwork, the

* Except that heavy wiring in conduit such as sub-main may

interspaces in which shall reject a ball 2 inches in diameter. Doors of openwork type shall not be power-operated.

(f) Manually opened doors of the solid vertically or horizontally sliding type for lifts with automatic and semi-automatic operation shall be provided with a vision panel, except at landings where a hall position indicator is provided. All swing-type enclosure doors shall be provided with a vision panel. The panel shall be of wired or otherwise shatter-proof clear glass not less than 25 square inches nor more than 144 square inches in area through which a view of the car may be conveniently obtained from the landings.

(g) In the case of a goods lift fitted with vertical sliding enclosure doors, the doors shall not be operated by the movement of the car. Such doors shall be manually operated.

(h) The distance between the lift well side of the enclosure doors opposite the car entrance and the lift well edge of the landing thresholds shall not exceed $2\frac{1}{2}$ inches in push button automatic control lifts, and 4 inches in other lifts.

If the enclosure door consists of two or more sections, the distances specified above shall be measured from the section of the door nearest to the edge of the landing sill.

Provided that the distances specified above shall not apply to goods (only) and service lifts.

18. Hoisting Ropes

(a) Car and counterweight ropes for all lifts shall be steel without covering. Chains shall not be used for hoisting.

(b) All steel rope shall conform to the requirements of B.S.S. No. 329-1957 — "Wire Ropes for Lifts and Hoists" or an equivalent specification, and a certificate shall be furnished for each size of rope used showing (1) the name and address of the makers, (2) circumference of rope, (3) number of strands, (4) number of wires of each strand, (5) quality of material, (6) grade of material, (7) lay of rope, and (8) breaking load of rope.

(c) The factor of safety for car and counterweight ropes based on maximum static loads shall be not less than 12 for passenger, passenger-goods, and goods-attendant lifts, and 10 for goods and service lifts. (See also Clause 13(b)).

(d) The minimum circumference of ropes for cars and counterweights shall be $1\frac{1}{2}$ inches and the minimum number of ropes for cars and counterweights shall be two for drum drive and hydraulic types and three for all other types. (Exception: Service Lifts.) Each rope shall be independently connected and shall be identical in circumference, construction and quality. (See also Clause 13(c)).

(e) All ropes anchored to a winding drum shall have not less than one turn on the winding drum when the car or counterweight has reached the extreme limit of its overtravel. The anchorage of the rope shall be effected by passing the rope through a hole in the drum and effectively clamping it.

(f) The car and counterweight ends of ropes shall be fastened by spliced eyes or by tapered sockets, or by bulldog grips. If the spliced eye is used a metal thimble shall be placed within the eye and the splice made with at least three tucks of the whole strand of the rope and two tucks with one-half of the wire cut out of each strand made under and over against the lay of the rope. The eye shall be drawn tightly around the thimble, the strands drawn tight after each tuck and the tucks smoothly laid. After the last tuck is made each strand shall be cut off not closer than $\frac{1}{4}$ inch from the tuck and beaten down flush.

If a tapered socket is used the dimensions, material and method of socketing shall conform with B.S. Specification 463-1946, "Sockets for Wire Ropes".

Where bulldog grips are used for securing ends of hoisting ropes the grips, with respect to materials, proportions and dimensions, shall conform to B S S. 462-1932. Not less than three grips applied in the correct manner shall be the minimum number used to secure any wire rope



Fig. 3
CORRECT
METHOD



Fig. 4
INCORRECT
METHOD

Bulldog grips shall be fitted to wire rope as shown in Fig. 3 and not as shown in Fig. 4. The bridge of the grip shall be fitted on the working part of the rope and the U bolt on the rope tail or dead end of the rope. Grips shall not alternate in position on the rope.

(g) No ear or counterweight rope shall be repaired by splicing.

(h) A traction-drive lift shall be provided with means to adjust the lengths of ropes to equalise the load on the individual suspension rope. The suspension ropes of drum drive and hydraulic lifts shall be fitted with bar type equalisers.

(i) Eyebolts for the suspension of cars and counterweights, and for the anchorage of the standing ends of ear and counterweight ropes where two to one roping is employed, shall be solid forged and of the form and dimensions specified in British Standard 529: Part 2: 1944: "Steel Eyebolts without Collars for Lift Suspension", or of equivalent strength and quality.

