NZS 4334:2012

STANDARDS NEW ZEALAND
PAEREWA AOTEAROA

New Zealand Standard

Platform lifts and low-speed lifts

NZS 4334:2012

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COMMITTEE REPRESENTATION

This Standard was prepared under the supervision of the P 4334 Committee the Standards Council established under the Standards Act 1988.

The committee consisted of representatives of the following nominating organisations:

CCS Disability Action

Department of Building and Housing (became part of the Ministry of Business, Innovation and Employment on 1 July 2012)

Disabled Persons Assembly

Institution of Professional Engineers New Zealand

Low Rise Elevation Suppliers' Association

Ministry of Education

Ministry of Health

Royal New Zealand Foundation of the Blind

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REFERENCED DOCUMENTS

Reference is made in this document to the following:

New Zealand Standards

NZS 4121:2001	Design for access and mobility: Buildings and associated facilities
NZS 4223:----	Glazing in buildings
Part 3:1999	Human impact safety requirements
NZS 4332:1997	Non-domestic passenger and goods lifts

Joint Australian/New Zealand Standards

AS/NZS 1680:----	Interior and workplace lighting. Parts 0 – 5
AS/NZS 3000:2007	Electrical installations (known as the Australia/New Zealand Wiring Rules)

International Standards

ISO 8434:----	Metallic tube connections for fluid power and general use
Part 2:2007	37 degree flared connectors
IEC 60417:2002	Graphical symbols for use on equipment

Australian Standard

AS 1074-1989	Steel tubes and tubulars for ordinary service

British Standards

BS EN 81:----	Safety rules for the construction and installation of lifts
Part 1:1998	Electric lifts
Part 2:1998	Hydraulic lifts
Part 40:2008	Special lifts for the transport of persons and goods. Stairlifts and inclined lifting platforms intended for persons with impaired mobility
BS EN 10253:----	Butt-welding pipe fittings
Part 3:2008	Wrought austenitic and austenitic-ferritic (duplex) stainless steels without specific inspection requirements
Part 4:2008	Wrought austenitic and austenitic-ferritic (duplex) stainless steels with specific inspection requirements
BS EN 12385:----	Steel wire ropes. Safety
Part 5:2002	Stranded ropes for lifts
BS EN 50214:2006	Flat polyvinyl chloride sheathed flexible cables

Other publications

Department of Building and Housing. *Guidance on barrier design*. Department of Building and Housing: Wellington. (The latest version is available at www.dbh.govt.nz/guidance-information.)

NOTE – The department became part of the Ministry of Business, Innovation and Employment on 1 July 2012.

Royal New Zealand Foundation of the Blind. *Accessible signage guidelines*. Royal New Zealand Foundation of the Blind: Auckland, 2010.

New Zealand Legislation

Act

Building Act 2004

Regulations

New Zealand Building Code (NZBC) (1st Schedule to the Building Regulations 1992)

Clause B2 'Durability'

Clause F4 'Safety from falling'

Clause G8 'Artificial light'

Clause G9 'Electricity'

New Zealand Building Code (NZBC) supporting documents

Compliance Document for B1 'Structure'

Compliance Document for D2 'Mechanical installations for access'

Websites

www.dbh.govt.nz

www.legislation.govt.nz

LATEST REVISIONS

The users of this Standard should ensure that their copies of the above-mentioned New Zealand Standards are the latest revisions. Amendments to referenced New Zealand and Joint Australian/New Zealand Standards can be found on www.standards.co.nz.

REVIEW OF STANDARDS

Suggestions for improvement of this Standard will be welcomed. They should be sent to the Chief Executive, Standards New Zealand, Private Bag 2439, Wellington 6140.

FOREWORD

This Standard is intended to complement the existing Standards for mechanical installations for access, NZS 4332 and BS EN 81 Parts 1 and 2, which are referenced in the NZBC Compliance Document D2 'Mechanical installations for access'.

This Standard specifies requirements for mechanical means of access to and within buildings where, unlike NZS 4332 and BS EN 81 Parts 1 and 2, the distance to be travelled, the speed, and likely usage are low. It is expected that this Standard will replace the existing *Rules for power lifts not exceeding 750 watts (less than one horsepower)* as an up-to-date reference in the NZBC Compliance Document D2.

The Standard limits lift speed and travel, thereby reducing potential hazards and enabling safe and useable lifts to be built without all the features, and therefore cost, of lifts complying with NZS 4332 or BS EN 81 Parts 1 and 2. The consequence of the Standard's limitations means that the lifts described in this Standard will not be suitable in public buildings where there is likely to be anything more than light demand for their use. This Standard thus applies to domestic buildings in general and to public buildings up to a few storeys high only.

OUTCOME STATEMENT

The Standard provides the specifications to build and maintain NZBC-compliant platform and low-speed lifts for both domestic and some public settings that are safe and fit for purpose. NZS 4334 aims to assist New Zealanders by ensuring that the lifts are safe and useable by all.

New Zealand Standard

Platform lifts and low-speed lifts

1 GENERAL

1.1 Scope

This Standard specifies requirements for platform lifts (as defined in 2.2.2) and low-speed lifts (as defined in 2.2.1) that are installed as part of a building and that provide access to and within the building. Where the NZBC requires a lift be installed it shall be on an accessible route.

Platform lifts shall have a speed of 0.15 m/s or less and travel no more than 7.5 m. Low-speed lifts shall have a speed of 0.3 m/s or less and travel no more than 15 m. Platform lifts and low-speed lifts can be used in residential or public buildings provided the requirements of this Standard are met.

This Standard also specifies general requirements for stairlifts and inclined lifting platforms (as defined in 2.2.3). Stairlifts and inclined lifting platforms can be used in residential buildings and, in certain situations subject to specific consideration and approval outside of this Standard in public buildings. Stairlifts and inclined lifting platforms shall have a speed of 0.15 m/s or less in the direction of travel.

Lifts in buildings other than single household units need to be on a compliance schedule (see section 11 and Appendix A).

C1.1

The lifts covered by this Standard are low-rise, low speed, and low use. In public buildings it is expected that stairs will carry the majority of the traffic with the lift most frequently being used by those people with reduced mobility who have difficulty negotiating stairs. This includes use by wheelchair users, persons with pushchairs/prams, persons with walking difficulties, those with walking aids, carers for persons with impaired mobility, children with impaired mobility, elderly persons, and so on.

1.2 Application

Where this Standard, or a document that it references, does not nominate the specific details of what is required for a lift component but instead describes the component's required performance, the details of how that component is proposed to be built shall be included on plans and specifications submitted for building consent. Further information shall be provided demonstrating the adequacy of the component to perform as required when built to the proposed details. ➤

C1.2

Demonstration of this performance may be by evaluation, history of use, type testing, and so on.

In those situations where the Building Act does not require a building consent it is nevertheless recommended that the above required information be made available to the building owner.

1.3 Exclusions

This Standard does not apply to types of installation other than those set out in 1.1. Those installations excluded from the scope of this Standard include:

(a) Dumbwaiters/service lifts (that is, lifts for transporting goods only (not people) and that have no car controls);

(b) Goods lifts (that is, lifts primarily for the carriage of goods but which have car controls for service personnel travelling with the goods) that don't meet all the requirements of this Standard;

(c) Cable cars;

(d) Passenger ropeways;

(e) Construction hoists;

(f) Lifts in ships;

(g) Lifts in mines;

(h) Lifts in cranes; or

(i) Building maintenance units.

C1.3

Many of these installations could, to varying degrees, be based on the provisions of this Standard. The resultant design of the installations however would be outside of the scope of the Standard and, where necessary, compliance with the requirements of the NZBC, or other industry regulations would need to be demonstrated.

1.4 Interpretation

For the purposes of this Standard, the word 'shall' refers to requirements that are essential for compliance with the Standard, while the word 'should' refers to practices that are advised or recommended.

Clauses prefixed 'C' and printed in italic type are intended as comments on the corresponding clauses. They are not to be taken as the only or complete interpretation. The Standard can be complied with if the comment is ignored.

The term 'Normative' has been used in this Standard to define the application of the Appendix to which it applies. A 'Normative' Appendix is an integral part of a Standard and contains requirements.

2 DEFINITIONS

2.1 General definitions

For the purposes of this Standard, the following definitions shall apply:

25 cm^2 probe — A test probe that has a specified force applied via its tip, which has a square section of 50 mm sides or a round section of 56.4 mm diameter. The test probe shall be metal or other material that will not deform at the test pressures, but may be faced with a thin layer of soft material (such as leather or felt) to prevent scratching of the surfaces being tested

Angle of fleet — The angle between a rope and a perpendicular to the axis of a sheave or drum

Car controls — The controls mounted in or on the lift car for use by lift passengers

Domestic lift — A lift that serves a single household unit (as defined in the New Zealand Building Code (NZBC))

Extra low voltage — As defined in AS/NZS 3000

(Hydraulic) cylinder — The outer, usually fixed, cylindrical component of a hydraulic jack, into which hydraulic fluid is pumped to cause a ram within the cylinder to move

(Hydraulic) jack — The assembly consisting of hydraulic cylinder and hydraulic ram plus any associated seals, stops, restriction orifices, but not the pump or connecting hoses

(Hydraulic) ram — The inner component of a hydraulic jack that slides within the cylinder

Indirect hydraulic drive — A hydraulic lift where the ram or cylinder is connected to the lift car by suspension means (ropes, chains)

Landing door — A full-height door – that is, at least 1.98 m tall – giving access between the exterior and the interior of a lift shaft when the floor of the car platform is level with the landing

Landing gate — A part-height landing door

Lift car or car — The passenger-carrying part of a platform lift or low-speed lift and all parts, except those associated with the drive mechanism, that move with it. A lift car may consist of a car platform only, a car platform with one or more full or part height walls, or a car platform with walls and ceiling

(Lift car) ceiling — The upper inside surface of a lift car that extends over all the area of the car platform

(Lift car) roof — A lift car ceiling as viewed from above the lift car that can safely bear the weight of a person ➤

Lift shaft	The volume through which the lift car travels, its immediate vicinity and its projection below to solid floor and above to ceiling, or within reach (2.4 m above the floor of the car platform or 2.0 m above any car roof). It may be fully or partly defined by lift shaft walls or doors. Where it is not so defined, the lift shaft is deemed to extend sideways to a distance of 300 mm from the line of travel of the lift car
Lift shaft enclosure	Lift shaft walls and doors
Pit or lift pit	The portion of the lift shaft below the lowest landing
Public lift	A lift other than a domestic lift
Safety switch	A normally closed switch that opens when an unsafe or potentially unsafe situation is detected
Safety edge	Device attached to any edge to provide protection against a pinching, shearing, or crushing hazard
Sensitive surface	A safety device designed to protect against crushing anywhere under the lift car
Stop switch	Emergency device on the control panel which brings the lift to a complete stop
Support rail	A rail used to provide steadying or stabilising assistance
Toe guard	A downward extension of a car sill to prevent a shear hazard from the underside of a car platform passing a landing sill. See Figure 8
Unlocking zone	The part of a lift's travel during which a landing door or gate may be unlocked. See Figure 8
Under-car barrier	A blind, flap, shutter, screen, or other type of barrier that prevents inadvertent access to underneath a lift car where there is no lift shaft wall or landing door or landing gate. See Figure 10 and Figure 11

2.2 Types of lift

2.2.1 Low-speed lift

A low-speed lift travels in a vertical or approximately vertical direction and has:

(a) A lift car with at least two full-height walls and a ceiling;

(b) A lift shaft enclosed on all sides for its full height;

(c) A maximum speed of 0.3 m/s; and

(d) A maximum travel distance of 15 m.

2.2.2 Platform lift

A platform lift travels in a vertical or approximately vertical direction and has:

(a) A lift car consisting of a car platform only, or a car platform with one or more walls (lift car walls may be full or part height) but not a ceiling; and

(b) A maximum speed of 0.15 m/s.

2.2.2.1 Enclosed platform lift

An enclosed platform lift has a maximum travel distance of 7.5 m with a lift shaft enclosed on all sides at least up to a height above the top landing of 1000 mm for a domestic lift and 1100 mm for a public lift. Examples of enclosed platform lifts are shown in Figure 9.

2.2.2.2 Open platform lift

An open platform lift is a platform lift that is not fully enclosed by lift shaft walls on all four sides and has:

(a) A maximum of three stops;

(b) A maximum travel distance of 3.6 m.

Examples of open platform lifts are shown in Figure 10 and Figure 11.

2.2.2.3 Stage lift

A stage lift is an open or enclosed platform lift that has no or minimal projection above the level of the top landing.

2.2.3 Stairlifts and inclined lifting platforms.

An inclined lift travels in an inclined plane over a stair or inclined surface and has:

(a) A maximum speed of 0.15 m/s in the direction of travel; and

(b) A chair with a footrest or a platform, or both.

2.3 Hazards

There are six types of hazards for passengers and other building users associated with lifts.

2.3.1 Crush

A crush hazard exists when two surfaces in approximate alignment approach each other in the direction of travel to within:

(a) 600 mm;

(b) 350 mm if both crushing surfaces are more than 1 m above a stand-on surface such as a floor, car platform, or car roof.

Examples of crush hazards are shown in Figure 1.

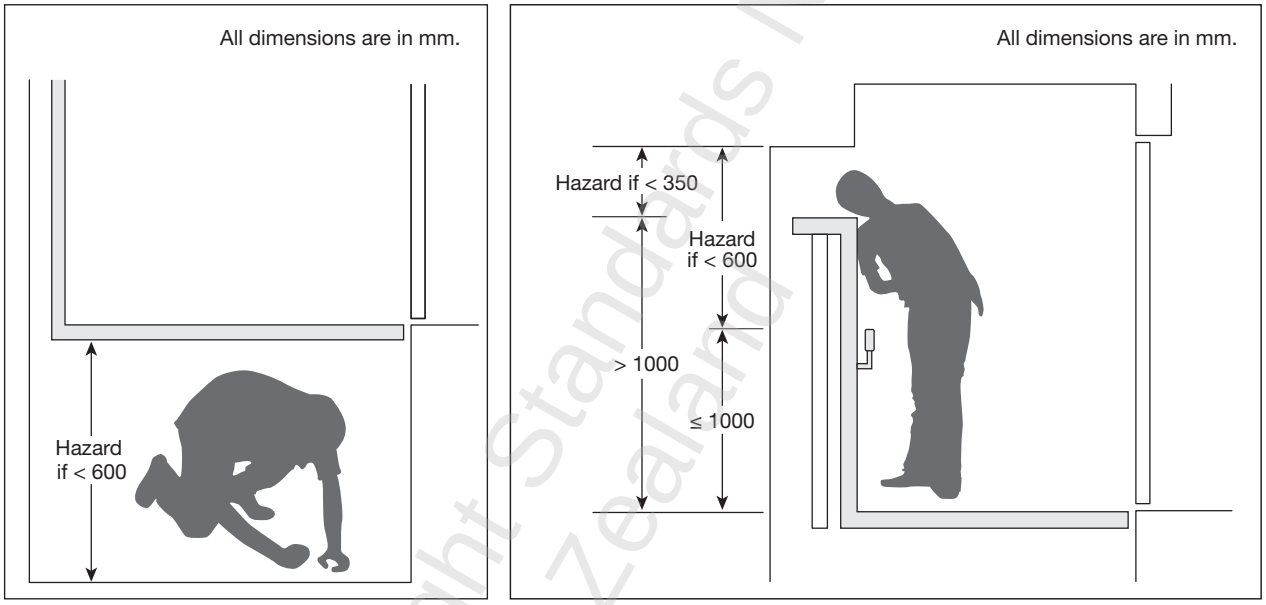


Figure 1 – Examples of crush hazards

2.3.2 Shear

A shear hazard exists if two opposing surfaces pass by within 20 mm of each other. Figure 2 shows an example of a shear hazard.

2.3.3 Striking

A striking hazard exists if two opposing surfaces pass by each other within 300 mm. Figure 3 shows an example of a striking hazard.

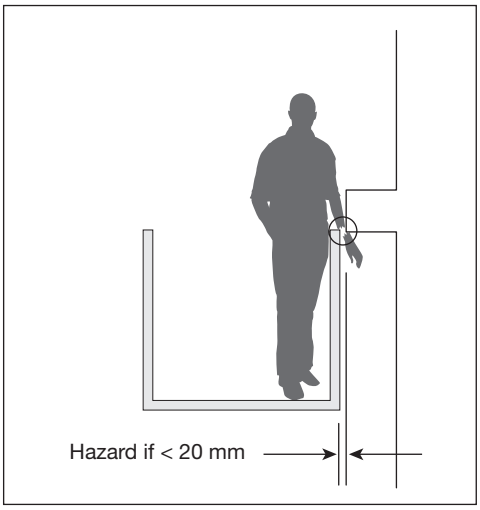


Figure 2 – Example of a shear hazard

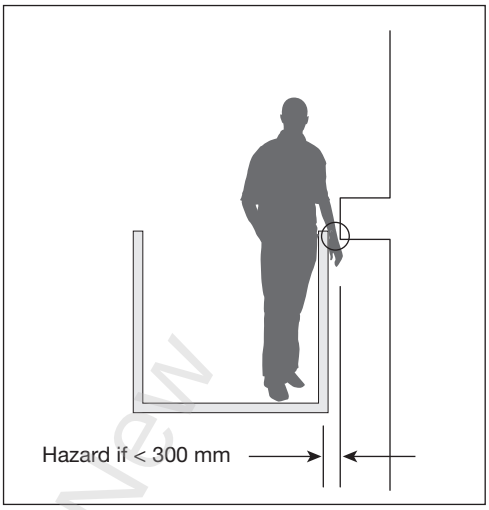


Figure 3 – Example of a striking hazard

2.3.4 Pinch

A pinch hazard exists if two (approximately) parallel surfaces pass by within 20 mm to 75 mm of each other. Figure 4 shows an example of a pinch hazard.

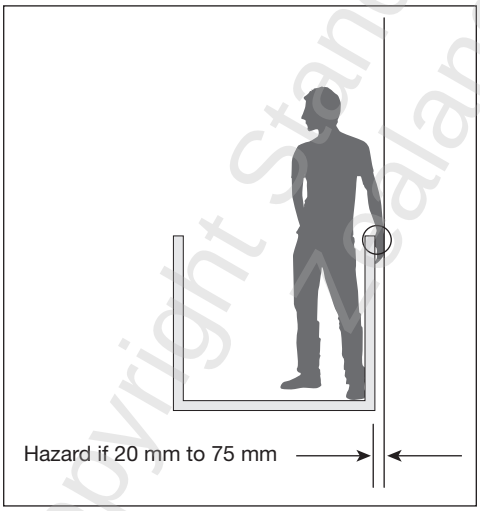


Figure 4 – Example of a pinch hazard

2.3.5 Falling

A falling hazard exists if it is possible to fall 1 m or more.

2.3.6 Entanglement

An entanglement hazard exists if moving machinery parts such as wheels (toothed or otherwise), rollers, sliding parts, chains, belts, or ropes are within 45 mm of a gap up to 10 mm wide or 90 mm of a gap between 10 mm and 50 mm wide. Gaps wider than 50 mm shall not be permitted if an entanglement hazard is to be avoided.

2.4 Abbreviations

The following abbreviations are used in this Standard:

BCA	Building consent authority
CFLi	Self-ballasted compact fluorescent lamp
CPEng	Chartered professional engineer
dB	Decibels
DBH	Department of Building and Housing (to be read as the Ministry of Business, Innovation and Employment (MBIE) from July 2012)
J	Joule
lx	Lux
N	Newton
N-m	Newton-metre
NZBC	New Zealand Building Code
VM	Verification method
W	Watt

3 GENERAL REQUIREMENTS

3.1 Durability and maintenance

The requirements for maintenance and inspection of the lift, which may include replacement of some components, shall be provided by the person proposing to install the lift. The requirements shall account for the expected frequency and conditions of use and for any special requirements that may exist due to the lift's environment (for example, exposure to weather).

The requirements shall list all necessary servicing (including adjustments, lubrication, checks) and inspections of safety, operating, and communication devices including nominating the frequency of the required maintenance and inspections and the qualifications of the person who shall perform the work.

Information shall be furnished demonstrating that the lift, when maintained as described will meet the durability requirements of the NZBC.