19. Sheaves, Drums and Pulleys

(a) The diameter of sheaves, drums and pulleys for hoisting or counterweight ropes of 6 x 12 and fibre, 6 x 19, 6 x 19 Scale, 6 x 24, 6 x 25, 8 x 25, and 8 x 25 Scale construction shall in no case be less than those obtained from the following table for speeds not exceeding 400 ft. per minute.

6 x 12 and fibre	6 x 19	6 x 19 Scale	6 x 24	6 x 25	8 x 25	8 x 25 Scale
13 0	13 0	15 0	15 0	13 0	13 0	13 0
41 D	41 D	47 D	41 D	41 D	41 D	41 D

Where D = diameter of rope 0 = circumference of rope

(b) For each increase in speed of 100 ft. per minute, 2.5 per cent of the basic figure shall be added to the diameter of the sheave or drum.

(c) All drums, sheaves and pulleys shall have flanges extending one rope diameter beyond the centre of the rope, or at least to

the level of the surface of the rope when close-fitting guards are provided.

(d) The sheave rims of traction sheaves shall be of sufficient thickness to permit re-machining of worn rope grooves.

20. Counterweights

(a) Counterweights shall run in guides and be of approved construction with frames preferably of wrought steel. Where the speed of a lift exceeds 100 ft. per minute the frame or other stress bearing parts enclosing or supporting the counterweights shall not be of cast iron.

(b) The sections of sectional type counterweights shall be secured by at least two tie-rods passing through holes in all sections and having locknuts at each end, or the sections may be contained in a rigid steel frame and adequately secured.

(c) For the purpose of determining the stresses in the beams and other stress bearing parts of counterweights the equivalent static loading due to the counterweights shall be assumed to be twice their actual weight.

(d) The factor of safety for the beams and other stress bearing parts of counterweights, based on the ultimate strength of the material and the loading assumed in (c) above, shall be not less than 5 for steel, and 8 for cast iron (where this material is permitted).

21. Guides

(a) Lifts operated at a speed exceeding 100 ft. per minute shall have car and counterweight guides made of steel. Lifts operating at a speed of 100 ft. per minute or less may have timber guides.

(b) The guides shall be sufficient for the loads imposed upon them and shall be securely fastened to suitable supports. All joints shall be tongued and grooved or doweled and the working faces of the finished guides shall form a continuous smooth surface.

(c) For the purpose of determining car guide deflections and stresses due to the thrust exerted by the guide shoes, the lift car shall be considered as suspended by its rope or ropes, in any portion of travel, with the contract load evenly distributed over any half of the area of the car platform; such area being bounded on one side by a line passing through the centre of the car platform.

(d) Should the gross weight of the empty car exceed that of the contract load, then the contract load for the purposes of paragraph (c) above shall be taken as one-half of the total of the gross weight of the empty car and the contract load.

(e) Special conditions for lifts which carry goods: In addition to the requirements of paragraphs (c) and (d) the guide shoe thrusts caused by the load being moved, wheeled or rolled over the car floor nosing during loading and unloading operations shall also be considered, but only for those positions occupied by the guide shoes when the car is approximately level with a landing platform.

(f) For the purpose of determining the deflection and stresses of counterweight guides during an earthquake, the counterweight shall be assumed to be suspended in any position of the travel and acted upon by a continuous horizontal force in any direction equal to not less than 0.08 of the weight of the counterweight.

(g) For cars and counterweights provided with safety gear and having steel guides, the maximum distance between points of substantial support, regarding each span of the guides as a simple beam supported at each end, shall not exceed the lesser of the following:

(i) 180 times the least radius of gyration of the section employed;

(ii) that distance which could result in either a deflection of $\frac{1}{4}$ inch allowing a modulus of elasticity of 13,500 tons per square inch, or a stress of 18,000 lb. per square inch with the car and counterweight loaded as defined in paragraphs (c), (d), (e) and (f).

(h) For cars and counterweights with safety gear and having Oregon (Douglas Fir) or equivalent timber guides and backing, the maximum distance between the points of substantial support shall not exceed the lesser of the following:

(i) 110 times the least radius of gyration of the section employed;

(ii) that distance which would result in either a deflection of $\frac{1}{4}$ inch allowing a modulus of elasticity of 1,500,000 lb. per square inch, or an extreme fibre stress of 1,300 lb. per square inch with the car and counterweight loaded as defined in paragraphs (c), (d), (e) and (f).

(j) For counterweights without safety gear where the two guides are secured one to the other midway between points of substantial support, the distance between points of substantial support may be increased to 270 times the least radius of gyration for steel guides and 165 times the least radius of gyration for wooden guides, provided the maximum deflection and stress in the guides due to the horizontal force defined in paragraph (f) do not exceed those specified in paragraphs (g) and (h) for the material used.

22. Car Construction

(a) Lift cars shall be of approved construction. The bow, side members, safety gear bearers and platform frames shall be of steel. The car sides may be of timber or metal or other approved material. If grille or other openwork is used, the car enclosure, where not less than six feet six inches above the floor level, shall reject a ball two inches diameter, and where less than six feet six inches above the floor shall reject a ball $\frac{1}{4}$ inch diameter.

The sides of passenger, passenger-goods and goods-attendant lift cars shall extend from floor to roof. The sides of goods lift cars shall extend to a height not less than six feet from the floor or to the bow if the bow is lower.

(b) Every passenger, passenger-goods, and goods-attendant lift car shall be provided with a roof which shall cover the whole area of the car and shall be such as to safely support the weight of a man. The roof shall be provided with a panel capable of being opened only from outside the car. The panel shall be of such size as to permit easy ingress and egress. Glass shall not be used in the construction of a car roof.

(c) No glass shall be used in lift cars except to cover certificates, lighting fixtures, and appliances necessary for the operation of the car, and as a vision panel in the car door.

No pieces of glass, unless wired or otherwise shatter-proof, shall exceed one square foot in area.

Glassware used in lighting fixtures larger than 10 inches diameter shall be of wired glass or surrounded by a wire guard of a mesh that will reject a ball $\frac{1}{2}$ inch diameter.

(d) The cars of all passenger, passenger-goods, and goods-attendant lifts shall be lighted at all times when the lift is available for use. Electric light shall be used if available. The car light shall be placed so that when the car is at a landing, that portion of the landing immediately opposite the car entrance shall be effectively illuminated. In the case of automatic lifts, the control of the light shall be such that it may be switched off only by an authorized person, and the lamp shall be guarded and locked to prevent its removal.

(e) The upper sections or roof of all passenger lift cars shall be provided with openings, which may be adjustable, for ventilation purposes.

(f) The factor of safety (for static loading) in the car bow, safety gear bearers, members in platform, side members, and their connections to the bow and platform, shall be not less than 6.

(g) The car of a passenger, passenger-goods or goods-attendant lift shall not have more than two entrances.

(h) (i) Where in a lift with more than one car entrance there is a lift well with a blank wall opposite the entrance of the car when the car is at a landing, the clearance between the car floor nosing and the blank wall shall not exceed $1\frac{1}{2}$ inches.

(ii) If at such landing or landings mentioned in (i) above the distance between the car floor nosing and the well would exceed $1\frac{1}{2}$ inches, a projecting face shall be built on the well opposite so that the clearance shall not exceed $1\frac{1}{2}$ inches.

(iii) Where in a goods or goods-attendant lift with vertical sliding enclosure doors it would be impracticable to provide the projecting face prescribed in (ii) above, the car gate opposite the blank wall shall be mechanically locked so that it cannot be opened.

(j) Floating floors are not permitted for new or existing lifts.

23. Car Gates and Doors

(a) Gates or doors of approved construction shall be fitted at each entrance to passenger, passenger-goods, and goods-attendant lift cars. Each gate or door when closed shall guard the full opening and shall be provided with an electric contact so arranged that the car gate or door must be closed before the lift can be operated (see Clause 22(h)).

(b) Sliding gates shall be guided top and bottom, and if of the collapsible type (i.e., grille, lattice, or other openwork) shall be so constructed that the interspaces when in the closed position shall reject a ball two inches in diameter.

(c) In the case of a lift equipped with a car levelling device, the car gate or doors may be opened during the period of inching provided the car landings are equipped with approved toe guards.

(d) Car gates or doors of passenger, passenger-goods, and goods-attendant lifts shall have a minimum height of 6 ft. 6 in.

(e) Collapseible car gates may be closed under power. Collapseible car gates may be partially opened under power, provided that power operations shall not exceed a distance of 10 inches, and positive means shall be employed to prevent automatic opening beyond a distance of 12 inches. Full opening of the gates shall be manual.