C3.1

The NZBC requires the lift to be durable with normal maintenance. The NZBC's requirements, given in Clause B2 'Durability', depend on ease of access and replacement and whether, and in what situations, failure can be detected. Things that are difficult to replace or where failure would go undetected during both normal use and maintenance are required to last for the life of the building. Other components will be required to last for either 15 years or 5 years depending on these circumstances. This clause in the Standard requires evidence of the lift's required durability along with the nomination of maintenance and inspection requirements to ensure ongoing performance. The information required by this clause forms the basis for the compliance schedule for non-domestic lifts and provides a maintenance schedule for owners of domestic lifts (where compliance schedules are not required).

This Standard provides for many different types of lift and driving mechanisms and accordingly it is not possible to itemise common maintenance and inspection requirements that apply to all. It is therefore essential that plans and specifications submitted for building consent not only detail and justify the design of the proposed lift but also identify the particular lift's specific maintenance and inspection requirements.

3.2 Structural requirements

The structural adequacy of the lift, including machinery supports, lift shaft enclosures, and lift cars, and of the building supporting the lift, shall be demonstrated by a suitably qualified structural designer.

Lift shaft enclosures, lift cars, doors and gates shall withstand point loadings described in this Standard. Where they protect a fall of 1 metre or more they shall be designed for barrier loadings as described in Verification Method B1/VM1 in NZBC Compliance Document B1 'Structure'.

The Standard contains some information about the levels of safety that shall be achieved by the lift. The demonstration of structural adequacy shall ensure these requirements and all others necessary to show NZBC compliance is met.

The person proposing to install the lift shall supply to the structural designer all necessary information to enable the design to be carried out, including weights of lift components and all working tolerances necessary to ensure proper operation of the lift.

C3.2

It is expected that evidence would be furnished to the Building Consent Authority (BCA) with the building consent application showing that a competent structural designer, CPEng or other, has designed or otherwise checked the proposed lift, and the building supporting it, and considers the proposals to be adequate. The evidence about the lift itself could, depending on circumstances, be either specific engineering calculation or it could be a consideration of a design carried out overseas by others. It is envisaged that most BCAs would accept the advice of a CPEng working within a known area of expertise.

Although the Standard expresses levels of safety in the elastic design terminology of 'factors of safety' it is appreciated that structural designers may use different design approaches to demonstrate structural adequacy.

Discussion and further information on Verification Method B1/VM1's barrier loadings can be found in the DBH guidance document Guidance on barrier design.

3.2.1 Load bearing capacity

The structural components of the lift installation shall be able to bear the load of the lift carrying 125% rated load with a safety factor of at least 4.0, without permanent deformation or deflections that change clearances to beyond allowed limits. See 4.1.1 for rated loads.

3.2.2 Resistance to earthquakes

Earthquake resistance of the lift, and the building supporting it, shall meet the requirements of Verification Method B1/VM1 in NZBC Compliance Document B1 'Structure'.

3.2.3 Glazing

All glazing associated with the lift installation shall be Grade A safety glass complying with NZS 4223.3.

3.3 Electrical installation

The requirements of this clause are additional to the normal requirements for an electrical installation. All wiring shall comply with NZBC Clause G9 'Electricity'.

All electrical components that are installed outdoors or otherwise exposed to the weather shall be of a type suitable for the conditions and purpose.

3.3.1 Electrical supply

3.3.1.1 Electrical supply for domestic lifts

If the current drawn by the lift exceeds 10 A, the electrical supply shall be from a dedicated subcircuit. The circuit breaker and the outlet of a dedicated circuit feeding the lift machinery and controller shall be clearly and indelibly marked 'LIFT SUPPLY'.

The addition of a lift to an existing subcircuit shall not result in the subcircuit being overloaded.

If the lift is powered by a battery, the lift shall be supplied from a dedicated outlet that shall include a means of isolation and either a means of locking the means of isolation in the OFF position or have a plug-socket connection. The lift shall also include a means of isolating the load from the battery.

C3.3.1.1

The requirements for electrical supply to public lifts are recommended for domestic lifts.

3.3.1.2 Electrical supply for public lifts

The supply of electricity to the lift machinery and controller of a public lift operating on mains voltage shall be by a dedicated circuit, or the lift shall have battery back-up.

The circuit breaker and the outlet of a dedicated circuit feeding the lift machinery and controller shall be clearly and indelibly marked 'LIFT SUPPLY'.

If the lift is powered by a battery, the lift shall be supplied from a dedicated outlet that shall include a means of isolation and either a means of locking the means of isolation in the OFF position or have a plug-socket connection. The lift shall also include a means of isolating the battery power.

3.3.2 Equipment cabinets

Electrical supply and control equipment shall be enclosed in a cabinet or similar enclosure. The clearance between the front (access side) of the enclosure and the nearest immovable object shall be not less than 600 mm. Sufficient clearance shall be provided for hinged doors and panels to permit them to open freely through an arc of at least 90°.

The enclosure shall be secured from unauthorised use and shall require the use of a tool or key to open.

3.3.3 Lift operation

The lift shall start only in response to a car or landing call made when all gates and doors are closed, any barrier arms – apart from those operated by movement of the lift – are down and all safety switches are closed, or in response to the re-levelling function being activated.

Any brake shall not be released until the lift starts.

The lift shall stop at its destination automatically.

3.3.4 Control system

The control system shall be extra low voltage, as defined in AS/NZS 3000.

3.3.5 Safety circuit

3.3.5.1 Provision of a safety circuit

All drives shall include a safety circuit that consists of a number of safety switches connected in series and that provides the following features:

(a) All of the safety switches shall be closed before any brake is released and before the lift can start, other than for re levelling within a door unlocking zone;

(b) Operation of a safety switch shall break the safety circuit and cause the immediate removal of power to the drive and to any brake, thereby stopping the lift and engaging the brake;

(c) Removal of the hazard detected and the restoration of the safety switch shall not in itself cause the lift to start again; the lift shall be started only by operation of a car or landing button or a maintenance control;

(d) No single control component failure shall result in the start or continued movement of the drive.

A safety switch shall not be used to bring the lift to a halt at a landing in normal circumstances.

3.3.5.2 Safety switches

All safety switches shall be normally closed with enclosed contacts that open when an unsafe situation is detected.

A safety switch shall be of a fail-safe design whereby any sub-component failure results in an open circuit.

3.3.5.3 Unsafe conditions to be detected

Depending on the type of lift and drive and position of buffers that preset the lowest possible lift level, the safety circuit shall incorporate the applicable safety switches that detect and open on the following conditions:

(a) A slack suspension rope or chain;

(b) A landing door or landing gate, or car door or car gate, open when the lift is outside the unlocking zone;

(c) An obstruction encountered by a sensitive surface;

(d) Operation of a safety edge;

(e) Travel to higher than the top landing;

(f) Travel below the bottom landing: this may be detected by a dedicated safety switch or by a stop that operates a sensitive surface, but this function is not required if travel is prevented by a stop;

(g) Loading of the safety nut of a screw drive;

(h) Operation of safety gear;

(i) Removal of a guard (see 9.1.1);

(j) Loading of a safety rope or chain;

(k) A slack governor rope.

3.3.5.4 Safety switches requiring manual resetting

Once operated, safety switches that detect broken or slack ropes or chains shall require manual resetting.

3.3.5.5 Stop switch

Any manually operated stop switches shall be included in the safety circuit and shall comply with the following requirements:

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

(b) Capable of being positively opened mechanically and not solely dependent on springs;

(c) Conspicuously and permanently marked ‘STOP’ with both the stop position and the run position identified (often by markings); and

(d) When opened, the switch shall open the control circuit so as to stop the lift and prevent any power doors from operating.

3.3.6 Operation under overload conditions

The lift system shall include means to detect a lift overload or shall react safely in the event of an overload. Upon detection of an overload, where stationary, the lift system shall prevent the lift from starting. The lift shall operate safely beyond the point that the overload is detected or with the lift carrying 125% rated load, whichever is greater.

3.3.6.1 Detection of overload – Hydraulic lifts

In the case of a hydraulically operated lift, an overloaded lift shall be detected and travel prevented by at least one of the following means:

(a) Operation of the pump motor overload;

(b) Operation of the pump motor thermal cut-out;

(c) Operation of the pump motor timeout;

(d) Detection of excessive rope tension;

(e) Detection of excessive hydraulic fluid pressure;

(f) Operation of a pressure relief valve;

(g) By the pressure produced by the pump being limited to a safe value; or

(h) By direct measurement of the load.

Detection of overload when travelling in a downward direction is not required providing the downward speed when carrying twice rated load does not exceed 0.3 m/s and the lift is physically prevented from travelling past the unlocking zone at the lowest landing.

3.3.6.2 Detection of overload – Electric lifts and roped hydraulic lifts

In the case of an electrically driven lift or a roped hydraulic lift, detection of overload shall be by direct measurement of the load on the floor of the car platform, or by detection of rope tension, or by detection of hydraulic fluid pressure. Detection using motor current measurement may be used as an additional measure.

3.3.7 Circuit diagram

A circuit diagram for the lift control circuit shall be provided that includes full schematic diagrams, logic ladder diagrams, and a designation list. In the case of public lifts provision shall be made to keep a copy of the diagram in or near the equipment enclosure. The diagram shall be suitably finished, protected, and stored to provide durability and permanent legibility.

3.3.8 Socket outlet for maintenance

A general purpose socket outlet shall be provided within 10 m of the lift. In the case of a public lift, the socket outlet shall be located so that an electric lead running between the socket outlet and the lift car does not need to be run across any passageway.

3.3.9 Lighting

Lighting shall provide a maintained illuminance throughout the lift travel of at least 40 lux (lx) measured:

(a) Horizontally on the floor of the car platform, at the centre of entry and exit points; and

(b) At lift car controls in the plane of the control panel face.

Lighting at landings shall provide a minimum of 40 lx measured at the centre of the sill in the case of domestic lifts and in accordance with the appropriate part of AS/NZS 1680 in the case of public lifts.

C3.3.9

In the case of a platform lift serving two storeys and with light-coloured inside-lift shaft walls, a luminaire with a lamp that has an output of around 1200 lumens, such as a 100 W incandescent lamp or a 23 W CFLi lamp, mounted at the top of the lift shaft will generally provide sufficient illumination. If measuring using a light meter, care shall be taken not to cast shadows on the measurement point; however, assessment of lighting adequacy can usually be assessed by eye.

3.3.9.1 Lighting in lifts with a fully enclosed lift shaft

Lighting within a low-speed lift, and for a platform lift that has a shaft enclosed on all sides for its full height and without glazing, shall be provided by at least two lights. Either the lighting shall be supplied by two separate circuits, one of which may be the lift supply, or one of the lights shall be an emergency lighting luminaire that in the event of a power failure provides illumination for at least 2 hours.

3.3.9.2 Lighting for public open platform lifts

Lighting in the vicinity of a public open platform lift shall be supplied from a circuit other than that supplying the lift.

3.3.9.3 Lighting for domestic open platform lifts

Lighting in the vicinity of a domestic open platform lift or a domestic enclosed platform lift with a lift shaft enclosure that terminates below the top of the lift shaft shall either be provided by household lighting or by lighting incorporated into the lift system. Neither option shall be required to be on a dedicated circuit.

C3.3.9.3

In a domestic environment the lift is installed to meet the needs of an individual. Existing household lighting may provide adequate light that complies with NZBC Clause G8 'Artificial light'.

3.3.9.4 Emergency lighting

Where emergency lighting is supplied, it shall provide a minimum vertical illuminance of 2 lx measured at the alarm/phone button.

3.4 Lift car controls

3.4.1 Controls to be provided in the car of a public lift

Car controls to be provided for public lifts shall comprise:

(a) Destination buttons, one for each floor;

(b) OPEN and CLOSE (or RAISE and LOWER) controls for any powered gate, door or barrier arm, unless these functions are initiated by operation of the appropriate destination button;

(c) Platform lifts shall have a STOP button;

(d) Alarm button (but see also 4.1.10.1); this function may be integrated with the STOP button.

3.4.2 Controls to be provided in the car of a domestic lift

Car controls of a domestic lift shall perform the same functions as in 3.4.1 but the controls may be in a form to suit the individual user.

C3.4.2

For example, a long-handled toggle switch may be used instead of up and down buttons.

3.4.3 Car controls in public lifts – Markings

Car controls in public lifts shall have raised tactile designations of a minimum height of 15 mm that are in a contrasting colour to its background and that are positioned on or to the left of the call button.

Where the lift serves only two levels, floor designations may be replaced with up and down arrows.

For lifts serving more than two levels, the floor designations shall in addition be given in Braille which is placed immediately to the left of the floor designation. However, where the floor designation is not on the call button it is permissible to place the Braille underneath the designation. The Braille shall comply with 10.6.

The designation for the stop button shall be an octagon with a cross; the background shall be raised tactile but not the cross. The colour red shall be reserved for the stop function.

See Figure 19 for allowed options for car control markings.

For requirements on landing controls see 5.2.

3.4.4 Position of controls in public lifts

Controls in public lifts shall be positioned near the centre of the longest side (see Figure 5, Figure 6, and Figure 7) and within a height of 900 mm to 1200 mm (optimum 1000 mm to centres of controls) from the floor of the car platform. Additional sets of controls may be placed elsewhere for users' convenience.

C3.4.4

It is recommended that the height of controls be within the range 900 mm to 1100 mm.

3.4.5 Size and operation of control buttons in public lifts

Control buttons shall have a minimum diameter or width of 20 mm and have a movement of not less than 0.5 mm and not more than 3 mm, to cause operation of the contact.

The force normal to the centre of the button required to operate each control button shall be not less than 2 N and not more than 5 N. Where raised tactile symbols are provided on the face of the button, the force required to operate the button shall be not less than 3.5 N and not more than 5 N.

3.5 Physical hazards

The lift and its installation environment shall be designed so that the shear, crush, pinch, falling, entanglement, and striking hazards described in 2.3 do not occur.

4 SYSTEM REQUIREMENTS

4.1 Requirements for platform lifts and low-speed lifts

Requirements that apply to both platform lifts and low-speed lifts shall be as given in 4.1. Specific requirements for the various type of lift, additional to those of 4.1, shall be as given in the following:

Unless noted as applying specifically to domestic or public lifts, the requirements of the clauses relate to both.

4.1.1 Rated load

A domestic lift shall be designed to suit the requirements of the owner and shall have a minimum rated load of 250 kg. In addition, if the lift is for a wheelchair user, the car platform shall be able to withstand a point load of 125 kg applied over an area of 25 cm^2 at any point along the lift car platform sill without causing any permanent deformation.

A public lift shall be designed to carry the expected load and shall have a minimum rated load of 340 kg. In addition, the car platform shall be able to withstand a point load of 150 kg applied over an area of 25 cm^2 at any point along the car platform sill without causing any permanent deformation.

4.1.2 Car platform size – Public lifts

For public lifts, unless 4.1.3 applies, the minimum size of the car platform shall be 1.4 m x 1.4 m as shown in Figure 5.

The control panel shall be placed in the centre of a side wall as shown in Figure 5.

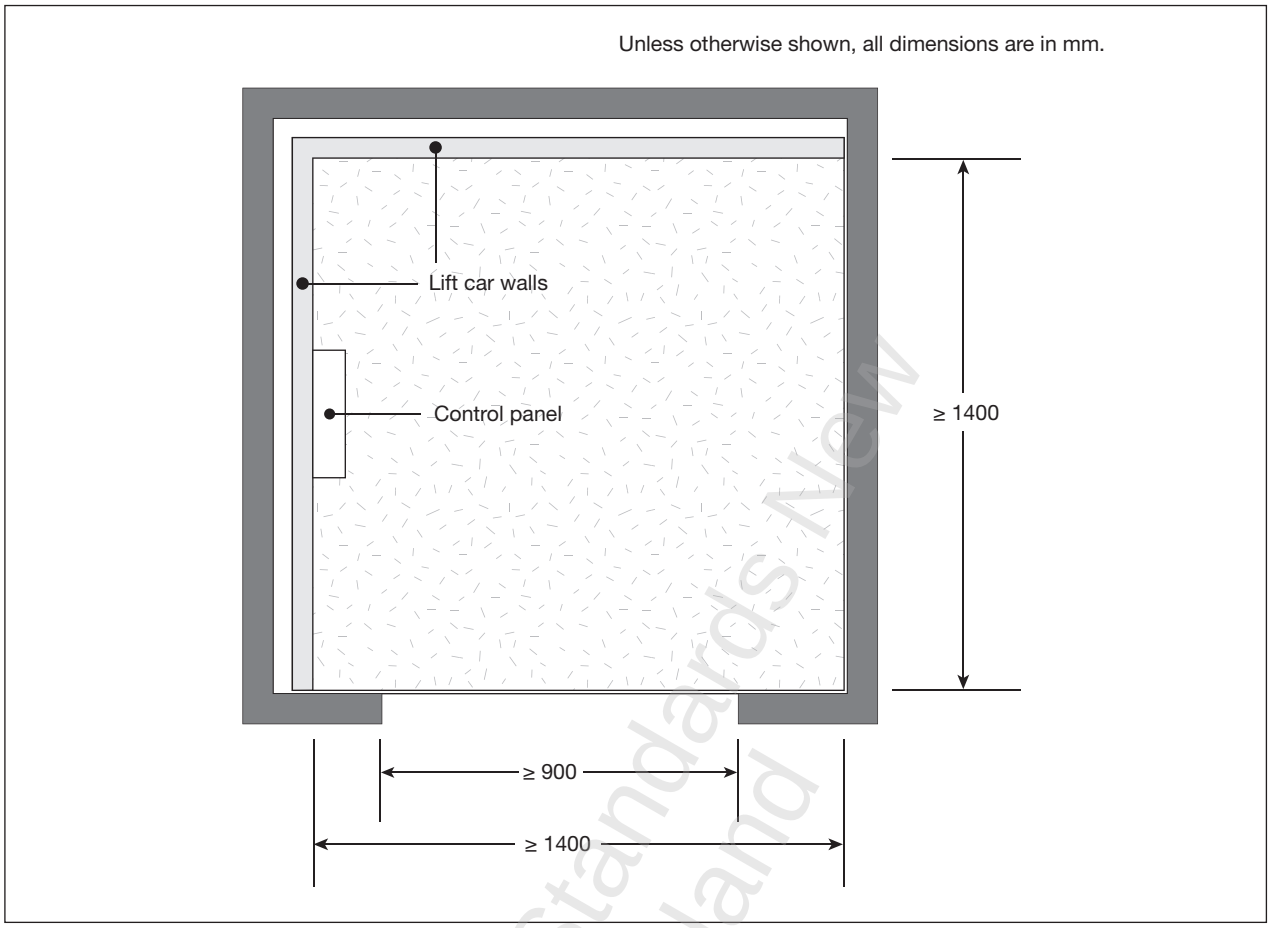


Figure 5 – Layout for minimum size of public lift with entrances on same side

4.1.3 Car platform size – Public lifts with two entrances serving two levels

Public lifts that have entrances on different sides as shown in Figures 6 or 7 and that serve only two levels shall have a minimum car platform size of 1.1 m x 1.4 m. For a lift with entrances opposite each other, on the shorter wall the layout shall be as in Figure 6 and for a lift with entrances on adjacent walls the layout shall be as in Figure 7.

The control panel shall be placed in the centre of a side (longer) wall as shown in Figures 6 and 7. ➤

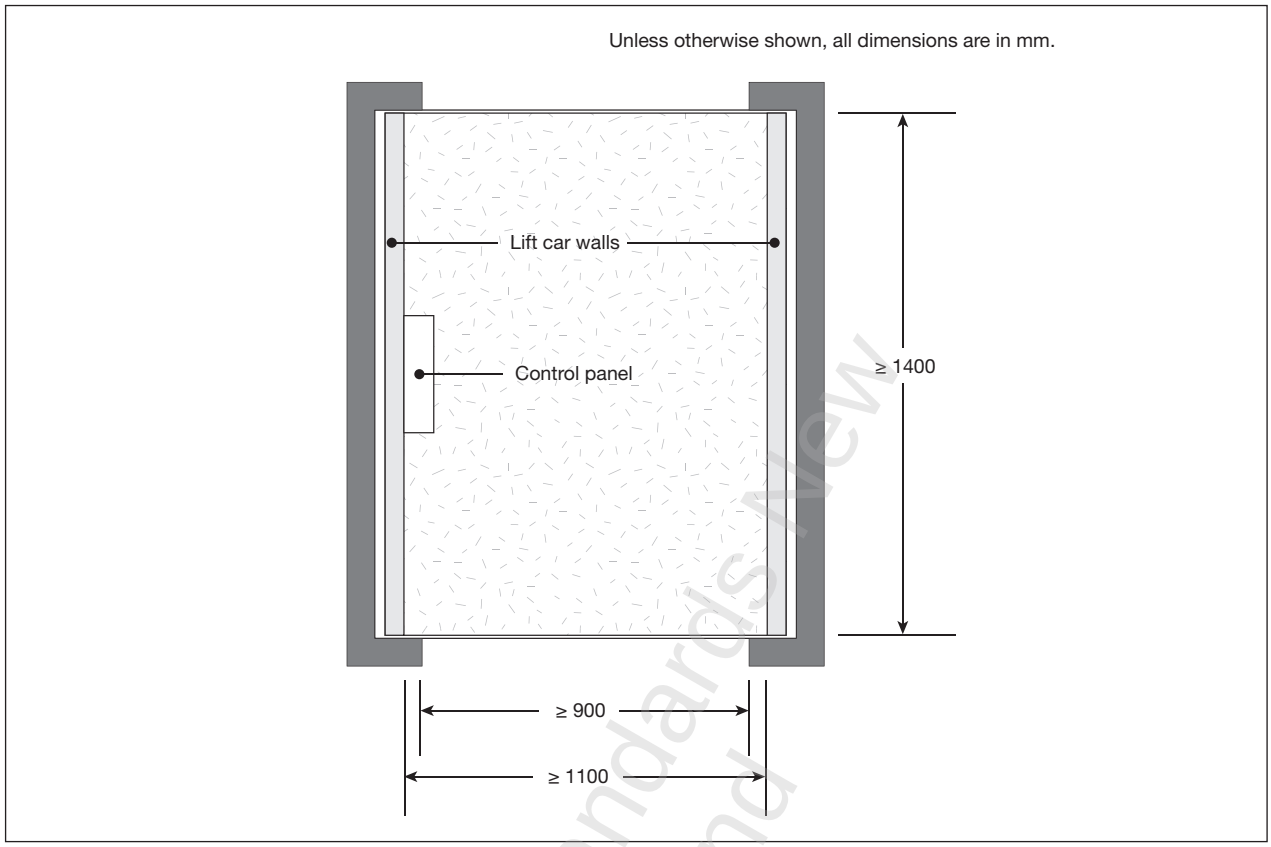


Figure 6 – Layout for minimum size of two-level public lift with entrances on opposite sides

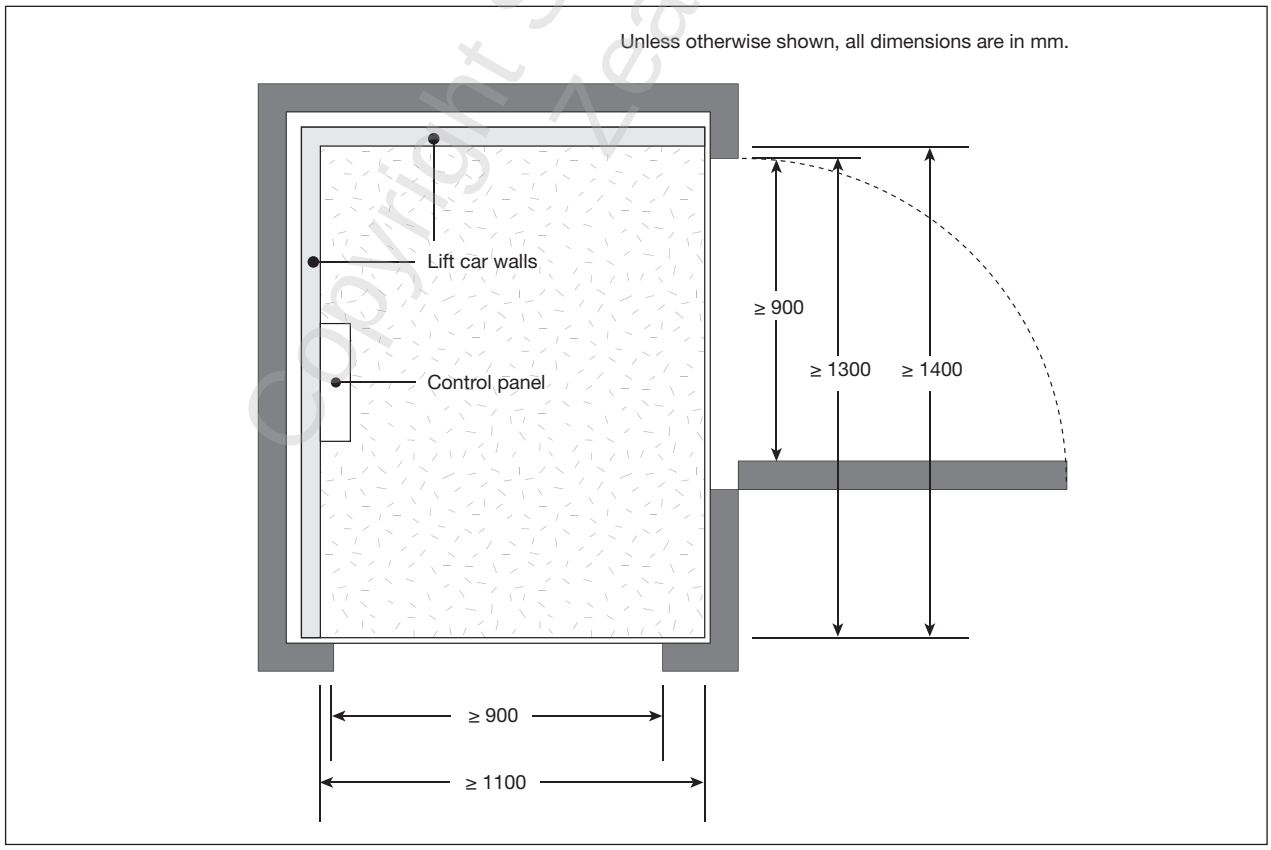


Figure 7 – Layout for minimum size of two-level public lift with entrances on adjacent sides

4.1.4 Car platform size – Domestic lifts

In the case of domestic lifts, the car platform size shall be sized to meet the needs of the user.

C4.1.4

A car platform size of at least 1200 mm x 900 mm is recommended for wheelchair users, and at least 900 mm x 900 mm for other users.

4.1.5 Operation near a landing

4.1.5.1 Unlocking zone

When approaching a landing with a landing door or landing gate, the door or gate shall not be unlocked unless the sill of the car platform overlaps the landing sill by at least 20 mm. The overlap may be achieved by means of a toe guard.

The landing door or landing gate shall not be unlocked unless the floor of the car platform is within 50 mm of the landing; see Figure 8.

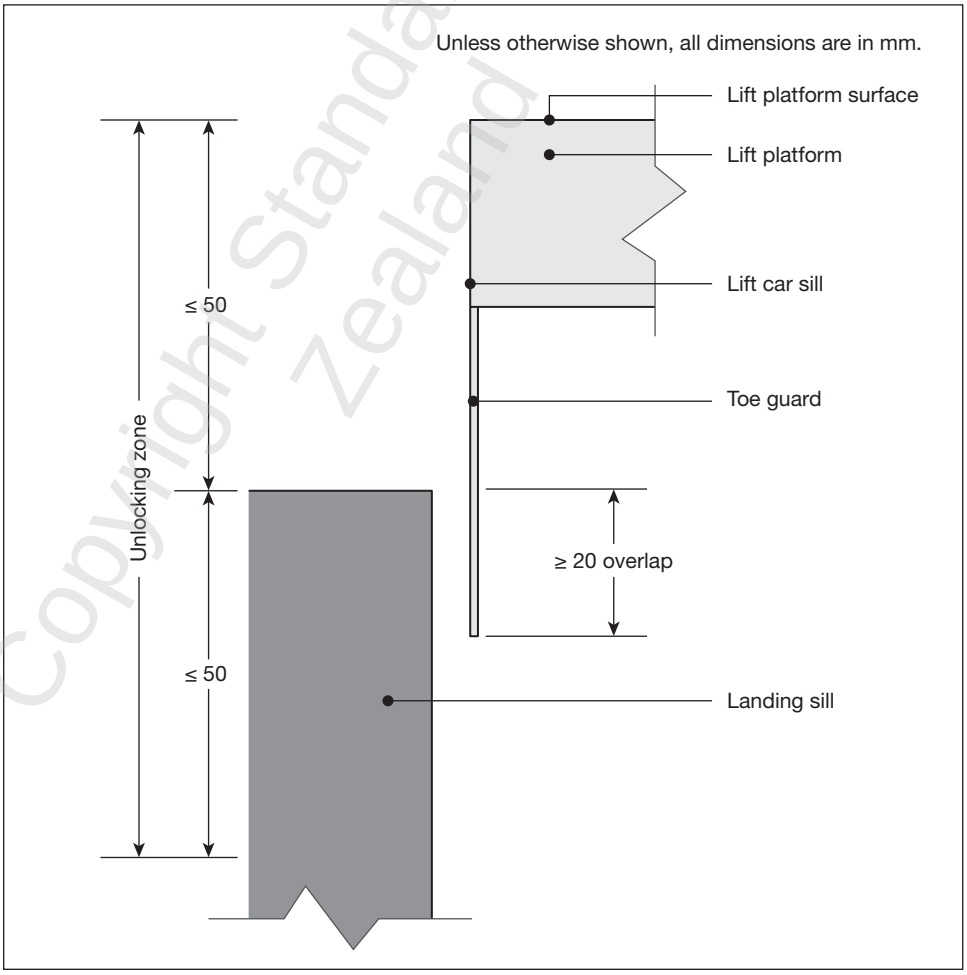


Figure 8 – Unlocking zone

4.1.5.2 Levelling

Lifts shall stop level with the landing to within ±10 mm under all conditions from unloaded to carrying 125% rated load.

4.1.5.3 Re-levelling

Hydraulic lifts other than platform lifts with a travel distance of less than 1 m shall re-level before the lift has sunk to 50 mm below the landing.

4.1.6 Support rail

4.1.6.1 Support rail to be provided

A passenger support rail shall be provided on at least one side of a public platform lift and two sides on a public low-speed lift greater than 1.1 m wide.

C4.1.6.1

A passenger support rail or support post is recommended for domestic lifts, but its provision is according to the user's preference.

4.1.6.2 Height

The top of a support rail shall be between 950 mm and 1050 mm above the floor of the car platform. A support rail shall be smooth, graspable, provide support, and be of adequate strength and rigidity.

C4.1.6.2

Additional passenger support rails at different heights may be provided.

4.1.6.3 Clearance

The clearance between a support rail and a car wall shall be a minimum of 30 mm. The clearance between a support rail and a lift shaft wall shall be a minimum of 75 mm.

4.1.6.4 Dimensions

The minimum length of uninterrupted support rail shall be one third of the car length. The diameter of the support rail shall be a minimum of 30 mm and a maximum of 40 mm. Over the length of the uninterrupted support rail there shall be a minimum vertical separation of 90 mm between the top of the rail and any bracket securing it in position.

4.1.6.5 Use of part-height car wall in place of a support rail

In the case of a platform lift, in a domestic environment only, a lift car side wall that meets the clearance, and length requirements given above, may be considered as a support rail. In such a case, the top surface of the wall shall be between 30 mm and 40 mm thick and have rounded top edges with a height above platform floor level between 950 mm and 1050 mm. Where the drop from a car platform is 1000 mm or more, the top of the car side wall shall be at least 1000 mm above the floor of the car platform.

4.1.7 Lift shaft enclosures

Lift shaft enclosures shall meet the requirements of 6.1 and 6.2. Lift pits shall meet the requirements of 6.3. In addition, lift shaft enclosures protecting a fall of 1 m or more shall be able to withstand barrier loadings. The structural adequacy of the lift shaft enclosure shall be demonstrated (see 3.2).

4.1.8 Lift car walls

Lift car walls shall withstand a force of 700 N applied by a 25 cm^2 probe without permanent deformation or damage (including without a permanent indentation of the surface) and without causing clearances to go outside their allowable range.

Car walls protecting a fall of 1 m or more shall be able to withstand barrier loadings. The structural adequacy of the car walls shall be demonstrated (see 3.2).

4.1.9 Car doors and car gates

Car doors and gates shall comply with 5.4.

4.1.10 Means of calling help

The means of calling for help set out in 4.1.10.1 and 4.1.10.2 shall be available.

4.1.10.1 Alarm

Lifts shall have an alarm button that, when pressed, sounds an audible alarm.

Alarms shall produce a sound of at least 110 decibels (dB) and shall be placed where they are most likely to attract attention and reaction. Where the sounder is not on or adjacent to the lift, a sign shall be fixed near the sounder stating 'LIFT ALARM' and, in the case of an alarm fitted outside the building that relates to a lift inside the building, the sign shall state whom to contact for assistance; see 10.8.

Enclosed platform lifts in public buildings in addition shall have as a minimum a 24-hour monitored alarm.

4.1.10.2 Telephones

Low-speed lifts in public buildings shall have a telephone.

The telephone shall not be a cordless phone and shall either:

(a) Connect automatically to a permanently staffed answering service; or

(b) Be a user-dial type and have an adjacent sign that gives the appropriate telephone number or numbers to call.

C4.1.10.2

Cordless telephones are not acceptable as they rely on continuity of electric power to operate.

In addition, it is recommended that a lift with a lift shaft enclosed on all sides for its full height is fitted with a telephone.

4.1.11 Trailing cable

Electrical connections to the lift car shall use a flexible cable.

Trailing cables for low-speed lifts with a travel distance of over 7.5 m shall be flat trailing cables complying with EN 50214.

Trailing cables shall be installed so as not to chafe against the ground or any part of the lift installation, and so as not to put any strain on the conductors.

C4.1.11

Coiling on the floor does not count as chafing.

4.1.12 Lifts to be guided

The lateral movement of the lift car shall be restrained so that there is no stress on the drive.

Lift cars shall be guided so that they do not deflect more than 10 mm under any conditions of unbalanced load, starting, stopping, or wear.

An unbalanced load is when 50% of the rated load is distributed over any 50% of the floor area of the car platform.

C4.1.12

Deflection may be considered as relative movement of the floor of the car platform and the lift shaft enclosure after making due allowance for overall downward movement due to the application of the load.

4.1.12.1 Guide shoes

Sliding shoes or roller guides shall be spring-loaded or have other means of ensuring continuous contact with the running surface.

Guide shoe liners and other parts subject to wear shall be readily replaceable.

C4.1.12.1

Lifts with very slow speeds may have low rates of wear and therefore may need minimal adjustment.

4.1.13 Uncontrolled drop

As a precaution against an uncontrolled drop, a lift shall feature one or more of the following:

(a) A direct-acting hydraulic system with a flow restriction orifice or flow restriction valve that limits the speed of descent to no more than 0.3 m/s in the event of rupture of any hydraulic hose or pipe;

(b) An indirect hydraulic lift fitted with safety gear, (not reliant on safety support from chains or ropes);

(c) A nut-and-screw drive that has a safety nut and that is incapable of downward over speed in the event of drive disconnection;

(d) Safety gear fitted to the underside of the lift car. The safety gear for lifts with up to 5.5 m of travel distance shall be the instantaneous type; safety gear for lifts with travel distance over 5.5 m shall be instantaneous or governor-operated.

4.1.14 Safety gear

Where a lift is fitted with safety gear, it shall operate automatically and shall bring a car carrying 125% rated load to rest and hold it in position.

Safety gear shall grip the guide rails when tripped and shall operate on both guide rails simultaneously.

The lift shall not restart until a lift service person has inspected the lift, released the safety gear, and reset the control system.

C4.1.14

Safety gear operating other than as described in 4.1.14 may be available; however, as these have not been considered by this Standard they are outside of its scope. Proposals to use such safety gear need to demonstrate their adequacy, possibly by comparison to the measures in this Standard.

4.1.14.1 Instantaneous safety gear

Instantaneous safety gear shall operate in the event of a suspension rope or chain breaking or becoming detached. The lift shall stop within 20 mm.

4.1.14.2 Governor-operated safety gear

Governor-operated safety gear shall operate in the event of the lift over speeding. Speed governors shall conform to NZS 4332 except that either:

(a) The maximum tripping speed shall be 0.3 m/s; or

(b) The lift is fitted with resilient buffers that limit the deceleration of the car with a 75 kg load to 2 m/s^2 at the tripping speed of the governor and that do not fully compress when bringing to rest a car carrying 125% rated load travelling at the tripping speed.

For buffers with a classic spring characteristic the buffer stroke requirements shall be determined from Appendix B. In all other cases, the adequacy of the buffer to perform as required shall be demonstrated.

4.2 Specific requirements for low-speed lifts

4.2.1 Speed

Low-speed lifts shall have a rated speed of no greater the 0.3 m/s. The lift shall not exceed a speed of 0.3 m/s even under abnormal conditions unless the lift has governor-operated safety gear and resilient buffers so that the requirements of 4.1.14.2 are met.

4.2.2 Travel

Low-speed lifts shall have a maximum travel distance of 15 m which shall be in a vertical or approximately vertical direction.

4.2.3 Lift car

The lift car of a low-speed lift shall have at least two full height walls and a ceiling.

4.2.4 Lift shaft enclosure

The lift shaft of a low-speed lift shall be fully enclosed for its entire height.

4.2.5 Landing controls

Landing controls shall meet the requirements of 5.2.

4.2.6 Landing doors and gates

Landing doors and gates shall meet the requirements of 5.3. Where a lift car travels past a landing, landing gates shall be permitted only where passengers are suitably protected from any hazards as detailed in 2.3.

4.2.7 Indication of position

In public buildings low-speed lifts shall provide passengers with an indication of position when at or near a landing. In addition, the landings served by these lifts shall have markings complying with 10.3.

4.2.8 Drives

Low-speed lift drives shall be one of the following:

(a) A direct hydraulic drive meeting the requirements of 9.2;

(b) An indirect hydraulic drive (rope or chain suspension) meeting the requirements of 9.3;

(c) A screw drive meeting the requirements of 9.4;

(d) A drum drive meeting the requirements of 9.5;

(e) A traction drive meeting the requirements of 9.6.

C4.2.8

Other drive systems may be available; however, as they have not been considered by this Standard they are outside its scope. Proposals to use such drives need to demonstrate their adequacy, possibly by comparison to the measures in this Standard.

4.2.9 Ropes

Suspension ropes for roped hydraulic, drum drive, and traction drive lifts shall conform to section 7.

4.2.10 Overhead, car-top access

If it is necessary to carry out maintenance or other work at the top of the lift shaft, the roof of the lift car shall safely support a load of 250 kg. A clear working volume of 800 mm x 600 mm x 500 mm with minimum height of 600 mm shall be provided when the car is at its furthest point of upward travel. If this space is not available, a deployable stop shall be permanently available to prevent upward movement of the lift into the required working volume. The stop shall be able to withstand safely the shock of a lift carrying 125% of rated load at rated speed. A notice shall be fitted in a prominent position requiring the stop to be deployed when standing on the car roof.

If maintenance or other work is to be undertaken from the roof of the car, a maintenance switch shall be installed that deactivates the lift car and landing controls, or other means shall be provided to prevent use of the lift by others.

4.3 Specific requirements for enclosed platform lifts

4.3.1 Speed

Enclosed platform lifts shall have a rated speed of no greater the 0.15 m/s. The speed shall not exceed 0.15 m/s under abnormal conditions.

4.3.2 Travel

Enclosed platform lifts shall have a maximum travel distance of 7.5 m which shall be in a vertical or approximately vertical direction.

4.3.3 Enclosure

An enclosed platform lift shall have its lift shaft enclosed on all sides at least up to a height above the top landing of 1 m for a domestic lift and 1.1 m for a public lift.

4.3.4 Landing controls

Landing controls shall meet the requirements of 5.2.

4.3.5 Landing doors and gates

Landing doors and gates shall meet the requirements of 5.3. Figure 9 shows two examples of enclosed platform lifts.

C4.3.5

The requirements for enclosed platform lifts (see 2.2.2.1) mean that landing gates are permitted only at the top landing.