(f) Solid car doors of lifts with solid enclosure doors in which vision panels are required by Clause 17(f) shall be provided with a panel through which a view of the interior of the car can be conveniently obtained from the landings. The panel shall be of wired or otherwise shatter-proof clear glass, and shall be not less than 25 square inches nor more than 144 square inches in area.

24. Machines

(a) Lift machines shall be of approved construction.

(b) No lift machine shall be hung from the overhead supporting beams.

(c) Electric lift machines shall be equipped with brakes applied automatically when the operating device is at the "stop" position or power is cut off from the motor from any cause.

(d) Drum drive machines shall not be used for lift speeds exceeding 300 ft. per minute.

(e) Machines driven by multi-vee belts shall have not less than three belts. Provision shall be made for adjustment of the belt tension.

(f) The factor of safety of lift machines, and the pins, shafting and attachments of suspension rope sheaves and pulleys, based on ultimate strength of the material and the static load imposed thereon, shall be not less than:

8 for wrought steel;
10 for castings or other materials.

(g) The dimensions of keys and keyways shall be in accordance with British Standard Specification No. 46, Part 1, 1929. Set screws or pins shall not be used for transmitting power, or for connections subject to tension.

(h) Adequate provision shall be made for lubrication of the machine parts. If the diverter sheave bearings must be lubricated or inspected from the top of the car and the bearings cannot be conveniently reached from this position, a suitable permanent steel ladder shall be provided.

25. Electrical Installations

All wiring, pressure in electric circuits, power supply, circuit breakers, conduits, trailing cables and earthings shall conform to the requirements of the New Zealand Electric Supply Regulations and Electric Wiring Regulations and their amendments.

Note: Where in a lift having a direct current hoisting motor a rectifier is installed to convert A.C. electrical energy to D.C., the lift machine shall be re-tested by an Engineer Surveyor and he shall be satisfied that the brakes are applied automatically and effectively whenever the operating device is at the "stop" position or when for any reason power is cut off from the motor of the lift machine - See also Clause 24(a).

26. Emergency Signal

Push button automatic control lifts shall be provided with an emergency signalling device operative from inside the car and audible in approved positions outside the lift well. The device shall be marked:

"EMERGENCY SIGNAL"

27. Landing Door Control

Each enclosure door of a lift shall be interlocked with the control to ensure that:

- (a) the lift car cannot be started unless every enclosure door is closed and locked;
- (b) in the event of an enclosure door being open, the lift will come to rest;
- (c) in the case of a car switch controlled lift, an enclosure door may normally be unlocked and opened only from the car, except that provision shall be made that the door at one landing may be opened from the outside by a special key, provided the car is opposite that landing;
- (d) in the case of an automatic lift, an enclosure door at a landing may be unlocked and opened from either the car or landing only when the car is stationary and within 9 inches of the landing.
- (e) in the case of automatic lifts with self-levelling device and manually operated enclosure doors, the enclosure door at a landing may be unlocked and opened from either the car or the landing only when the car is under the control of the self-levelling device and is within 9 inches of the landing;
- (f) in the case of automatic lifts with power operated enclosure doors, the enclosure doors during normal operation shall not open until the car is within a distance of 15 inches of the landing.

Note:

(1) In respect of either a goods or goods-attendant lift having a speed of travel not exceeding 150 ft. per minute and which has a travel not greater than one floor of a building or approximately 17 ft., an enclosure door may be considered locked if it is arranged that the locking operation is completed within the period that the car takes to move not more than 15 inches from the landing level, for the purpose of subclause (2) and notwithstanding the provision of subclause (c).

(2) Attention is drawn to the fact that devices employing locks and contacts of a type in which the interlocking contact is made when the door is closed and the locking of the door takes place subsequently are not true interlocks and are not permitted under these rules except in the special cases mentioned in the preceding paragraph.

(3) Suitable toe guards shall be fitted to the landings and the car of all lifts with self-levelling device.

28. Landing Door Interlocks

(a) Door locks of push button automatic control lifts shall be of such a type and so fitted that an unauthorised person cannot manipulate the lock and open the door when the lift car is away from the landing.

(b) Landing-door or landing-gate contacts shall be designed so that they are positively opened by the locking bar, or by a lever or other device attached to, and operated by, the door or gate.