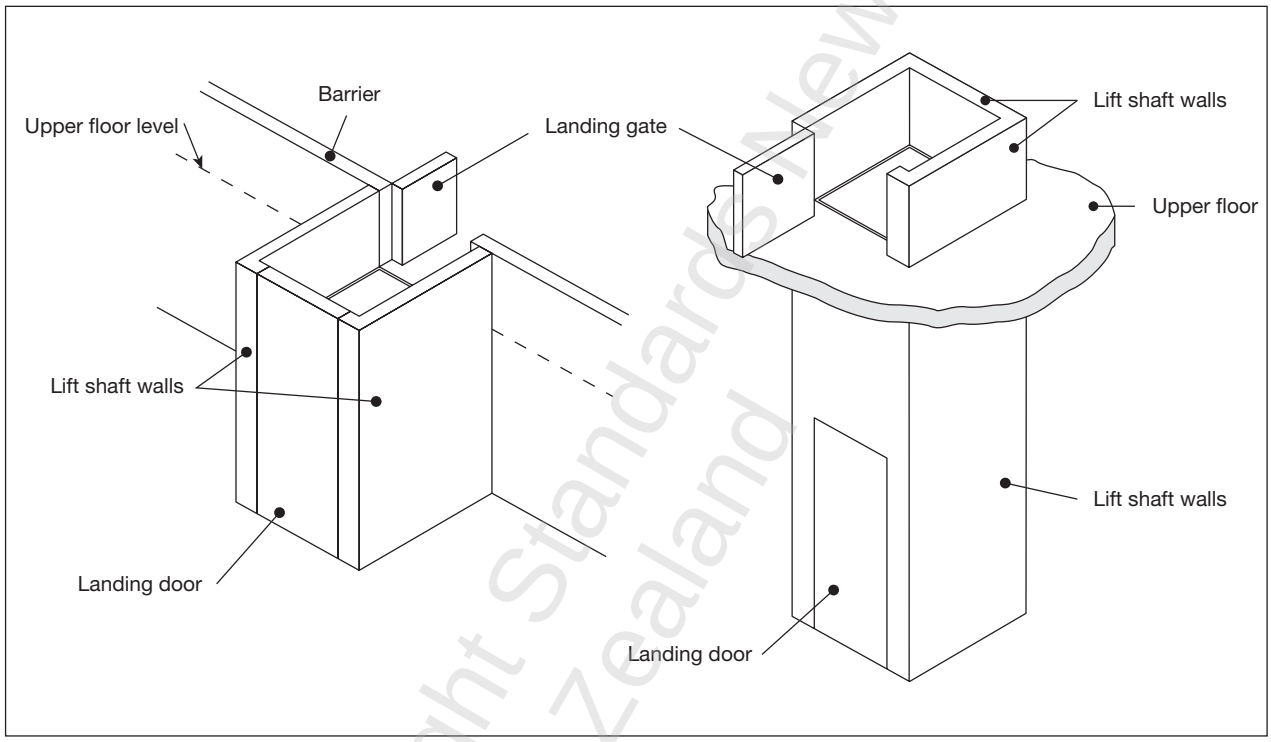


Figure 9 – Examples of enclosed platform lifts

4.3.6 Indication of position

In public buildings enclosed platform lifts that serve more than two levels shall provide passengers with an indication of position when at or near a landing. In addition, the landings served by these lifts shall have markings complying with 10.3.

4.3.7 Drives

Lift drives shall be one of the following:

(a) A direct hydraulic drive meeting the requirements of 9.2;

(b) An indirect hydraulic drive (rope or chain suspension) meeting the requirements of 9.3;

(c) A screw drive meeting the requirements of 9.4;

(d) A drum drive meeting the requirements of 9.5;

(e) A traction drive meeting the requirements of 9.6.

C4.3.7

Drum and traction drives are unlikely with platform lifts.

For other drives see C4.2.8.

4.3.8 Ropes

Suspension ropes for roped hydraulic lifts shall conform to section 7.

4.4 Specific requirements for open platform lifts

Examples of different types of open platform lifts are given in Figure 10 and Figure 11.

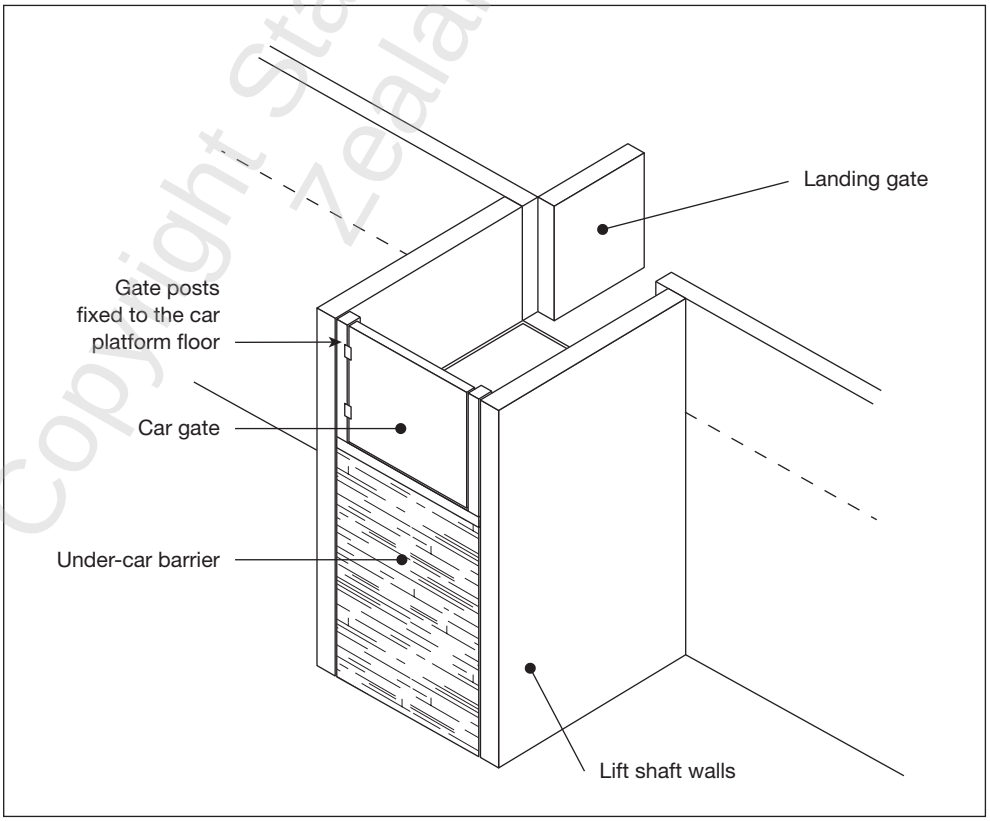


Figure 10 – Example of an open platform lift

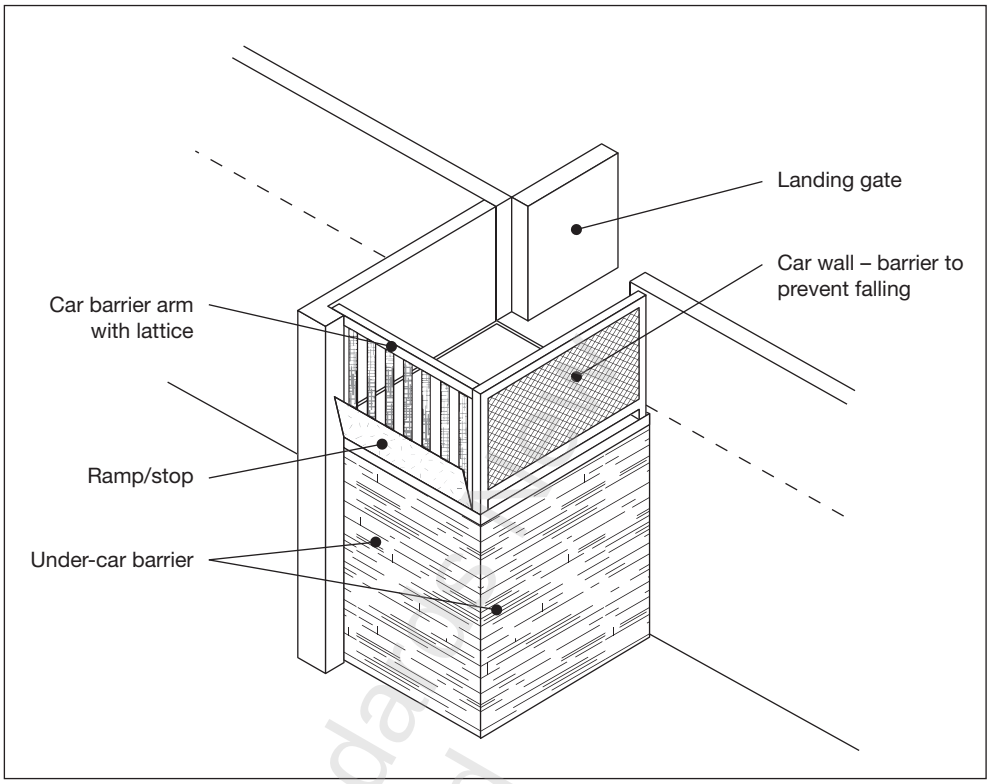


Figure 11 – Example of open platform lift with a car wall

4.4.1 Speed

Open platform lifts shall have a rated speed of no greater the 0.15 m/s. The speed shall not exceed 0.15 m/s even under abnormal conditions.

4.4.2 Travel

Open platform lifts shall have a maximum travel distance of 3.6 m.

C4.4.2

Because of the clearances needed to avoid strike hazards, open platform lifts are not generally used when passing through a floor penetration. They are therefore more suited for applications where there are changes of level or perhaps a mezzanine floor. This indicates the limit to travel distance of 3.6 m is one consistent with practical considerations.

4.4.3 Landing controls

Landing controls shall meet the requirements of 5.2.

4.4.4 Landing doors and gates

Landing doors and gates shall meet the requirements of 5.3.

4.4.5 Safety from falling

Each side of an open platform lift shall comprise either:

(a) A car wall of minimum height 1000 mm in the case of a domestic lift or 1100 mm in the case of a public lift;

(b) A car door or car gate;

(c) A car barrier arm and a roll-off guard;

(d) A landing gate or door that reaches up to a minimum of 1000 mm above the top landing in the case of a domestic lift and 1100 mm in the case of a public lift; or

(e) A lift shaft wall up to a minimum of 1000 mm above the top landing in the case of a domestic lift and 1100 mm in the case of a public lift.

4.4.6 Car walls

Openings in car walls shall be limited so as not to permit the passage of a 100 mm diameter sphere. Further, where a passenger would be exposed to a striking hazard (see Figure 3) provide either:

(a) A full-height car wall with no openings; or

(b) A minimum-height car wall positioned to ensure passengers are kept at least 300 mm away from the striking hazard.

C4.4.6

Landing doors and lift shaft walls meeting the requirements of 5.3.13 and 6.1 respectively do not pose a striking hazard.

4.4.7 Car doors and gates

In public buildings, as a minimum, car doors and gates shall be manually opened and spring or self-closing. See 5.4 for all requirements for car doors and gates.

4.4.8 Car barrier arms

Car barrier arms shall be power operated, with either manual or automatic control, or shall be operated via mechanical linkage with the movement of the lift away from the landing. Car barrier arms on domestic lifts may be manually operated, provided:

(a) The lift cannot move away from the landing until the barrier arm is in the closed (down) position;

(b) Opening the barrier arm causes the lift to stop; and

(c) Re-closing the barrier arm does not in itself cause the lift to start.

4.4.8.1 Self-closing barrier arm

Self-closing barrier arms shall be fully closed (down) by the time the car platform has moved 150 mm from the landing. The maximum torque exerted by a closing door, gate, or barrier arm shall be 3 N-m, and its kinetic energy while closing shall not exceed 2.5 J.

4.4.8.2 Height

The top of a barrier arm when closed shall be between 900 mm and 1150 mm above the floor of the car platform. Where the drop from a car platform is 1000 mm or more, the top of the barrier arm shall be at least 1000 mm above the floor of the car platform in the case of a domestic lift and shall be at least 1100 mm above the floor of the car platform in the case of a public lift.

4.4.8.3 Barrier arm lattice

Where the drop from the floor of a car platform is 1 m or more, the barrier arm shall include a lattice or similar barrier beneath the barrier arm itself that prevents the passage of an object 100 mm wide applied with a force of 30 N. The lattice shall not exert a hazardous shearing action when folding or unfolding, and the moment exerted by an unfolded lattice with the barrier arm in the open (raised) position shall not exceed 0.5 N-m.

4.4.8.4 Strength of barrier arm and lattice

A closed barrier arm shall withstand a horizontal force of 300 N applied by a 25 cm^2 probe without permanent deformation and without any damage to its mechanism. A lattice that forms part of the barrier shall similarly withstand a horizontal force of 100 N.

4.4.9 Roll-off guard

A roll-off guard shall be at least 150 mm high and shall withstand a horizontal force of 300 N applied by a 25 cm^2 probe with no permanent deformation and elastic deformation of no more than 30 mm.

4.4.10 Ramps and ramp/stops

In the case of a lift without a pit, the lower entrance shall be provided with a ramp of sufficient strength to withstand the passage of rated loads onto the car platform.

Ramps shall be fitted on all platform access edges incorporating a step greater than 10 mm high. A step of up to 10 mm high is permissible at the leading edge of any ramp.

Ramping inclinations shall not be greater than:

(a) 1:4 on a vertical rise up to 50 mm;

(b) 1:6 on a vertical rise up to 75 mm;

(c) 1:8 on a vertical rise up to 100 mm; and

(d) 1:12 on a vertical rise over 100 mm.

The ramp/stop shall meet the roll-off guard requirements by the time the car platform has moved 150 mm from the lower landing.

Examples of ramp/stops are shown in Figure 12.

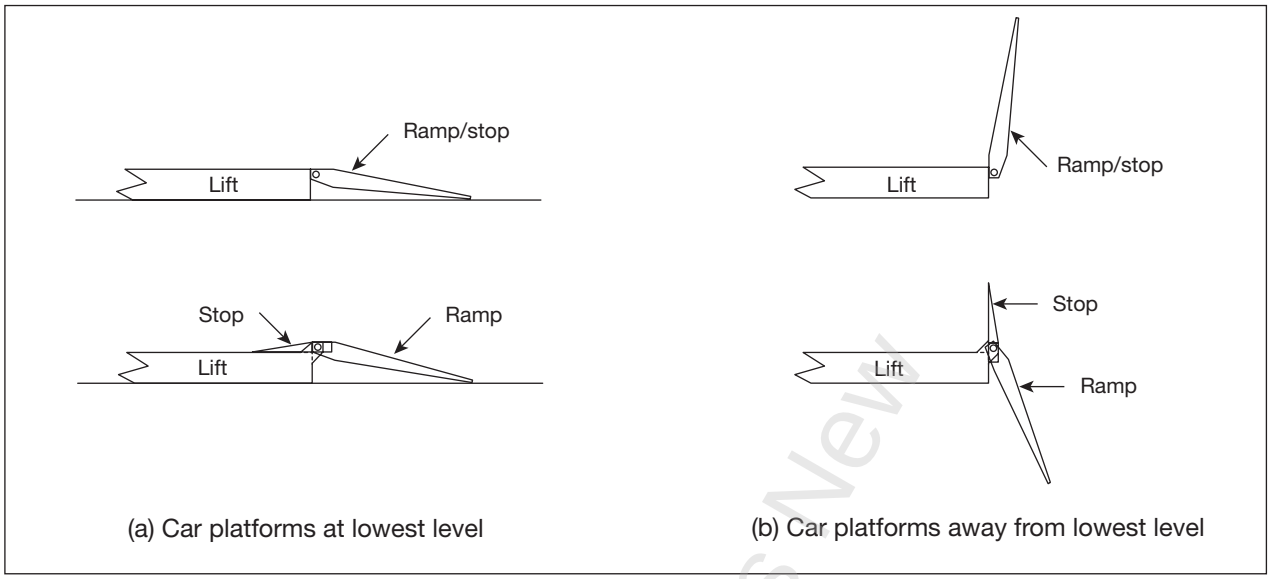


Figure 12 – Ramp/stops with car platform at lowest level (see (a)) and away from lowest level (see (b))

4.4.11 Under-car protection

To prevent crushing type incidents under the car platform, either an under-car barrier shall be fitted to all sides without a lift shaft enclosure or the area under the lift car shall be protected by a sensitive surface.

4.4.11.1 Under-car barrier

An under-car barrier shall be a blind, flap, shutter, screen, or other type of barrier that meets the following criteria.

The barrier shall not allow the passage of a 50 mm sphere pressed against the barrier with a force of 30 N. When at any point of the lift's travel the height of the exposed barrier is greater than 50 mm and the barrier is subjected to a force of 30 N applied by a 25 cm^2 probe, the barrier shall not deflect by more than half the height of the exposed portion of the barrier or 100 mm, whichever is less.

4.4.12 Sensitive surface

A sensitive surface shall extend the entire area under a lift car. It may be in the form of an under-car displaceable tray operating a safety switch upon relative upward movement of the tray, or a light or electronic beam type.

4.4.12.1 Displaceable tray type sensitive surface

At least four safety switches shall be installed as part of the sensitive surface mechanism. The maximum operating force shall be 30 N. Upon anywhere on the sensitive surface encountering an obstacle, the relative upward movement of the sensitive surface shall operate a safety switch and stop the car platform within 20 mm. Once the car platform has stopped, there shall be at least a further travel allowance of 25 mm of the sensitive surface.

4.4.12.2 Light or electronic beam type sensitive surface

The system shall detect a 50 mm sphere or an object with any dimension greater than 50 mm in any part of the volume directly under the lift car and stop the downward motion of the car bringing the car to a halt within 20 mm. The lift car shall not start to move in a downward direction until the obstruction is removed. The system shall be fail safe.

4.4.13 Drives

Lift drives shall be one of the following:

(a) A direct hydraulic drive meeting the requirements of 9.2;

(b) An indirect hydraulic drive meeting the requirements of 9.3;

(c) A screw drive meeting the requirements of 9.4.

C4.4.13

For other drives see C4.2.8.

4.4.14 Ropes and chains

Suspension ropes and chains for indirect hydraulic lifts shall conform to section 7.

4.5 Relaxation of requirements for open platform lifts with travel distance less than 1 m

An open platform lift that has a travel distance of less than 1 m shall comply with the requirements of 4.4 with the exception that the provisions of 4.4.5 shall be relaxed so that only a roll-off guard need be provided to each side.

Examples of open platform lifts with a travel distance of less than 1 m are shown in Figure 13 to Figure 15.

C4.5

NZBC Clause F4 'Safety from falling' requires protection from falling where 'people could fall 1 metre or more'. As these lifts travel less than this distance then the items required by 4.4.5 for safety from falling, with the exception of the roll-off guard, do not need to be provided. If, however, the owner chooses to provide any of these items they will be relied on by building users to protect the fall and therefore need to be adequate for that purpose.

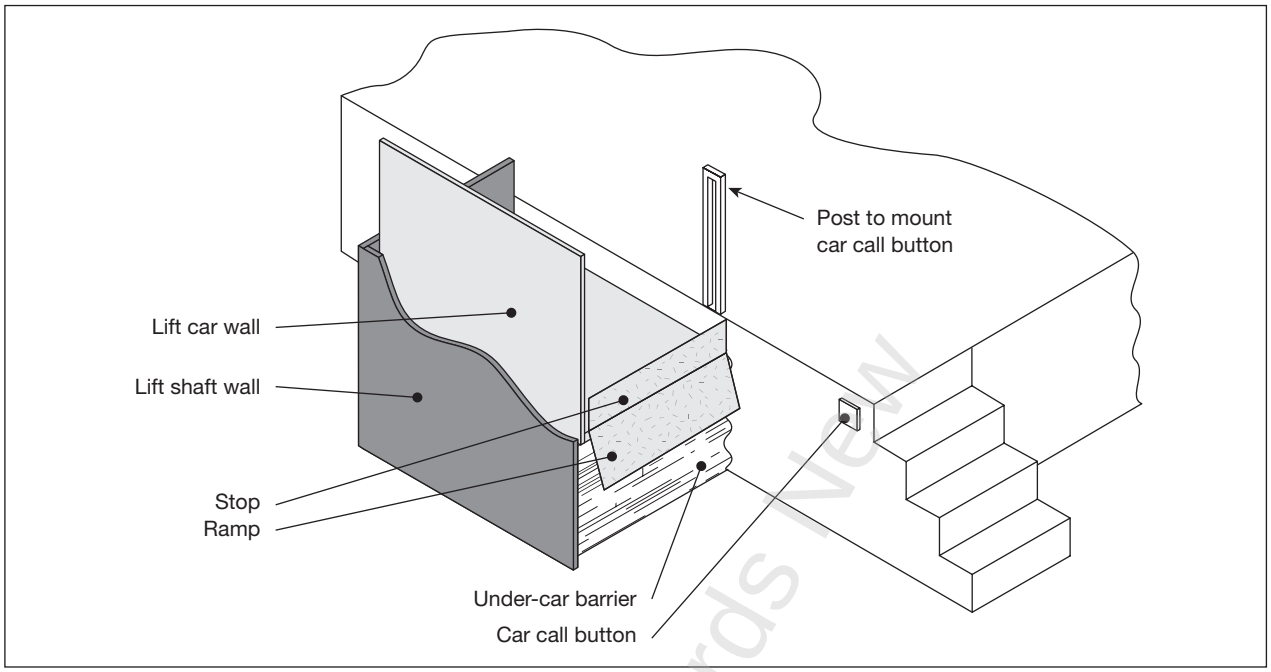


Figure 13 – Example of an open platform lift with travel distance less than 1 m

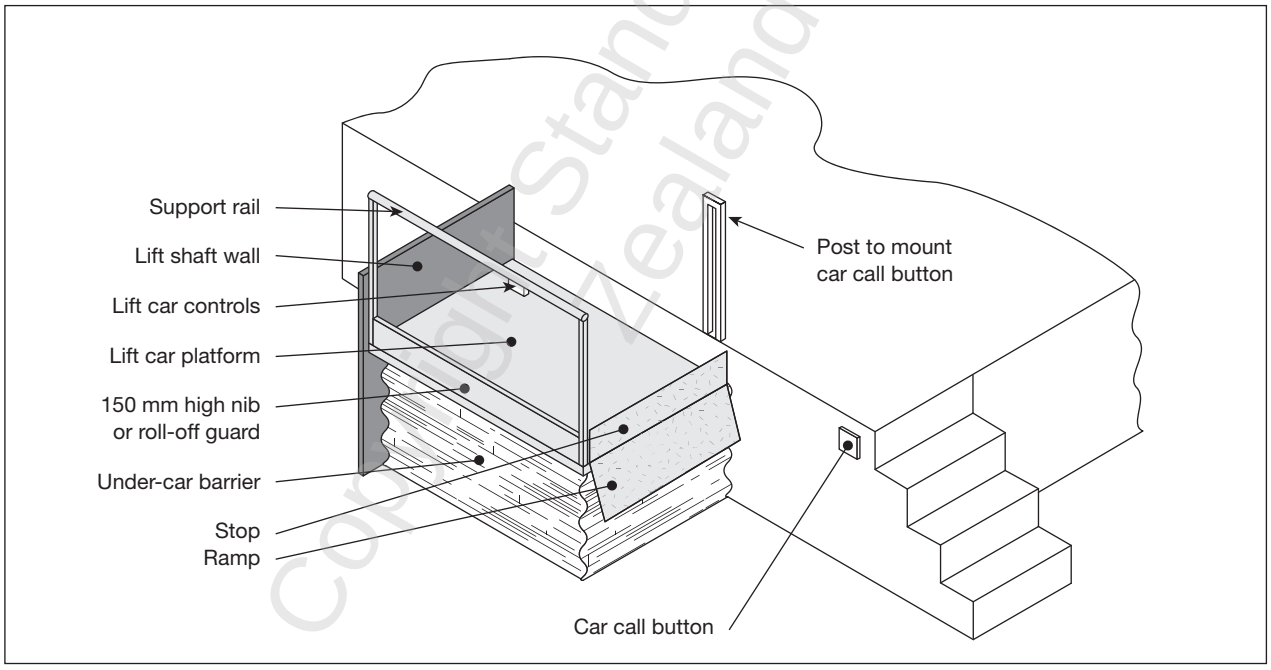


Figure 14 – Example of an open platform lift (no car walls) with travel distance less than 1 m

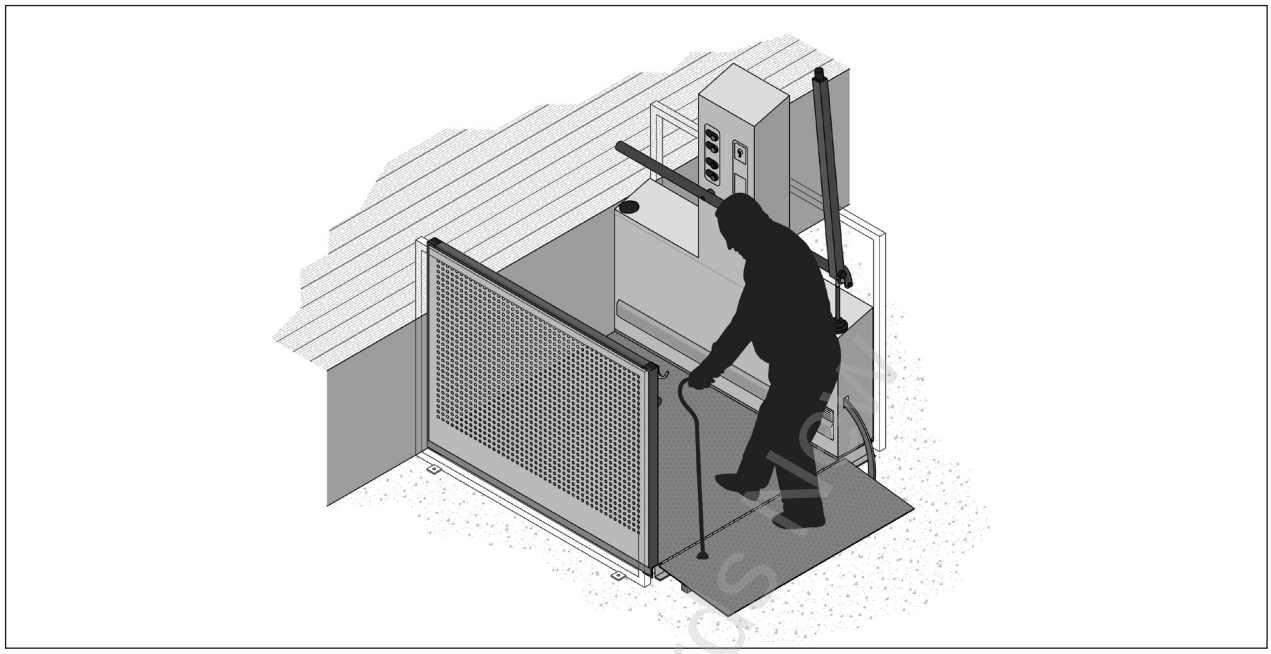


Figure 15 – Example of an open platform lift with travel distance less than 1 m

4.6 Stage lifts

Stage lifts shall either be enclosed or open platform lifts meeting the requirements of 4.2 to 4.5 as appropriate depending on what type of platform lift they are and the vertical distance travelled. In all cases, however, there is no requirement for lift car walls or lift shaft enclosures, which provide a barrier protecting a fall, to extend above the level of the stage floor.

C4.6

The limits on application of NZBC Clause F4 'Safety from falling' mean that barriers preventing falls are not necessary if their provision would be incompatible with the use of the building. Stage lifts then do not require barriers to extend above the stage floor and this applies irrespective of fall height from the stage floor. Although barriers are not necessary above the height of the stage floor, they nevertheless are required throughout those portions of the travel of the lift where:

(a) *Barriers would not protrude above the level of the stage floor; and*

(b) *Falls of 1 m or more are possible from the lift car.*

In instances where this limit on application means that barriers are not required, it is recommended, as a minimum, that car platforms have roll-off guard protection. This will prevent, for example, the wheels of a wheelchair from travelling over the edge of the platform.

4.7 Requirements for stairlifts and inclined lifting platforms

4.7.1 Basic requirements

An inclined lift shall travel in an inclined plane over a stair or inclined surface and shall have:

(a) A maximum speed of 0.15 m/s in the direction of travel; and

(b) A platform, or a chair with footrest, or both.

4.7.2 Relevant Standard

Stairlifts and inclined lifting platforms shall comply with BS EN 81-40 as modified by Appendix C. Where there is a conflict between BS EN 81-40 and this Standard (NZS 4334), the general requirements in section 3 of NZS 4334 will take priority. Of the remainder of this Standard, only section 11, and Appendices A and C provide requirements for stairlifts and inclined lifting platforms.

5 LANDINGS AND LIFT ACCESS

5.1 General

5.1.1 Access to public lifts

A public lift shall be available for use at all times without the need of a special device (for example, a key or card, key pad, voice, or other recognition) or assistance from building management. Where it is necessary to manage the use of the lift (for example, access to a stage), it shall be possible for building management to readily bypass the management procedures so that the lift is always available for use when required. Such procedures need to be identified under 11 (e) of this Standard and notified to the BCA.

5.1.2 Landing area in public buildings

There shall be a minimum clear distance of 1.8 m beyond the landing doors in the closed position. In addition, if landing doors are hinged there shall be a minimum clear dimension of 900 mm beyond the landing doors as shown in Figures 16(a) and 16(b).

These minimum dimensions do not apply at the end of a corridor or similar spaces where the minimum dimensions shall be as shown in Figure 16(c). Where the landing door is hinged the minimum dimension of Figure 16(c) applies only when the hinged side of the door and the position of the landing controls are as shown in the figure.

5.2 Landing controls

5.2.1 Provision of landing controls and indicators

The following controls and indicators shall be provided at each landing:

(a) Lift call button, in a colour that contrasts with its background;

(b) An indication that the call has been registered. This shall be by at least one of the following:

(i) By being able to see and hear the motion of the lift car

(ii) By the call button illuminating and staying illuminated

(iii) By turning on a separate indicator lamp with the lens or an adjacent label bearing the legend 'CALL REGISTERED' or 'LIFT COMING'

(iv) By turning on a separate indicator display showing illuminated arrows or graphics indicating the travel direction of the lift;

(c) Indication of lift arrival. This shall be by at least one of the following:

(i) By being able to see and hear the motion of the lift car

(ii) By the automatic opening of the landing door

(iii) By the sounding of a bell or gong

(iv) Landing call button extinguishes upon arrival of the lift car.

Any illuminated landing call button shall extinguish upon arrival of the lift car.

In the case of domestic lifts, an alternative form of control to a call button to suit the requirements of the user is permitted.

5.2.2 Position of controls

Controls shall be within 600 mm of the door opening. For hinged doors the controls shall be placed on the fly (non-hinged) side of the door except in the situation shown in Figure 16(b). Controls shall be positioned within a height of 900 mm to 1100 mm from the floor level.

C5.2.2

It is not acceptable to have lift controls behind an open-hinged door, except where they are clear of the door swing as in Figure 16(b).

The optimum height for the controls is 1000 mm above floor level.

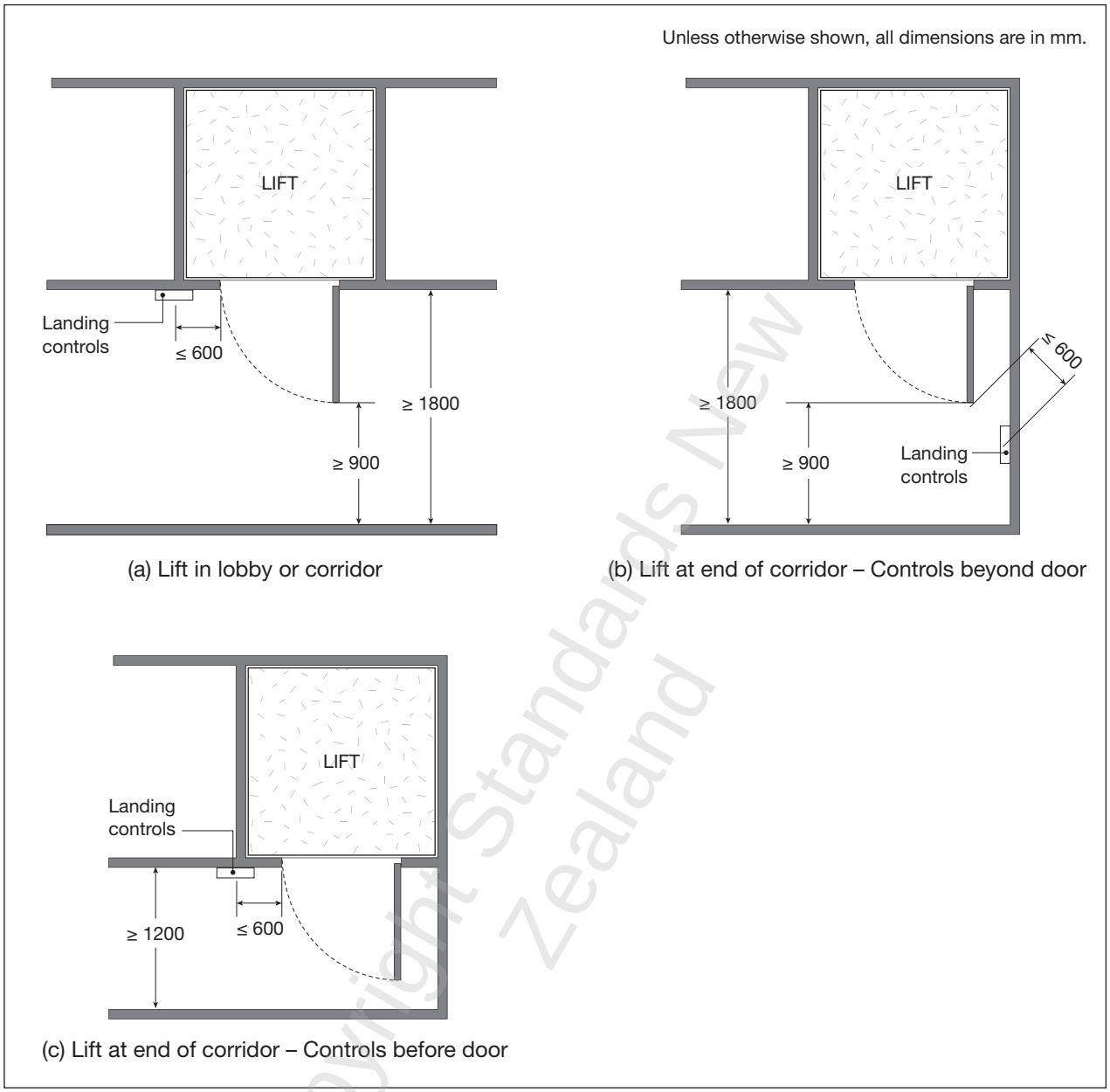


Figure 16 – Lobby size and some possible positions of landing controls

5.2.3 Size of control buttons

Control buttons shall have a positive movement on actuation. Control buttons on non-domestic lifts shall have a minimum diameter or width of 20 mm.

The force normal to the centre of the button required to operate each control button shall be not less than 2 N and not more than 5 N. Where raised tactile symbols are provided on the face of the button, the force required to operate the button shall be not less than 3.5 N and not more than 5 N.

5.2.4 Marking and legends

Control buttons shall have raised designations on, or immediately to the left, of the button. The designations shall be at least 15 mm high.

Braille signage shall be provided for public lifts. Where the designation is on the control button the Braille signage shall be placed to the immediate left of the designation. Where a designation is placed to the immediate left of the control button it shall be permissible to place the Braille signage either underneath or to the immediate left of the designation. See Figure 19 for correct Braille and designation placement examples, and see 10.6 for Braille requirements.

5.3 Landing doors and gates

5.3.1 Location of landing doors and gates

A landing gate or landing door shall be fitted at all upper landings of lifts with a travel distance of 1 m or more, and the bottom landing of all enclosed platform lifts and low-speed lifts.

5.3.2 Lift doors for public lifts

The lift doors for public lifts shall be clearly delineated by colour contrasting with their surroundings.

5.3.3 Operation of landing doors and gates

Landing doors shall be either:

(a) Manual opening and closing;

(b) Manual opening and self-closing;

(c) Powered automatic opening with manual closing;

(d) Powered automatic opening and self-closing; or

(e) Powered automatic opening and closing.

Hinged landing doors and gates shall open away from the lift shaft.

In public buildings, gates taller than 1.35 m and landing doors shall comply with (d) or (e) above. In addition, all gates 1.35 m or lower shall be self-closing or powered closing.

C5.3.3

In practice, the majority of landing doors for platform lifts and low-speed lifts will be hinged, not sliding.

This clause ensures that in public buildings, landing doors will have powered opening and be at least self-closing.

5.3.4 Landing doors and gates – Strength and openings

A locked door or gate shall withstand, without permanent deformation, a horizontal force of 1000 N applied by a 25 cm^2 probe at a height of 1 m anywhere across its width.

Where a passenger would be exposed to a striking hazard (see Figure 3), there shall be no openings in doors or gates. Where this is not the case, openings shall be limited to those that will not permit the passage of a 100 mm diameter sphere. Gaps between landing doors or gates and lift shaft walls shall be as small as practicable and less than 10 mm; see Figure 17.

A glazed area of a door or gate shall meet the requirements of 3.2.3.

5.3.5 Minimum height of landing gates

If a landing gate is provided for the lower landing of an open platform lift with a travel distance less than 1000 mm, the gate height shall provide a 150 mm high barrier above the floor of the car platform at the upper level.

Other landing gates shall have a minimum height of 1000 mm in the case of domestic lifts and 1100 mm in the case of public lifts.

5.3.6 Minimum headroom at lift entrances

The minimum headroom at a lift entrance shall be 1.98 m.

5.3.7 Minimum clear width of landing doors and landing gates

The minimum clear width of the opening at the landing door or gate shall be 760 mm for domestic lifts and 900 mm for public lifts.

C5.3.7

A minimum clear width of 900 mm meets the needs of domestic lift wheelchair users.

5.3.8 Door and gate locks

Landing doors and gates shall be fitted with a means of locking that shall be 'fail to safe' such as an electric strike or mechanical latch. They shall also have a separate sensor switch that detects the presence of the door or gate when closed. The control circuitry shall be connected to prevent lift movement unless all landing doors and gates are closed and latched shut.

A landing gate or door shall be locked unless the lift is within 50 mm of the landing. See 4.1.5.1 for further requirements.

5.3.9 Manual unlocking

If the lift shaft is enclosed on all sides, or if the lift travel distance is 1 m or more, unlocking of a landing door or gate shall be possible from outside using either:

(a) A key to fit the unlocking triangle as defined in BS EN 81;

(b) The existing national pattern key for lift fire recall switches; or

(c) A key or tool that is stowed in the lift control cabinet or, in the case of a domestic lift, in the distribution board.

Opening a landing door or gate when the lift car is away from the landing shall operate a safety switch.

5.3.10 Manual unlocking from within the lift

Domestic lifts may also have a mechanism within 1 m of the landing floor level to unlock a landing door from inside the lift using a special tool.

C5.3.10

It is presumed that the unlocking facility operates on the door strike, so is accessible only when the car platform is lower than the strike.

At the time of installation the lift installer should provide homeowners with information on safely accessing the lift.

5.3.11 Powered and self-closing doors

Powered and self-closing doors shall meet the following requirements.

5.3.11.1 Maximum force and energy of powered landing doors

The maximum force exerted by a powered landing door shall be 65 N, and 30 N when a spring or self-closing door is shutting. In the case of a hinged door, this force shall be measured at a distance from the hinged side of two thirds the door width.

The maximum kinetic energy of the door shall be 4 J, or in the case of a hinged door, it shall take at least 4 seconds to open or close through the arc between 10° and 80° from fully shut.

5.3.11.2 Operation of powered landing doors

Landing doors may start to open when the lift reaches the unlocking zone. They shall remain fully open for a set period of at least 5 seconds, unless a car button is pushed where it may reduce to 1 second.

When a door is closing under power, it shall reopen upon encountering an obstruction.

When a spring or self-closing door encounters an obstruction, it shall be possible to push it open against the maximum force specified in 5.3.11.1.

5.3.12 Manually operated doors and gates

5.3.12.1 Door grip and handle

A door or gate taller than 1.35 m shall be fitted with a handle on the outer (landing) face and a grip on the inner (lift) face.

The handle and grip shall be mounted within 150 mm of the fly edge (non-hinged side) of the door at a height between 900 mm and 1100 mm (optimum height being 1000 mm). On public lifts, handles operating locks or latches shall have a lever action and shall have a return on the end of the handle pointing towards the door.