(c) The functioning of a landing-door or landing-gate electric contact to prevent the movement of the car shall not be dependent solely on the action of a spring or springs, nor solely upon gravity, nor shall it be dependent on the closing of an electric contact. If springs are used they shall be in compression. The interruption of the electric circuit shall stop the car.

(d) Interlock contacts shall be on the positive side of the circuit.

29. Car Control Devices

(a) Electric lifts having a speed of over 100 ft. per minute shall not be controlled by hand ropes.

(b) The car control buttons in push-button automatic control lifts shall be placed in sequence of the landings served. The markings of the buttons shall correspond with the names or numbers of the landings served. An emergency stop button shall be provided and shall be clearly and distinctly marked and shall be placed in close proximity to the control buttons. There shall be provided a non-interference device, time element or some other device such as will afford a person in an automatic lift car a reasonable opportunity of opening the doors on the car coming to rest and before it can be called away.

Note: An emergency stop button is not required to be fitted in a lift car having solid doors, where a suitable alternative device is provided for maintenance staff to stop the car at any level.

30. Terminal Stopping Devices

(a) Every electric lift shall be provided with upper and lower normal stopping devices in accordance with Clause 31.

(b) Every electric lift shall be provided with upper and lower final stopping devices in accordance with Clause 32.

(c) The normal and final terminal stopping devices shall not control the same switches on the controller unless two or more separate and independent switches are provided, two of which shall be closed to complete the motor and brake circuit for each direction of travel.

(d) All normal and final terminal stopping switches, whether mounted on the lift car or in the lift well, shall be enclosed to prevent accidental contact.

(e) The contacts of all terminal stopping devices shall be opened positively and mechanically by the movement of the lift car.

(f) Normal and final terminal stopping switches shall be held in the open position when the lift car is in contact with the overhead structure or resting on the fully compressed buffers.

31. Normal Terminal Stopping Devices

(a) Normal terminal stopping devices shall be arranged to stop the lift car automatically from any speed attained in normal operation within the limits of top and bottom over-run independently of the operating devices, the final terminal stopping device, and the buffers.

(b) Every lift having a drum machine shall have normal terminal stopping devices operated by the movement of the car and fixed either in the lift well or on the lift car.

(c) Every lift having a traction machine shall have normal terminal stopping devices operated by the movement of the lift car and fixed either in the lift well or on the lift car or in the machine room.

(d) When normal terminal stopping devices are situated in the machine room they shall be mounted on and operated by a stopping device mechanically connected to and driven by the lift car without dependence upon friction as a driving means. An automatic safety switch shall be provided which will stop the machine should the tape, chain, rope or other similar device mechanically connecting the stopping device fail.

Note: When the floor controller or selector of an automatically operated lift is driven in accordance with this requirement, the floor-stopping contacts for each terminal floor may serve as normal terminal floor-stopping devices.

32. Final Terminal Stopping Devices

(a) Final terminal stopping devices shall be arranged to stop the lift car within the top and bottom over-runs independently of the operating device and normal terminal stopping devices.

(b) Final terminal stopping devices shall be arranged to operate with the lift car as close to the terminal floors as practicable without interfering with the normal operation of the lift.

(c) Every lift having a drum machine shall have two final terminal stopping devices, one being operated by the machine and the other by the movement of the lift car.

(d) Every lift having a traction machine shall have final terminal stopping devices operated by the movement of the lift car.

(c) Final stopping devices shall act to prevent movement of the car under power in both directions of travel.

33. Safety Gear

(a) Safety gear shall be provided on the cars of all lifts except direct acting ram lifts. The gear shall be applied mechanically and shall be located beneath the car platform. It shall be automatic in action and shall be such that it will bring the car with its maximum load to rest and securely hold it in position should the hoisting ropes break or become detached, or, in the case of lifts fitted with speed governing devices, should the lift attain a predetermined excess speed.

(b) In passenger, passenger-goods, and goods-attendant lifts whose travel exceeds 18 ft., provision shall be made for the operation of the safety gear by a speed governor.

(c) Instantaneous safety gear may be fitted to the cars of lifts whose speed does not exceed 160 ft. per minute, provided that where the speed exceeds 100 ft. per minute the safety gear cars shall be made of cast or wrought steel. Upon failure of the hoisting ropes such safety gear shall apply instantly and independently of the speed action of the governor. This may be accomplished by the use of a governor and a governor rigging having a sufficiently high value of inertia to apply the safety gear in the event of a free drop, or by means of a fly-rope between the safety gear and the counterweight, or an equivalent device.