A landing door that is manually closed shall be fitted on the inside with a recessed door grip having a width not exceeding 152 mm and a depth not exceeding 25 mm. The top of the recess shall be bevelled at an angle not exceeding 30° from the vertical. The top of any hold shall be smooth and rounded with a minimum radius of 1 mm; see Figure 17.

5.3.12.2 Maximum force to open or close door

It shall be possible to open and close manually operated doors using a maximum force of 10 N applied at the door handle or door grip.

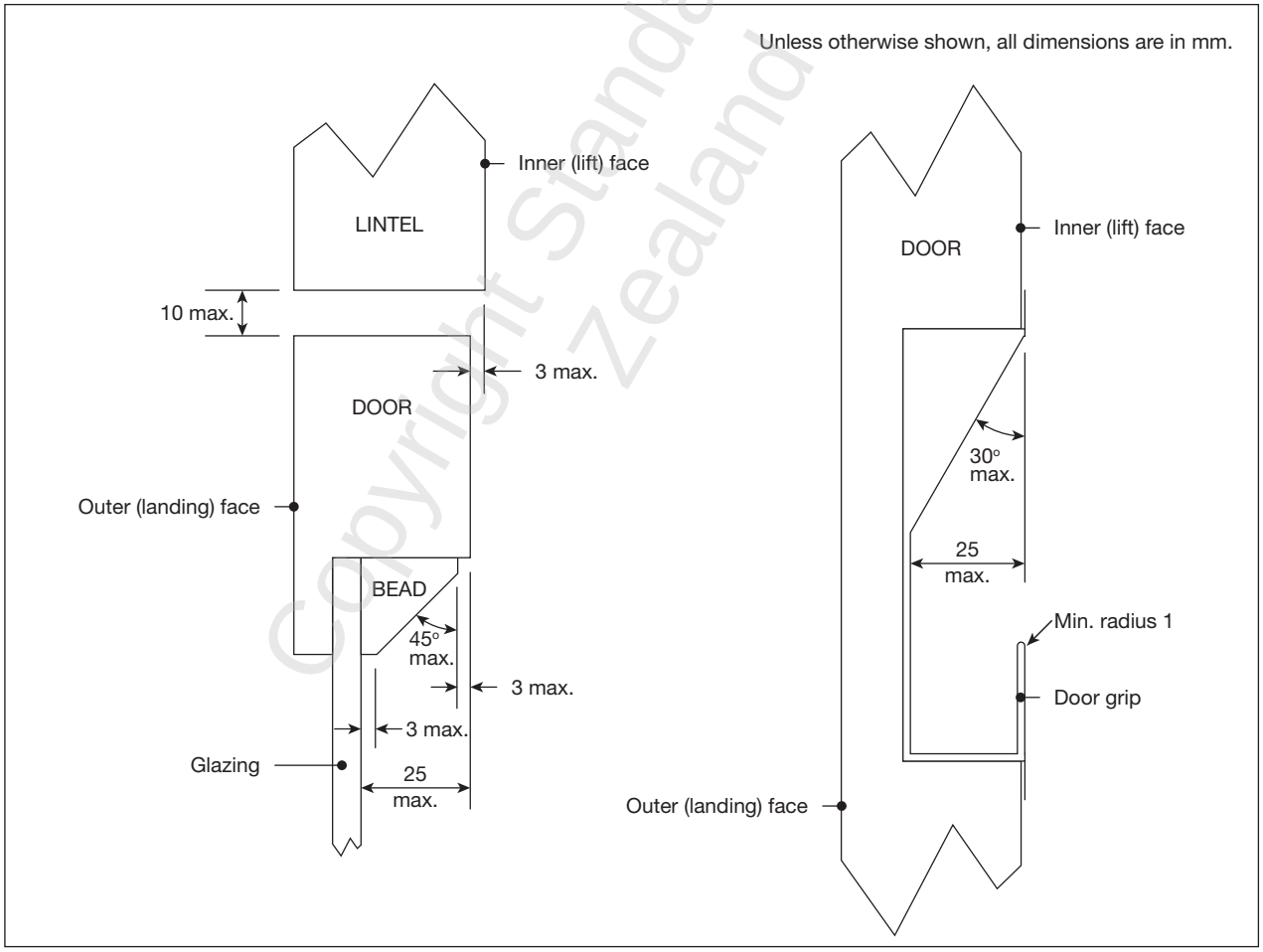


Figure 17 – Details of landing door recesses for glazed panel (left) and door grip (right)

5.3.13 Exposed inner faces of landing doors

Inner faces of landing doors exposed to passengers shall be smooth and flush and shall conform to the requirements for exposed faces of the lift shaft.

A landing swing door in a public lift shall be fitted with a vision panel. The opening for the vision panel shall extend as a minimum from 900 mm to 1800 mm above floor level, and be at least 150 mm in width and fixed 200 mm maximum from the opening side of the door. The recess formed by the vision panel shall not exceed 25 mm in depth. Any recess greater than 3 mm in depth shall be bevelled to an angle of no more than 45° from the plane of the door. Details shall be as shown in Figure 17 and Figure 18.

C5.3.13

A near flush glazing arrangement is preferred, as shown in Figure 18.

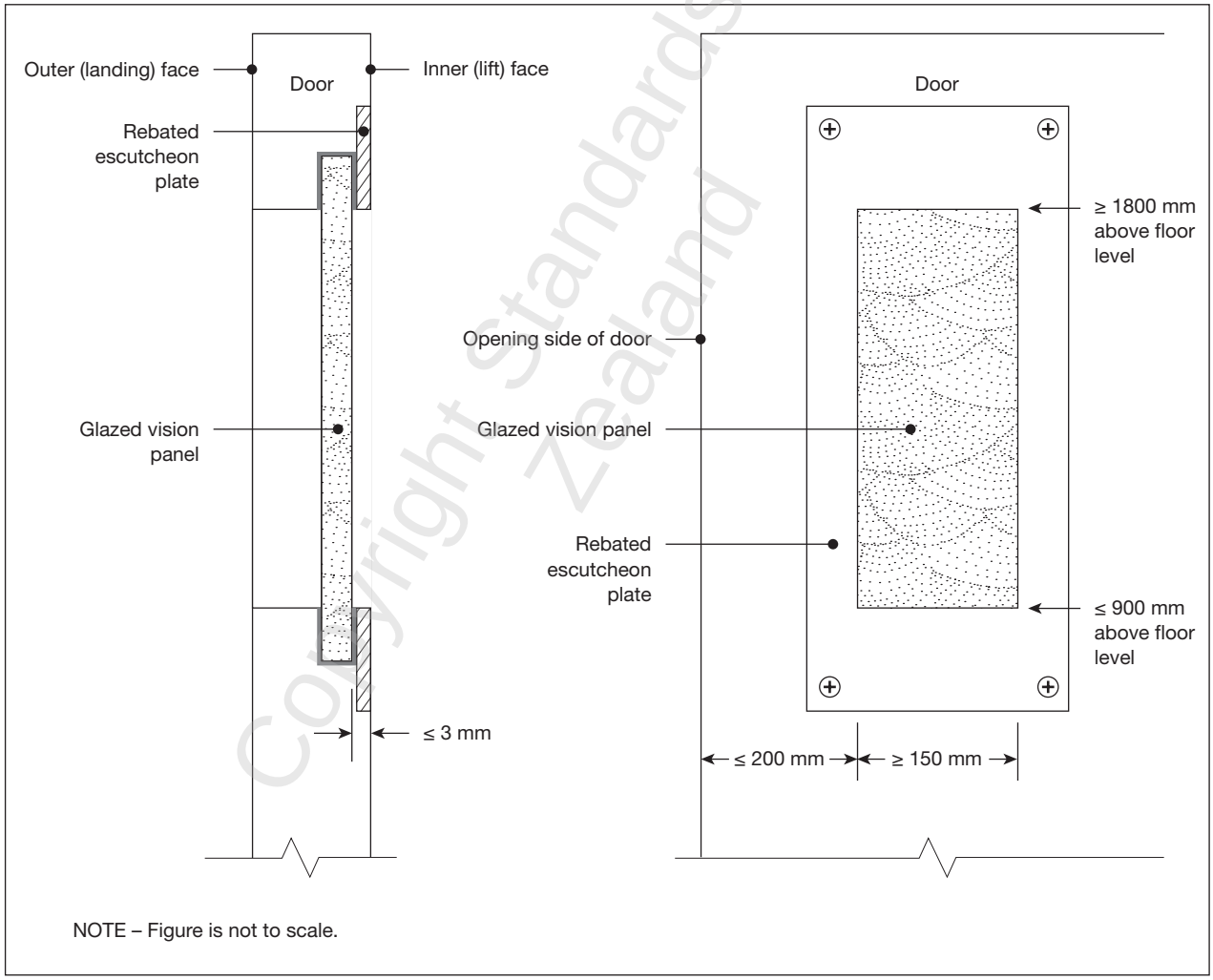


Figure 18 – Preferred arrangement for glazed vision panel, with glazing secured by rebated escutcheon plate

5.3.14 Automatic sliding doors

Automatic sliding doors shall meet the requirements of Appendix D.

5.4 Lift car doors and gates

5.4.1 Provision of car doors and gates

Car doors and gates are not required where landing doors or gates are fitted flush with the internal surface of the lift shaft in accordance with 5.3.13. If car doors or gates are fitted, they shall comply with the following requirements.

5.4.2 Operation of car doors and gates

Car doors and gates shall be either:

(a) Manual opening and closing;

(b) Manual opening and self-closing;

(c) Powered automatic opening with manual closing;

(d) Powered automatic opening and self-closing; or

(e) Powered automatic opening and closing.

In public buildings, car gates taller than 1.35 m and car doors shall comply with (d) or (e) above. In addition, all gates 1.35 m or lower shall be self-closing or powered closing.

C5.4.2

In public buildings, car doors will have powered opening and be at least self-closing and car gates will be at least self-closing.

5.4.3 Confinement of car doors and gates

Except as permitted by 5.4.8, no part of any car door or gate shall project outside the line of the car sill at any time.

5.4.4 Strength of car doors and gates

A closed door or gate shall withstand, without permanent deformation, a horizontal force of 300 N applied from within the lift car by a 25 cm^2 probe at a height of 1 m anywhere across its width and at any suspected weak point.

In cases where there is no lift shaft wall and the potential fall after failure of the car door or gate is greater than, or equal to, 1 m, the force to be withstood shall be increased to 1000 N.

A glazed area of a door or gate shall meet the requirements of 3.2.3.

5.4.5 Openings in car doors and gates

Where a building user would be exposed to a striking hazard (see Figure 3), there shall be no openings in doors or gates. Where this is not the case, openings shall be limited to those that will not permit the passage of a 100 mm diameter sphere. Gaps between car doors or gates and car walls shall be as small as practicable and less than 10 mm; see Figure 17.

5.4.6 Minimum clear width of car doors and car gates

The minimum clear width of the opening at the car door or gate shall be 760 mm for domestic lifts and 900 mm for public lifts.

C5.4.6

A minimum clear width of 900 mm meets the needs of domestic lift wheelchair users.

5.4.7 Door and gate sensor

Car doors and gates shall be fitted with a sensor switch that detects the presence of the door or gate when closed. The control circuitry shall be connected to prevent lift movement unless all car doors and gates are closed. Except as required in 5.4.8, car doors and gates shall not be locked.

5.4.8 Hinged car gates on open platform lifts

An open platform lift may be fitted with a hinged car gate opening outwards away from the lift car where it serves the lowest landing. These car gates shall be locked unless the lift is stationary at the lowest landing. In addition, 5.4.8.1 and 5.4.8.2 shall apply.

A stop or other means shall be fitted to ensure that the car does not travel below the level of the bottom landing thereby making it impossible to open the gate.

5.4.8.1 Gate locks

The means of locking the hinged car gate shall be 'fail to safe' such as an electric strike or mechanical latch. It shall also have a separate sensor switch that detects the presence of the gate when closed. The control circuitry shall be connected to prevent lift movement unless the car gate is closed and locked.

5.4.8.2 Manual unlocking

If the lift travel distance is 1 m or more, unlocking of the car gate shall be possible using either:

(a) A key to fit the unlocking triangle as defined in BS EN 81;

(b) The existing national pattern key for lift fire recall switches; or

(c) A key or tool that is stowed in the lift control cabinet or, in the case of a domestic lift, in the distribution board.

The means of manual unlocking shall be within 300 mm of the top of the car gate. Opening the car gate when the lift car is away from the landing shall operate a safety switch.

5.4.9 Powered and self-closing doors and gates

Powered automatic sliding doors shall comply with Appendix D. Other powered doors and gates shall comply with the following.

5.4.9.1 Maximum force and energy of powered doors

The maximum force exerted by a powered car door shall be 65 N, and 30 N when a spring or self-closing door is shutting.

The maximum kinetic energy of the door shall be 4 J.

A self-closing door or gate that takes at least 4 seconds to close from 90% open to 10% open – or from 80° to 10° in the case of a hinged car door or gate – may be assumed to meet this requirement.

If the operation of car and landing doors is mechanically linked, the maximum combined kinetic energy shall be 4 J.

5.4.9.2 Operation of powered car doors

Unless linked to the operation of the corresponding landing doors, a car door shall not open until the lift is stopped.

When a door is closing under power, it shall reopen upon encountering an obstruction.

When a spring or self-closing door encounters an obstruction, it shall be possible to push it open against the maximum force specified in 5.3.11.1.

Wherever applicable, the operation of a powered car door or gate shall be initiated by the same control signal that initiates the operation of the corresponding landing door or gate.

Automatic car doors and gates shall remain fully open for a set period of at least 5 seconds, unless a car button is pushed where it may reduce to 1 second.

5.4.10 Manually operated car doors and gates

5.4.10.1 Door grip and handle

A door or gate taller than 1.35 m shall be fitted with a handle between 900 mm and 1200 mm (optimum 1000 mm) above the finished floor level. A handle operating a lock or latch shall have a lever action and the end of the handle shall be returned towards the door.

C5.4.10.1

Doorknobs with a twist or turn action do not provide an adequate grip for people with limited or reduced hand function.

5.4.10.2 Maximum force to open or close door

It shall be possible to open and close manually operated doors using a maximum force of 10 N applied at the door handle.

5.4.11 Vision panels in car doors

Where a landing door is fitted with a vision panel, any corresponding car door shall also be fitted with a vision panel that shall be sized to match. The two vision panels shall be aligned when the lift car floor is level with the landing.

6 LIFT SHAFT ENCLOSURES

In addition to the requirements of this section, lift shafts and landing doors or gates shall meet the requirements of 5.3.

6.1 Faces of lift shaft enclosures exposed to passengers

6.1.1 Lift shaft wall construction

Exposed lift shaft walls shall be plumb, smooth, and even. The coefficient of friction between the wall surface and denim cloth shall be less than 1.0.

The lift shaft lining shall withstand a force of 700 N applied by a 25 cm^2 probe without permanent deformation or damage (including without permanent indentation of the surface), and without causing clearances to go outside their allowable range.

6.1.2 Projections and indentations

Projections shall not exceed 3 mm. Any indentation greater than 3 mm (such as for a door release catch) shall have the top edge chamfered to an angle of no greater than 30° to the vertical. Indentations greater then 3 mm shall not exceed 152 mm in width or 25 mm depth.

Any gap in the wall, such as around a door, shall be as small as practicable and in any event less than 10 mm; see Figure 17.

6.1.3 Gap between the floor of a car platform and lift shaft walls

At the edges of the floor of a car platform where there are no lift car walls, either:

(a) The gap between the floor and the lift shaft wall shall not exceed 10 mm; or

(b) The car platform shall be fitted with a safety edge or safety beam and the gap between the floor (including the safety edge) and the lift shaft wall shall not exceed 20 mm. The variation in the gap between the floor and the lift shaft wall shall not exceed 10 mm throughout the lift's travel.

6.1.3.1 Safety edge operation

A safety edge, of no more than 20 mm in width, shall be activated by any object exerting a force of 5 N or more at any point along the front or user-facing edge of the safety edge. Movement of any part of the safety edge by no more than 6 mm shall cause a safety switch to operate and bring the lift to a halt in less than 20 mm. Each safety edge shall be fitted with at least two safety switches.

6.1.3.2 Safety beam operation

A safety beam shall operate to stop the lift if any object approaches within 20 mm of the edge of the floor of the car platform. Activation of the safety beam shall cause a safety switch to operate and bring the lift to a halt in less than 20 mm.

6.1.4 Clearance between lift car walls and lift shaft walls

Where a lift has part-height car walls, the clearance between car wall and lift shaft wall shall be less than 20 mm or greater than 75 mm throughout the lift's travel.

6.1.5 Clearances and gaps to be maintained

The gaps and clearances specified in 6.1.3 and 6.1.4 shall be maintained under conditions of unbalanced load, when 50% of the rated load is placed on any 50% of the car platform.

6.2 Faces of lift shaft walls not exposed to passengers

Except at lift entrances, the minimum gap between any part of the lift car and the lift shaft wall shall be 40 mm.

The lift shaft walls shall be lined to an essentially flush finish and plumb. Indentations and projections shall be kept to a minimum.

The lift shaft lining shall withstand a force of 700 N applied by a 25 cm^2 probe without permanent deformation or damage and without causing clearances to go outside their allowable range.

Any projections or indentations greater than 10 mm shall have the underside chamfered to an angle of at most 30° from the vertical. The top sides of any projection or indentation greater than 10 mm and within 2.0 m of the pit floor shall also be chamfered to an angle of at most 30° from the vertical.

6.3 Pit and working area under the lift

6.3.1 Working area

If it is necessary to carry out maintenance or other work in the lift pit, a clear working space at least 600 mm high shall be provided. If this space is not available when the car platform is resting on its buffers or final stop, a pit prop or other stop shall be permanently available in the pit and able to be deployed to provide a safe working space. The pit prop or stop shall be able to withstand safely the shock and weight of a lift carrying 125% of rated load at rated speed. A notice shall be fitted in a prominent position requiring the pit prop or stop to be deployed when working underneath the lift.

If the lift has a short travel distance that precludes a 600 mm high space, the working space height shall be the maximum available with the lift car at the top landing.

6.3.2 Dryness of pits

Pits shall be kept sufficiently dry to ensure against malfunction of components. Details of proposals and their adequacy shall be provided by the person proposing to install the lift.

C6.3.2

Proposals need to account for both external moisture and indoor water sources. Depending on circumstances drains or sumps with sump pumps or other measures will be required to ensure the necessary dryness of lift pits.

7 ROPES AND CHAINS

7.1 Number and quality of ropes

Roped hydraulic lifts and drum drive lifts shall each have at least two ropes. Other types of lift with rope suspension shall have at least three ropes.

Suspension ropes shall be steel wire ropes to BS EN 12385-5 or of a type specifically intended by the rope manufacturer for use in lift installations. A rope manufacturer's certificate shall be supplied demonstrating the rope's suitability.

7.2 Safety factor

The minimum safety factor for the combined ropes with a lift carrying 125% rated load shall be 10.

7.3 Rope terminations

Ropes shall be terminated at the car and counterweights using wedge sockets or other suitable rope termination device. Terminations shall have at least 80% of rope strength.

The ropes shall be fitted with adjustable means on the termination device to equalise rope tensions. A label shall be attached to the crosshead or dead-end of any rope termination detailing the rope type and size of rope fitted.

7.4 Suspension chains

Chains used for lift car suspension shall be steel plate link chains and shall be bushed solid bearing pin construction, incorporating rollers. Chains shall not be used where lift travel exceeds 12 m. The factor of safety shall be not less than 12 of the static load. Connecting links shall have a strength at least equal to that of the chain to which they are attached. Chains shall be so installed that any one chain lies in one plane throughout its length.

7.5 Chain guides

Chain wheels or chain pulleys shall be used where the chain is required to change direction and shall have a profile suitable for the chain. These shall be designed to be at least the minimum diameter of that specified by the chain manufacturer. For all applications, means shall be provided to prevent the chain from leaving the guide.

8 BRAKE

8.1 Lifts to have a brake

Lifts other than hydraulic lifts shall have a brake as part of the drive system.

8.2 Brake operation

The brake shall be released only when energised and when power is being delivered to the drive motor. When de-energised, the brake shall stop the lift carrying 125% rated load within 20 mm and hold it safely.

8.3 Brake positioning

The brake shall be positioned to act as close as possible to the load (for example, between the motor or gearbox and the drive sheave, drive wheel, or winch drum).

8.4 Manual release

It shall be possible for the brake to be released manually as part of the procedure for lowering or raising the lift by hand in the event of a power failure. Constant pressure shall be required to keep the brake released. This feature is not required for platform lifts with a travel distance of less than 1 m.

9 DRIVES

9.1 General

9.1.1 Guards and enclosures

Machinery and moving parts shall be enclosed or guarded.

Lifts with machinery that has exposed moving parts and that is not in an enclosed part of the lift shaft shall have that machinery in a lockable room or cabinet. Where this is not possible, such as may, for example, be the case with a screw-drive for a platform lift with an open car, the moving parts shall be protected by means of a guard. In such a case, any necessary gaps for running clearances and the like shall be designed to avoid an entanglement hazard (see 2.3.6).

Guards shall not have any sharp edges. Removal of a guard shall cause a switch in the safety circuit to operate. A force of 30 N applied by a 25 cm^2 probe on any part of a guard shall not cause permanent deformation and shall not cause dimensional requirements to be violated.

9.1.2 Access and working space

There shall be adequate access to and working space around machinery.

Access routes to machinery shall be at least 450 mm wide and 1.97 m high. If it is necessary for a part of the access route to have a reduced height, it shall be 750 mm wide and at least 1000 mm high.

A working space 600 mm deep shall be provided in front of all cabinets and machinery. If the working space height is less than 2.0 m, the working space shall be at least 1 m deep.

It shall be possible to open all hinged cabinet doors to an angle of at least 90°.

9.2 Direct hydraulic drive

9.2.1 Hydraulic jacks

Hydraulic jacks shall pass a pressure test of twice that needed to support the lift carrying 125% rated load.

The stroke of the jack shall be such that:

(a) With the lift resting on its stops below the lowest landing, or on fully compressed buffers if applicable, the bottom of the ram shall be at least 25 mm above the base of the cylinder; and

(b) With the lift at the top landing the minimum unused stroke required shall be as determined from Table 1.

Table 1 – Minimum unused stroke of hydraulic jack

Lift travel	Minimum unused stroke
Up to 5 m	25 mm
Greater than 5 m	0.5% of travel

9.2.2 Caisson

Any hole bored in the ground to house a hydraulic jack shall be lined with a waterproof caisson. The inner diameter of the caisson shall be at least 100 mm greater than the outer diameter of the hydraulic jack. There shall be a minimum of 100 mm clearance between the caisson bottom and the bottom of the jack. The caisson shall extend at least 150 mm above the floor of the pit. The lift shall not impose any load on the caisson.

C9.2.2

The caisson performs the two functions of preventing collapse of the bored hole and protecting the jack from damage and deterioration caused by contact with water. If the jack itself is weatherproof, as may for example be the case with a water hydraulic jack, consideration may be given to having instead the caisson open-ended and its upper end finishing flush with the pit floor so it may act as a drain.

9.2.3 Anti creep/re-levelling device

A hydraulic lift that is parked at a landing shall detect when the lift car has sunk to near the bottom limit of the unlocking zone and shall re-level the lift at the landing. This requirement does not apply to an open platform lift with a travel distance less than 1 m.

9.2.4 Ram connection

The ram shall be attached to the car frame with a connecting coupling of sufficient strength to support the mass of the lift plus 125% rated load with a safety factor of not less than 4 on ultimate tensile strength. Such connections shall be designed to minimise eccentric loading of the ram.

The connection between lift and ram shall be designed to a safety factor of 4 on ultimate tensile strength to prevent disengagement of a ram from the lift when the ram strikes the ram stops, with the lift travelling upward at rated speed.

9.2.5 Relief valve

When the pump is capable of producing more than twice the pressure required to drive the lift with rated load upwards, a pump relief valve complying with Appendix E shall be installed.

9.2.6 Check valve

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

9.2.7 Rupture/flow restriction valve

The lift shall be fitted with a flow restriction valve that, in the event of rupture of a hydraulic line, restricts the downward speed of the lift carrying 125% rated load to 0.3 m/s or slower. The valve shall comply with the requirements of Appendix E. Alternatively the cylinder outlet shall be fitted with an orifice that results in the same speed limitation.

9.2.8 Manual lowering

Means shall be provided in or adjacent to the hydraulic tank (or pump) to lower the lift in an emergency under manual control. The lowering speed of a lift carrying 125% rated load shall not exceed 0.2 m/s or the lift rated speed, whichever is less.

9.2.9 Hydraulic tank

The hydraulic tank of an oil hydraulic system shall comply with section Appendix E.

9.2.10 Hydraulic lines

Hydraulic lines in an oil hydraulic system shall comply with, and shall be fitted in accordance with, Appendix E.

9.3 Indirect hydraulic drive

9.3.1 Number of ropes or chains

There shall be a minimum of two ropes or chains (see section 7) for an indirect hydraulic drive lift. Each rope or chain shall have a safety switch that in the event of breakage or excessive stretch in one or more suspension ropes or chains shall open and stop the lift.

9.3.2 Sheaves

The minimum sheave diameter shall be 40 times the nominal rope diameter.

Sheaves shall be grooved. The groove radius shall be 1.05 times half the diameter of the rope. The groove depth shall subtend an angle of 150°.

Sheaves shall have a flange on each side. Flanges shall extend to at least 1.5 times the rope diameter measured from the top of the groove.

9.3.3 Trolley guides

The guides for the sheave trolley shall be aligned with the ram so that it is not subjected to eccentric loading.

9.3.4 Anti creep/re-levelling device

A hydraulic lift that is parked at a landing shall detect when the lift car has sunk to near the bottom limit of the unlocking zone and shall re-level the lift at the landing.

9.3.5 Relief valve

When the pump is capable of producing more than twice the pressure required to drive the lift with rated load upwards, a pump relief valve complying with Appendix E, E1 shall be installed.

9.3.6 Check valve

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

9.3.7 Rupture/flow restriction valve

A flow restriction valve is not required for lifts with safety gear, but is recommended. Any flow restriction valve or alternative device shall comply with 9.2.7.

9.3.8 Manual lowering

Means shall be provided in or adjacent to the hydraulic tank (or pump) to lower the lift in an emergency under manual control. The lowering speed of a lift carrying 125% rated load shall not exceed 0.2 m/s or the lift rated speed, whichever is less.

9.3.9 Hydraulic tank

The hydraulic tank shall comply with Appendix E.

9.3.10 Hydraulic lines

Hydraulic lines shall comply with, and shall be fitted in accordance with, Appendix E.

9.4 Screw drive

9.4.1 Safety factor

With the lift carrying 125% rated load, the lift shall have the following safety factors:

(a) Screws under tensile loads shall have a safety factor of at least 5;

(b) Screws under compressive loads shall have a safety factor of at least 3 against buckling and the connection between the car platform and the nut(s) shall be flexible, with sufficient movement so that the relative movement and tilt of the lift car does not impose any lateral stress on the screw;

(c) The load-carrying nut shall, at state of maximum wear, have a safety factor of at least 5 when carrying 125% of rated load and under maximum torque condition.

9.4.2 Wear

The material of the load-carrying nut shall be of lower hardness than the mating screw.

It shall be possible to inspect and determine the wear of the load-carrying nut.

9.4.3 Safety nut

Screw drives shall include a safety nut capable of supporting the lift when carrying 125% rated load. During normal operation the safety nut shall not bear any load. The safety nut and its connection to the load carrying nut shall have a safety factor of at least 5 with the lift carrying 125% rated load and maximum torque conditions, including dynamic forces caused by the load-carrying nut collapsing. A safety switch shall be fitted to stop the drive if there is a load on the safety nut.

9.5 Drum drive

9.5.1 Installation

Drums from which a lift is suspended shall be fixed and supported on top of beams or other structure. Drums shall not be suspended from beams, ceilings, or other structures.

9.5.2 Drum construction

Drums shall be grooved and shall be long enough to hold all the rope in a single layer. The groove radius shall be 1.05 times half the rope diameter. The groove pitch shall be at least 1.1 times the rope diameter. The minimum drum diameter (measured between the centres of the wound rope) shall be 30 times the rope diameter. Drums shall have a flange at each end, with a minimum depth of 1 times the rope diameter measured from the top of the groove.

9.5.3 Application

With the lift car resting on the bottom stops, there shall be a minimum of 1.5 turns of rope on the drum. With the lift at its limit of upward travel, the drum shall be capable of accepting a further 1.5 turns.

The maximum angle of fleet shall be 5°.

9.5.4 Ropes

Drum drives shall have a minimum of two ropes. The ropes shall wind onto separate sections of the same drum. The sections shall be separated by a flange type barrier at least one rope diameter high measured from the top of the drum groove. The ropes shall wind onto the drum inwards, to avoid lateral forces on the lift car and to minimise fleet angle. Ropes shall be from the same batch.

C9.5.4

The requirement for ropes to be from the same batch means that although the ropes wind onto the drum in opposite directions, a left-handed and right-handed rope shall not be used; the negative aspects of possible variation between batches outweighs the advantages of using different handed ropes.

9.5.5 Slack rope safety switches

The drive shall include a separate slack rope switch for each rope. The switches shall be adjusted to suit the lift load and travel, and shall be set to operate before there is more than 20 mm slack in a rope.

9.5.6 Brake

Drums shall be fitted with a brake that meets the requirements of section 8.

9.5.7 Manual operation

It shall be possible to release the brake and power the drive by hand in the event of a power failure. The hand-winding operation shall be by turning a smooth solid wheel.

9.6 Traction drive

9.6.1 Installation

The drive machine and all sheaves from which a lift is suspended shall be fixed and supported on top of beams or other structure and shall not be suspended.

9.6.2 Sheaves

The minimum sheave diameter shall be 40 times the nominal rope diameter.

Sheaves shall be grooved. The groove radius shall be 1.05 times half the diameter of the rope. The groove depth shall subtend an angle of 150°.

Sheaves shall have a flange on each side. Flanges shall extend to at least 1.5 times the rope diameter measured from the top of the groove.

9.6.3 Ropes

Ropes shall meet the requirements of section 7. A slack rope safety switch or switches shall operate in the event of there being more than 20 mm slack in any rope.

9.6.4 Brake

The drive machine shall include a brake that meets the requirements of section 8.

9.6.5 Manual operation

It shall be possible to release the brake and power the drive by hand in the event of a power failure. The hand-winding operation shall be by turning a smooth solid wheel.

10 SIGNS AND MARKINGS

10.1 Identification of public lifts

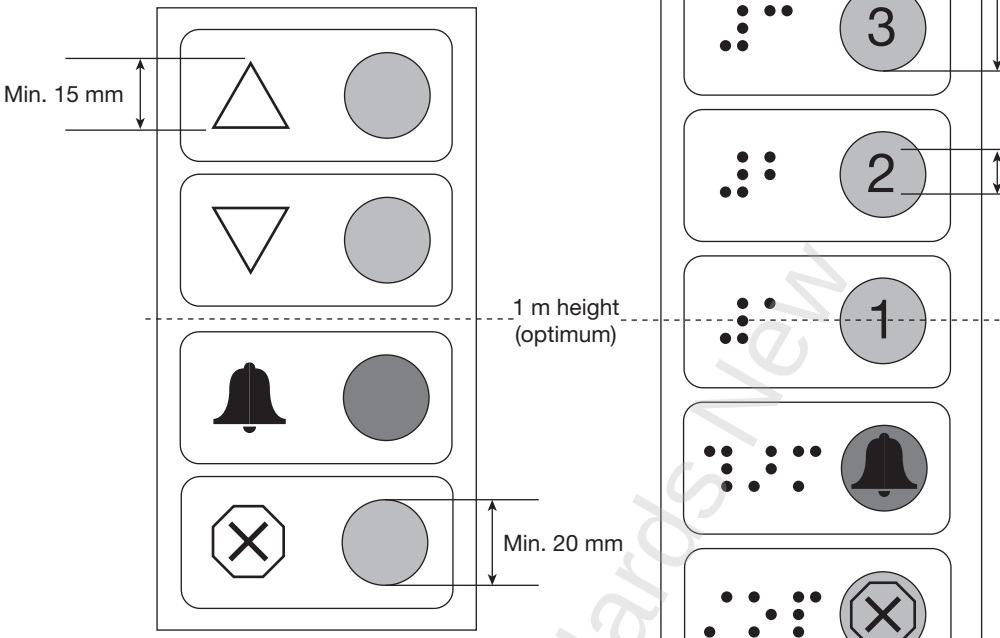
Low-speed lifts, enclosed platform lifts, and all other lifts if their presence is not obvious, shall be identified by a sign placed above or immediately adjacent to each lift entrance. The sign shall be colour contrasted with the surroundings, be clearly visible and shall contain the word 'LIFT' with letters of height as set out in Table 2 depending on the distance the sign will be viewed from.

Table 2 – Viewing distances and letter

Viewing distance	Letter height
0 – 20 m	50 mm
20 – 30 m	75 mm
30 – 40 m	100 mm
> 40 m	125 mm

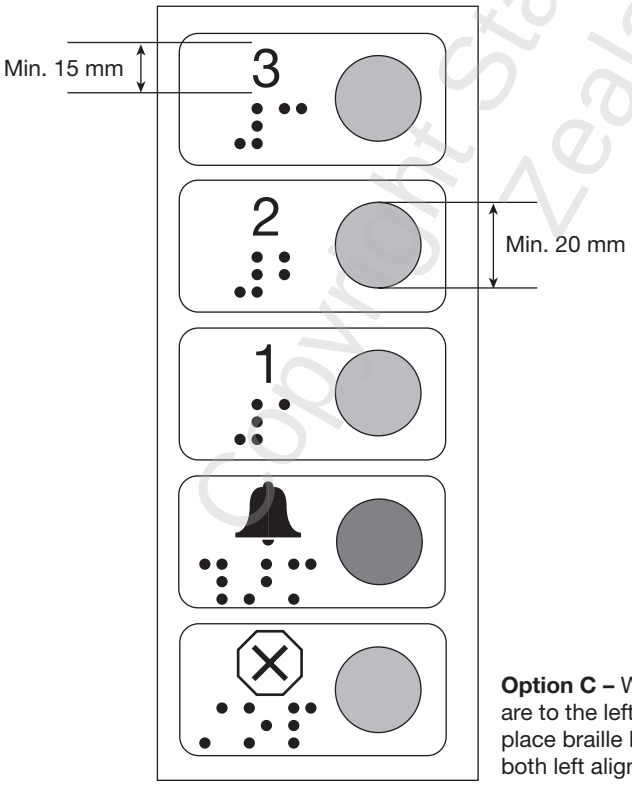
10.2 Car controls

For information on car controls see 3.4. For an example of car controls see Figure 19.



Option A – two stops only
(Braille recommended but not required.)

Option B – Where tactile symbols are on the control buttons, braille is left aligned.



Option C – Where tactile symbols are to the left of control buttons, place braille beneath tactile symbols, both left aligned to control buttons.

NOTE – Braille dots and spacing sized as per the technical specifications in the *Accessible Signage Guidelines*.

Figure 19 – Example layout of car controls

10.3 Marking at landings

Public enclosed platform lifts with more than two landings and public low-speed lifts with more than two landings shall have the floor designation marked adjacent to the fly (non-hinged) side of the door (or in the case of a centre-parting sliding door on the right side looking from inside the lift) at a height of 1000 mm above the landing level. The designation shall be visible to passengers in the lift and shall have each character at least 30 mm high in a contrasting colour to its background. The characters shall be raised tactile or there shall be a marking in Braille (refer to the *Accessible Signage Guidelines*), conforming to 10.6, alongside the nearest opening.

10.4 Manufacturer's plate

Each lift shall bear a manufacturer's plate that includes at least the following information:

(a) Manufacturer's name;

(b) Manufacturer's location (town or city);

(c) The model number and serial or project number; this shall be sufficient information for the manufacturer to supply the correct replacement parts if needed;

(d) Electrical supply requirements including voltage, number of phases, frequency, and current rating;

(e) The year of manufacture (if not readily apparent from the serial or project number).

The information shall be permanently marked on a plate in characters at least 2 mm in height.

The plate shall be permanently fixed to the lift in a position where it can be readily seen by a lift service person or inspector before gaining access to machinery or control equipment.

C10.4

If the plate includes information in lower case characters, the minimum 2 mm height applies to the lower case characters with the upper case characters being correspondingly larger.

10.5 Load plate

Each lift shall bear a load plate where it may be readily seen by passengers or intending passengers. The load plate shall show the rated load in kilograms in characters at least 6 mm in height. The plate shall also show the nominal number of passengers and, if applicable, the number of standing passengers that may accompany a passenger in a wheelchair. The number of standing passengers shall be determined by dividing the rated load by 75 and ignoring any remainder. The number of standing passengers that may accompany a passenger in a wheelchair shall be determined by subtracting 175 kg from the rated load and then dividing by 75, ignoring any remainder. The information on number of passengers shall be presented in ideographic form.

Figure 20 provides examples.

Figure 20 – Examples of load plates

10.6 Braille signage

Braille shall be Unified English Braille meeting the requirements of the technical specifications of the *Accessible Signage Guidelines* published by the Royal New Zealand Foundation of the Blind (RNZFB). Braille signs of 10 words or fewer shall be 'uncontracted' Braille.

C10.6

Unified English Braille (one of a number of different Braille languages used worldwide) is the standard adopted for Braille in New Zealand. Uncontracted Braille consists of the alphabet, punctuation, and numbers with one letter of Braille for each letter of print. The RNZFB Accessible Signage Guidelines *have been officially endorsed by the Braille Authority of New Zealand Aotearoa Trust (BANZAT), the Association of the Blind Citizens of New Zealand, and the Guide Dog Society New Zealand Inc. This type of Braille is usable by blind and partially sighted people, including those who are deaf-blind. Some imported signs fall outside these recommended guidelines. For example, Braille signs produced in Japan, Korea, Italy, and Sweden use slightly smaller dots and spacing, which can be very difficult to read by those not familiar with this size of Braille. Also, signs imported from the United States of America may be in contracted Braille which does not comply with this Standard or meet the RNZFB guidelines.*

10.6.1 Placement & layout

All text and Braille on a sign shall be left-aligned and set horizontally. Braille designations shall not be placed on lift control buttons or landing control buttons.

For information on car and landing controls use 3.4 and 5.2. For an example of controls see Figure 19.

10.6.2 Contrast

Ensure any print sign visually contrasts with its background so that it can be located more easily by partially sighted people.

10.7 Warning signs

If required by 6.3.1, a notice shall be placed in the area under the lift car opposite the access point or elsewhere where it is clearly visible to anyone venturing under the lift car. The notice shall read as set out in Figure 21(a). The word 'DANGER' shall be a minimum height of 15 mm and other wording a minimum height of 10 mm.

If required by 4.2.10, a notice shall be placed in the lift shaft opposite the access point or elsewhere where it is clearly visible to anyone venturing onto the lift car. The notice shall read as set out in Figure 21(b). The word 'DANGER' shall be a minimum height of 30 mm and other wording a minimum height of 20 mm.

A sign adjacent to the stowed pit-prop or lift-stop shall identify the item and provide any necessary instructions for its deployment and subsequent stowage.

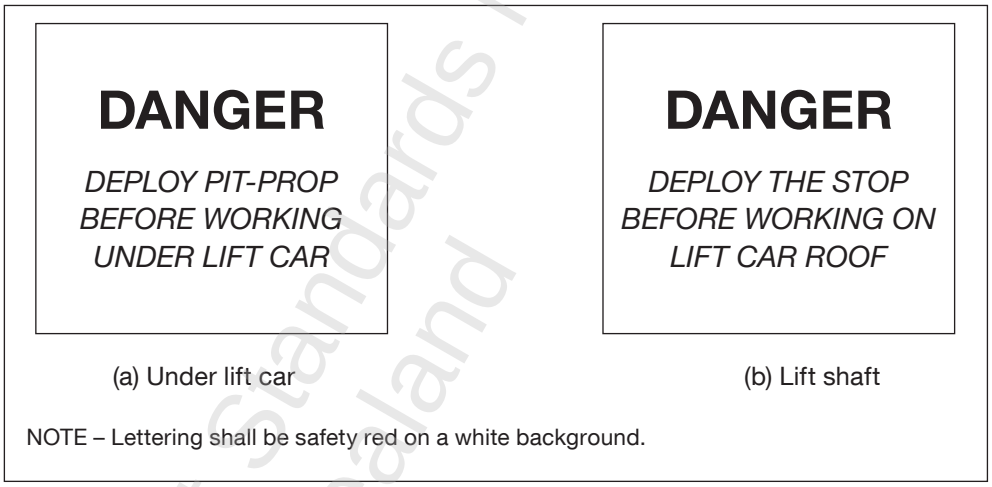


Figure 21 – Warning signs

10.8 Lift alarm

The sign stating the words 'LIFT ALARM' required by 4.1.10.1 shall be white on a safety red background and have letters 100 mm high. Beneath these words, whom to contact and the contact telephone number shall be given in numbers and letters 50 mm high. The latter information shall be black on a white background.