34. Governors

(a) Speed governors shall be so constructed, adjusted and maintained as to cause the operation of the car safety gear at a speed not greater than 40 per cent and not less than 15 per cent above the rated speed of the lift when the speed does not exceed 500 ft. per minute, provided that no governor shall be required to cause the operation of the car safety gear at a speed less than 175 ft. per minute.

(b) Governors shall be of approved design. The governor rope shall not be damaged or permanently deformed by the operation of the governor.

(c) Speed governors of lifts whose speed exceeds 200 ft. per minute shall be equipped with a switch which shall open before or at the time the governor trips and grips the governor rope, and shall cause the opening of the motor and brake circuits and bring the lift to rest.

(d) The proper tripping speed of the governor shall be stamped on the governor or on a brass plate permanently attached thereto.

(e) The governor and safety gear of every new lift, or new governor and safety gear of an existing lift, shall be tested with the contract load in the car before it is passed for service.

For wedge-clamp and similar types of safety gear in which the application of the gear is gradual, the test shall be carried out at governor tripping speed.

Where the safety gear is of the "broken-rope" instantaneous type the test shall be carried out by obtaining the necessary slack rope to cause the gear to function.

35. Black Rope Switch

Every electric drum-drive lift shall be provided with a "slack rope" device which will automatically cut off the power and stop the lift machine if the car lifting ropes become slack from any cause.

36. Emergency Switch

Every electric traction-drive lift shall be provided with a device which in the event of the car safety gear operating from any cause will automatically cut off the power and stop the lift machine.

37. Hydraulic Lifts

(a) Hydraulic lifts shall comply with the foregoing instructions where applicable.

(b) Machines: The cylinder and parts subject to hydraulic pressure shall be tested to three times the working pressure in the presence of an Engineer Surveyor.

Hydraulic machines shall be constructed and so roped that the piston or ram will be stopped before the lift car can be dragged into the overhead work, and it shall be arranged that the lift car will land at the bottom of the pit before the machine has completed its stroke.

The minimum number of ropes for the car and counterweight of hydraulic lifts shall be two.

Stops of ample strength shall be provided to bring the piston or ram to rest when under full pressure without causing damage to the cylinder or cylinder head.

Measures shall be taken to prevent the syphoning of water from the cylinder. Cylinders shall be provided with means for releasing air.

A high pressure valve shall be fitted in the exhaust system. The connection between this valve and the machine shall be high pressure piping.

(c) Control Valves: Every hydraulic lift shall be controlled by a stop valve and a non-return valve. The non-return valve shall be placed as close as possible to the machine control valve.

Control valves shall be so constructed as to effectively seal the circulating pipe to the machine in the event of failure of the control rope.

(d) Hand Ropes: Hand ropes shall be continuous with both ends connected to the lever.

(e) Tappet Stops: Tappet stops shall be provided on the machines of all hydraulic lifts. All tappets shall be so set that under any condition or normal loading the car will come to rest before it has over-run either terminal landing one-quarter of the available over-run.

(f) Enclosure Doors: Each enclosure door of a hydraulic lift shall be interlocked with the control to ensure that the lift car cannot be moved unless every enclosure door is closed and locked.

38. Service Lifts

(a) Service lifts shall comply with the foregoing instructions where applicable.

(b) Pits: Where the pit of a service lift does not extend to solid earth the car and counterweight shall be regarded as freely falling bodies and adequate strength shall be provided in the floor of the pit to withstand the effect thereof.

(c) Ropes: A single rope may be used for the cars and counterweights of service lifts. The rope factor of safety based on maximum static load for cars and counterweight ropes shall be not less than 10. The minimum circumference of ropes shall be $\frac{7}{8}$ "

(d) Slack Rope Switch: A slack rope switch shall be fitted to every service lift having a drum drive.

(e) Guides: Service lifts may have timber guides.

(f) Cars: Cars of service lifts may be constructed of timber but the bow shall be of steel and be connected to the platform by steel members.

(g) Terminal Stopping Device: Service lifts shall be provided at each terminal with a device which will automatically stop the car within the top and bottom over-run.

(h) Interlocks: Service lift enclosure doors shall be interlocked to provide that the car cannot be started unless every enclosure door is completely closed.

(i) Safety Gear: Provided that the well of a service lift is completely enclosed on all four sides throughout the whole travel of the car and counterweight, the fitting of safety gear to the car shall not be required.

39. Inspection and Tests

New lifts or existing lifts which are being re-erected or materially altered shall be examined by an Engineer Surveyor from time to time during erection or alteration. The work shall conform to the approved plans and specifications and these Rules.

On completion of the work, tests shall be carried out with the contract load in the car.

The operation of the governor and safety gear, brake, and all other safety devices shall be to the satisfaction of the Engineer Surveyor. Tests of the governor and car safety gear shall be in accordance with Clause 34.

40. Maintenance

Every lift shall be regularly serviced by competent engineers, when all repairs, adjustments, and lubricating necessary to ensure safe and efficient operation shall be carried out.

41. Routine Inspection

The whole of every lift shall be examined by an Engineer Surveyor at intervals of not more than six months, as required by section 19(2) of the Boilers, Lifts, and Cranes Act 1950.

Tests of safety devices shall be made as directed by the Engineer Surveyor, but the intervals between the tests shall not exceed twelve months.

42. Certificate to be Exhibited

The certificate granted to the owner of any lift shall be exhibited in some conspicuous place in the car, and every owner who neglects to exhibit such certificate commits an offence against the Boilers, Lifts, and Cranes Act 1950, section 14.

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APPENDIX 14.

Circular No. 1964/98

File No. M26/2/126

Binder L.C.E.

Marine Department,
P.O. Box 2395,
Wellington.

22 October 1964

MEMORANDUM for:

Engineer Surveyors
for General Distribution

Amendment to Power Lift Rules 1958 Over run requirements for higher speed lifts

At present the Marine Department's Power Lift Rules give the over run requirements for lifts operating at speeds up to 500ft. per minute. As trends indicate that a number of higher speed lifts will be shortly installed in New Zealand the following over run requirements are to be applied for lift speeds exceeding 500ft. per minute.

Top over run requirements for the car

The top over run requirements for the car shall be not less than the sum of the following four distances:

- (i) The bottom over run provided for the counterweight.
- (ii) The stroke of the counterweight buffer used.
- (iii) Two feet or the distance which any sheave or other equipment mounted in or on the car cross head projects above the top of the car cross head (the greater dimension shall be used).
- (iv) One half of the gravity stopping distance based on a lift speed of one hundred and fifteen (115) percent of the rated speed of the lift.

Bottom over run requirements for the car

The car over run provided at the lower limit of travel shall be not less than 6" plus the full stroke of the car buffer and shall be not more than 24" plus the full car buffer stroke.

3. Top over run requirements for the counterweight

The top over run for the counterweight shall be not less than the sum of the four following distances:

- (i) The bottom car over run.
- (ii) The stroke of the car buffer used.
- (iii) Six inches.
- (iv) Half of the gravity stopping distance.

4. The lower over run requirements for the counterweight

The lower over run provided for the counterweight shall be not less than 6" plus the full counterweight

5. Gravity stopping distance

In the above requirements a dimension is given referred to as half of the gravity stopping distance and this can be calculated from the following formula:

$$S = \frac{V^2}{38640}$$

Where S = half of the gravity stopping distance in inches

V = the velocity of the car in feet per minute at 115% of the rated speed

6. Oil buffers for all lifts shall comply with the following requirements. The buffer stroke shall be not less than as given in the following table:-

The buffer stroke shall be not less than the following:

<u>Rated Speed</u>	<u>115% of rated speed</u>	<u>Minimum stroke in inches</u>
250	288	4½
300	345	6½
350	402	8½
400	460	11
450	517	13½
500	575	17
600	690	24½
700	805	33½
800	920	43½
900	1035	55½
1000	1150	68½
1100	1265	83
1200	1380	98½

7. The buffer design shall be such that the car or counterweight on striking the buffer at 115% of the rated speed shall be brought to rest with an average retardation of not more than 32.2 feet per second per second.

8. The buffers shall develop no peak retardation greater than 80.5 feet per second per second having a duration greater than one twenty-fifth (1/25) of a second with any load in the car between the maximum rated load to a minimum load of 150-lbs when the car strikes the buffers at 115% of the maximum rated load.

9. The buffers shall be constructed having an adequate factor of safety under all impact conditions and the rams should have a slenderness ratio not greater than 80.

10. In general oil buffers shall comply with the provisions of the American Safety Code for Elevators (A17-1-1960) Rules 201.4a to 201.4k and certificates stating that the buffers comply in full with these test requirements will be acceptable. Makers certificates for the buffers may be accepted at the discretion of the Engineer Surveyor.

11. Counterweight buffers should comply with the above mentioned requirements also.

12. This amendment is intended to extend Rule 12 of the New Zealand Power Lift Rules published as Circular No. 1955/29 and dated 12 March 1958.

13. Engineer Surveyors are requested to bring these changes to the attention of all interested persons and copies of this circular are available on request to Head Office.


for G. L. O'Halloran
Secretary for Marine

File No. M41/3/2 M41/4/1

Binder: Lifts Cranes

General Distribution:

MARINE DEPARTMENT,
Head Office,
P.O. Box 10142,
WELLINGTON.

MEMORANDUM FOR ENGINEER SURVEYORS

4 March 1971

LOW POWER LIFTS AND CRANES

1. Consequent to the Machinery Amendment Act 1970 paragraph (a) of subsection (1) of section 4 of the Boilers Lifts and Cranes Act 1950 is repealed.
2. The Boilers and Machinery Exemption Order 1971 exempted from certain provisions of the Boilers Lifts and Cranes Act 1950, machines driven solely by manual or animal power or the motive power of which does not exceed one horsepower.
3. Resulting from the statutory amendment, the Power Lift Rules and the Power Crane Rules are amended as follows:
4. Power Lift Rules Circular No. 1955/29, Amendment No.3

The Lift Rules are amended by deleting the first paragraph of Rule 1 Scope, and substituting the following:

"The Rules shall apply to the design, construction, maintenance, inspection, testing and operation of lifts subject to the Boilers, Lifts and Cranes Act 1950 and amendments, except where exemption from a statutory requirement is given by an Order in Council or by a Notice in the Gazette. The Rules do not apply to the following machinery".

Rule 1 Scope is further amended by deleting clauses (g) (h) and Note.

Note Previous amendments were circulars Nos. 1962/95 and 1964/98.

5. New Zealand Power Crane Rules

The text of Rule 3 is cancelled and replaced by the following:

3. Cranes exempted from certain provisions of the Boilers Lifts and Cranes Act 1950: Any crane driven by manual or animal power, or by motive power which does not exceed one horsepower shall be constructed and tested to the appropriate standard or standards, including up-to-date amendments, mentioned in Rule 36 of these Rules.

R.N. KERR
Secretary for Marine

File No: 41/3/2

Survey No. 76

Binder: Lifts, Cranes and
Examinations (Lifts)

MARINE DEPARTMENT,
Head Office,
P.O. Box 2395,
WELLINGTON.

Memorandum for Engineer Surveyors
(For General Distribution to the
Public)

DISTRIBUTION: List J

14 March 1968

LIFTS EXEMPT FROM INSPECTION
AND CERTIFICATION.

Lifts which are used for domestic purposes only in private homes have now been exempted from the requirements of sections 10 and 19 of the Boilers, Lifts & Cranes Act 1950 which required inspection and certification of the lift.

Lifts for domestic purposes in private homes are to be designed to conform fully with the Department's rules. Designs are to be submitted to Head Office and approval will be given in the usual manner.

Construction is to be supervised by the Department's Engineer Surveyors in the same manner as for all other lifts and the installation will be fully tested when construction is complete.

Fees for the inspection of the drawings by Head Office and for the field inspection will be charged for at the respective rates.

Manufacturers of such lifts should emphasise to owners the need for regular maintenance carried out by skilled maintenance personnel.

It must be noted that this exemption applies only to lifts used for domestic purposes in private homes and that lifts used in flats or for any situation where the application is commercial or semi-commercial are still treated as lifts under the full meaning of the Act and this exemption notice does not apply.

R.N. KERR
Secretary for Marine

per:

D. J. McKenzie
(D. J. McKenzie)

26 MAR 1971

Survey No. 318

File No. M41/3/2 M41/4/1

Binder: Lifts Cranes

General Distribution:

MARINE DEPARTMENT,
Head Office,
P.O. Box 10142,
WELLINGTON.

MEMORANDUM FOR ENGINEER SURVEYORS

4 March 1971

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R.N. KERR
Secretary for Marine

per

[Signature]
(J.D. McKenzie)