11 DOCUMENTATION

For building consent purposes the person proposing to install the lift shall supply the following information. Items (e) and (h) apply only to public lifts, all other items apply to both domestic and public lifts:

(a) Drawings and specifications detailing the lift installation, including the circuit diagram;

(b) Demonstration of structural adequacy – see 3.2;

(c) Demonstration of durability – see 3.1;

(d) Justification for lift components meeting performance requirements of this Standard or a document that it references – see 1.2;

(e) Where managed use of a public lift is proposed, justification for, and details of, those procedures, see 5.1.1;

(f) Details of proposed inspections and tests during installation of the lift to be performed on behalf of the owner; and on completion of the work, evidence that the inspections and tests have been satisfactorily performed along with any certificates required for the electrical work;

(g) Requirements for routine maintenance – see 3.1 and Appendix A;

(h) Requirements for inspection and routine maintenance for inclusion in the building's compliance schedule – see 3.1 and Appendix A.

C11

This information comprises 'plans and specifications' as defined in the Building Act.

It is expected that the person proposing to install the lift will receive the above information from the lift manufacturer or supplier, lift designer, the structural designer, and others. Information on any warranties offered is not a NZBC requirement but may assist with the demonstration of durability required above.

Some of the above information may be supported by producer statements (for example: a PS1 for design, a PS2 for design review, a PS3 for construction, or a PS4 for construction review). But note that acceptance of producer statements is not mandatory.

APPENDIX A
INSPECTION AND ROUTINE MAINTENANCE
(Normative)

A1 Platform and low-speed lifts

A model checklist for platform lifts and low-speed lifts is set out in Table A1.

For domestic lifts, this list provides the basis for maintenance; for public lifts it provides the information that shall be included on the building's compliance schedule. Items shall be added or removed as appropriate. (See 1.2.)

Information on the detail of what the checks entail, who shall perform them and their frequency shall be added by the person proposing to install the lift. This information will vary depending on the details of the particular type of lift proposed.

Where a public lift has a managed use as described in 5.1.1 it shall be the responsibility of the building owner to ensure that the lift is readily available for use at times when the building is open, including use by unexpected visitors.

The word 'check' in the table shall be taken as meaning 'check and remedy (maintain, repair, or replace as appropriate) any fault found so as to reinstate to original condition'.

A2 Stairlifts and inclined lifting platforms

Refer to Annex E of BS EN 81-40 as modified by this Standard (see Appendix C).

Table A1 – Inspection checklist

Item	Clause reference in NZS 4334	Checked
Visual inspection of structure for deterioration of fixings or structural components	3.2.1	
Visual check of wiring	3.3 and G9 of NZBC	
Check operation of battery	3.3.1.1 and 3.3.1.2	
Check operation of battery back-up	3.3.1.2	
Check all safety circuit switches operate correctly, including door interlocks, safety edges and sensitive surfaces	3.3.5	
Check correct operation of safety gear	3.3.5.3(h)	
Check security of guards and equipment enclosures	3.3.7	
Check lighting is present	3.3.9	
Check operation of alarm and means of calling help	4.1.10	
Check lateral movement and deflection of lift car under unbalanced load is within limits	4.1.12	
Check guide shoes	4.1.12.1	
Check operation of barrier arms and ramp/stops	4.4.8 and 4.1.10	
Check operation of the means to bypass the lift's management procedures	5.1.1	
Check correct operation of landing and car controls and indicators	5.2.1	
Check operation of doors	5.3	
Check lift shaft enclosure is sound and undamaged	Section 6	
Check condition of ropes; check ropes have equal tension	Section 7	
Check condition of suspension chains. Chains, or sections of chains, showing signs of wear shall be replaced. Check chains have equal tension	Section 7	
Inspect chain guides (chain wheels; chain pulleys)	7.5	
Check condition of hydraulic jacks and hydraulic lines	9.2 and 9.3	
On screw drive lifts, check wear of drive nut	9.4.2	
Check signs are in place and legible	Section 10	
Check pit-prop and lift-stop are present and in good condition	10.7 and Figure 21	

APPENDIX B
RESILIENT BUFFERS – DETERMINATION OF MINIMUM COMPRESSIONS AND STROKES

(Normative)

In the case of buffers with a classic spring characteristic of force being proportional to compression, compliance with 4.1.14.2 shall be determined by measurement of buffer compression under static loads of 75 kg and 125% rated load plus measurement of maximum buffer stroke. The necessary equations are given in Equations B1 to B3. See Table B1 for examples of minimum compression and stroke.

The minimum required dynamic compression C_X of the buffer is given by:

$$C_X = \frac{v^2}{2f} \qquad \text{Equation B1}$$

where:

v = speed of lift upon tripping of safety gear

f = maximum permissible deceleration (of car with a 75 kg load) = 2 m/s^2

C_X = dynamic compression

The dynamic performance of resilient (spring) buffers that have a force proportional to compression shall be determined from measurements of static compression using the following equations.

The dynamic compression C_X shall be determined from measurement of static compression C_S of the buffer using the equation:

$$C_X = C_S + \sqrt{C_S^2 + \frac{C_S.v^2}{g}} \qquad \text{Equation B2}$$

where:

g = the acceleration due to gravity (9.81 m/s^2)

C_S = static compression

The reverse of equation B2 is:

$$C_S = \frac{g.C_X^2}{v^2 + 2.g.C_X} \qquad \text{Equation B3}$$

Table B1 – Examples of minimum compression and stroke

Tripping speed (m/s)	Minimum dynamic compression C_X with light load (using equation B1) (mm)	Corresponding static compression C_S with light load (using equation B3) (mm)	Measured or calculated static compression with 125% rated load (mm)	Corresponding dynamic compression and hence minimum buffer stroke (using equation B2) (mm)
0.3	22.5	9.3	24.9	54.7
0.4	40.0	16.6	44.3	98.1
0.5	62.5	26.0	69.2	155.0
0.6	90.0	37.4	99.7	226.2
0.7	122.5	50.9	135.7	312.8
0.8	160.0	66.5	177.2	415.9
0.9	202.5	84.1	224.3	536.9
1.0	250.0	103.8	276.9	677.4

APPENDIX C
MODIFICATIONS TO BS EN 81-40 FOR APPLICATION IN NEW ZEALAND

(Normative)

This Appendix provides the modifications to BS EN 81-40. Stairlifts and inclined lifting platforms shall comply with BS EN 81-40 as modified by this Appendix. Where there is a conflict between BS EN 81-40 and this Standard (NZS 4334), the general requirements in section 3 of NZS 4334 shall take priority.

C1

5.1.2 Pattern of use

Amend to read:

The mechanical design of the stairlift or inclined lifting platform shall take account of the intended use and frequency to which it will be subjected.

C2

5.1.8.2 Degree of protection for outdoor use

Delete the word 'NOTE', but not the text following the word and Figure 5.

C3

5.5.14.1

Amend first paragraph of 5.5.14.1 to read:

Control devices shall be provided at each boarding point and on the carrier. These shall be used to control the directional movement of the stairlift and their function shall be "hold to run" unless the lift is equipped with a designated emergency stop. The form and nature of the passenger controls of domestic stairlifts and inclined lifting platforms shall be those most suited to the individual user of the lift.

C4

5.6.1.3 Minimum clearance dimensions

Amend to read:

Required minimum clearance dimensions shall be as shown in Figure 5.

C5

Figure 5a) Standing passenger

Delete '1800'

And **replace** with '2000'

C6

Amend all 'should's to 'shall' in the following clauses of BS EN 81-40:

5.4.8.1

5.5.10.4 second paragraph

5.5.12.4 second paragraph

Figure 5 Note

5.6.2.2 third paragraph

C7

5.6.2.2 Height above stairway

Delete the note.

C8

6.2 Verification of design

Amend last sentence to read:

All verification records shall be submitted as part of the building consent documentation.

C9

6.4.2

Amend text to read:

A test and examination document which declares at least all the information and the results of all checks on-site listed above shall be submitted.

C10

7.1 General

Amend to read:

Test certificates for any rope(s) and chain(s) shall be supplied demonstrating their suitability.

C11

7.4.2 Emergency alarm device

Amend to read:

Any emergency alarm device specified in 5.5.16 shall be coloured yellow and shall be identified by a bell symbol, Symbol No. 5013 in IEC 60417:2002.

Alarms shall produce a sound of at least 110 decibels (dB) unless it can be demonstrated that a lesser sound level is suitable for the particular case. Where the sounder is not on or adjacent to the inclined lifting platform, a sign shall be fixed near the sounder stating 'LIFT ALARM' and, in the case of an alarm fitted outside the building that relates to an inclined lifting platform inside the building, the sign shall state whom to contact for assistance.

C12

Annex A, Clause A.1 Instruments

Delete 'unless particularly specified'

C13

Annex B

Delete subheading title 'Design guidelines'

Replace with 'Design requirements'

Under subheading **amend** first paragraph, second sentence to read:

Follow the recommendations given below, when information is collected from the safety chain for control purposes, for remote control, alarm control, and so on.

Fourth listed item. **Amend** to read:

– always use outside (out of element) resistors as protective devices of input elements; internal resistor of the device shall not be considered as safe;

C14

Delete Annex E and **replace** with:

Annex E

(Normative)

In-use periodic examination, tests and servicing

E.1 Periodic examinations and tests

The correct operation and condition of all aspects necessary to ensure the ongoing safety of the stairlift or inclined lifting platform, including the following as appropriate, shall be thoroughly checked at intervals not exceeding 12 months. The exact details of what is to be checked will vary depending on the details of the particular type of stairlift or inclined lifting platform proposed and shall be furnished by the person proposing to install the stairlift or inclined lifting platform taking advice from the manufacturer and others as appropriate:

(a) interlocking devices;

(b) electrical safety circuits;

(c) earthing continuity;

(d) supporting and suspension means for lifting;

(e) driving unit and brakes;

(f) devices for preventing free fall and descent with excessive speed, e.g. safety gear;

(g) alarm system (if any);

(h) sensitive edges and surfaces;

(i) inspection of guides and guide shoes or rollers;

(j) all control devices;

(k) all barriers, ramps, locks, hinged platforms and similar devices;

(l) all notices, and so on, are correctly displayed;

(m) emergency/manual operation;

(n) overload detection device for wheelchair platforms only;

(o) structure and fixings to it;

(p) guards and equipment enclosures;

(q) lighting;

(r) battery;

(s) battery backup.

For stairlifts or inclined lifting platforms, the above list provides the basis for maintenance and inspection.

Information on who is to perform the checks and their frequency shall be added by the person proposing to install the stairlift or inclined lifting platform. This information will vary depending on the details of the particular type of stairlift or inclined lifting platform proposed.

The requirement to 'check' shall be taken as meaning 'check and remedy (maintain, repair, or replace as appropriate) any fault found so as to reinstate to original condition'.

E.2 Servicing

In addition to E.1, the requirements for regular servicing, as necessary to keep the stairlift or inclined lifting platform in good working order, shall be specified by the person proposing to install the stairlift or inclined lifting platform taking advice from the manufacturer and others as appropriate. This information shall include who is to perform the servicing and the required frequency. This information will vary depending on the details of the particular type of stairlift or inclined lifting platform proposed.

APPENDIX D
AUTOMATIC SLIDING DOORS

(Normative)

This Appendix states the requirements for components of automatic sliding doors used in lifts. All content has been taken directly from NZS 4332.

D1 Car and landing doors

D1.1 Types of doors allowed

Automatic sliding doors shall be fitted to all or none of the lift car entrances. Automatic sliding doors shall be of the unperforated panel type and shall slide horizontally. There shall be both car and landing doors.

D1.2 Door size

Automatic sliding doors 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.

D1.3 Construction of doors

D1.3.1 Design

All doors shall be of metal and fire resistant construction. The doors and their ancillary equipment shall be designed to withstand seismic forces in accordance with 3.2.2 without distortion or displacement in any direction. Where doors consist of more than one panel, each panel shall be treated as a door.

D1.3.2 Projections and recesses – Panel doors

Exposed faces of car and landing doors shall be flush-faced without projections or recesses other than those for vision panels. Door panels may have textured surfaces but the maximum depth of indentations must not exceed 1 mm.

On the lift shaft side, no devices other than those provided for operation and locking of the doors shall project into the lift shaft beyond the line of the landing sill.

D1.3.3 Guides

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

D1.3.4 Counterweights

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.

D1.3.5 Door edges

The leading edges shall be smooth and free of sharp projections. The meeting edges of centre-opening doors may be provided with a fire resistive resilient member on one or both doors to form an overlap not exceeding 20 mm. Single-slide doors shall lap the strike jambs but shall not close into pockets in the strike jambs.

D1.3.6 Door clearance

The clearance between the landing face of the door and the architrave shall not exceed a maximum of 6.5 mm.

D1.3.7 Distance of door from landing sill

The doors shall be so located that the distance from the lift shaft face of the landing door to the edge of the landing sill shall be not more than 60 mm.

D1.3.8 Gap between doors

The distance from the lift shaft side of the car door to the lift shaft side of the landing door shall not exceed 140 mm.

D1.3.9 Movement of centre parting doors

Centre-parting doors shall be arranged for simultaneous movement of both panels. Interconnection of door panels shall be made such that the locking of one panel shall prevent the opening of all panels.

D1.4 Requirements for vision panels

Landing door vision panels shall comply with the following requirements:

(a) The opening for the vision panel shall not exceed 152 mm in width nor 762 mm in height. Vision panels should be fitted to ensure the top of the panel is no higher than 1.8 m above landing floor surface and the panel extends vertically to at least 1.2 m above the landing floor surface;

(b) Recesses for vision panels shall not exceed 4 mm in depth and shall be bevelled at the edges;

(c) The glazing in the vision panels shall meet the requirements of 3.2.3.

D2 Locking devices and switches for car and landing doors

D2.1 Car doors

Car doors shall be provided with an electrical switch that will prevent the lift car from, being started or kept in motion unless all car doors are closed. It shall not be possible under normal operation for the car door to be opened under power while the lift is in motion, except when the lift car is in the unlocking zone.

D2.2 Landing doors

Landing doors shall be provided with a lock that will prevent the opening of the doors from the landing side unless the car is in that particular unlocking zone. Under normal operation it shall not be possible to start the lift car or keep it in motion unless all landing doors are closed and locked, except when the car is within the landing's unlocking zone it may proceed to floor level with landing doors open.

D2.3 Requirements for door locks

Door locks shall meet the following requirements:

(a) The electrical and mechanical parts of door locks shall be of sound mechanical construction and adequate strength. They shall be designed to withstand reasonable wear without creating unsafe conditions or permitting the use of unsafe practices;

(b) Springs used shall be in compression under all conditions;

(c) Failure of the spring shall not render the lock unsafe;

(d) The locking devices and associated actuating rods or levers shall be so situated or protected as to be reasonably inaccessible from the landing or car;

(e) Electro-mechanical locks shall comply with the following:

(i) Be totally enclosed in one case and the removal of any detachable cover from the case shall not disturb any part of the lock mechanism

(ii) Electrical contacts fitted to a lock designed for prelocking shall be positively prevented from closing until mechanical locking takes place

(iii) If not designed for prelocking it shall be so constructed and adjusted that the electrical contacts cannot be closed until the door is in a position to be mechanically locked, and shall be provided with primary and secondary locking positions. The electrical contacts shall be open when the door is held in the secondary locking position

(iv) Opening of the door shall cause the contacts to be positively opened independently of gravity or springs.

D2.4 Emergency opening arrangements for landing doors

For emergency purposes and for purposes of maintenance and inspection, provisions shall be made to open each door from the landing, when the car is not within the particular landing's unlocking zone. This shall be accomplished with the aid of a key to fit the unlocking triangle as defined in Appendix B of BS EN 81-1 or such other specially shaped key that is in established use in the country. The key shall be kept in a place of security but be readily available in cases of emergency. (The use of a plain rod or bar for this purpose shall be precluded.)

D3 Power operation of car and landing doors

D3.1 Manual opening of power doors

All power-driven car doors shall be capable of being opened manually from within the car in an emergency. When the car is at a landing and within the unlocking zone, the landing doors shall also open with the car doors.

D3.2 Power opening of doors

D3.2.1 Power opening of car doors

Power opening of a car door shall occur only at a landing when the car is stopping, levelling or at rest.

D3.2.2 Power opening of landing doors

Power opening of landing doors shall meet the following requirements:

(a) Power opening shall occur only at that landing where the car is stopping, levelling or at rest and shall begin only when the car is within the unlocking zone (see 4.1.5 of this Standard);

(b) Power opening may be initiated automatically through control circuits provided that the car is being automatically stopped or levelled and provided further that, when stopping under normal operating conditions, the car is at rest or substantially level with the landings before the landing door is in the fully open position.

D3.3 Power closing of doors

D3.3.1 Power closing sequence of doors

The car and landing doors shall close simultaneously.

D3.3.2 Control of power-closed horizontal car and landing doors

Power closing of horizontally sliding car and landing doors by momentary pressure or by automatic means shall be subject to the following conditions:

(a) The power closing shall comply with the relevant requirements of NZS 4332;

(b) Doors shall be provided with a passenger protective device complying with NZS 4332;

(c) A momentary pressure switch shall be provided in the car, the operation of which shall cause the doors to stop and reopen.

D3.4 Kinetic energy and force limitations for power door operations

Where a power-operated horizontally sliding landing door is closed by momentary pressure or by automatic means (see NZS 4332), the closing mechanism shall be designed and installed to comply with the following requirements:

(a) The kinetic energy of the landing door and all its rigidly connected parts, computed for the average closing speed, shall not exceed 9.5 J. Where the landing door and the car door are closed in such a manner that stopping either one manually will stop both, the sum of the landing and car door masses as well as all rigidly connected parts shall be used to compute the kinetic energy;

The average closing speed over the full door travel shall be determined by timing the closing door as follows:

(i) With a single slide door, measure the time required for the leading edge of the door to travel from a point 50 mm away from the open jamb to a point 50 mm away from the opposite jamb. Divide the distance between these points by the time measured

(ii) With centre opening doors, determine the time required for the leading edge of the door to travel from a point 25 mm away from the open jamb to a point 25 mm away from the centre meeting point of the door. Divide the distance between these points by the time measured;

(b) The force necessary to prevent closing of the doors from rest shall be not more than 130 N.

D3.5 Passenger protective device – Horizontal doors

D3.5.1 Provision of device

Where a horizontally sliding car door of a passenger-controlled lift is power-operated in association with the landing doors and the closing is controlled by momentary button pressure or by automatic means, the car door or the door opening shall be provided with a passenger-protective device meeting the following requirements:

(a) The passenger protective device shall not rely on physical contact but shall detect an obstruction (such as a wrist or ankle) in the doorway and shall prevent the door closing until the obstruction is removed unless the delayed closing feature as per NZS 4332 is fitted;

(b) If the door is closing when an obstruction is detected the doors shall stop and reopen partially or fully while the device is activated;

(c) If the car doors are also fitted with a torque limiting device or mechanical safety edge which relies on physical contact for its actuation, the lift may remain in service if the detection device fails, until repairs have been carried out, providing the kinetic energy of the doors when closing does not exceed 3.4 J and an audible warning is sounded in the car during closing of the doors.

The door motor shall be in direct control of the opening and closing motion of the doors.

D3.5.2 Delayed closing

If the closing of doors is delayed for a period of not less than 10 seconds through the operation of the passenger-protective device, the doors may power close with the passenger-protective device ineffective, if the kinetic energy then does not exceed 3.4 J and an audible warning is sounded in the car. The timing device used for this purpose shall be fully reset after the car leaves each landing.

D3.5.3 Circuit failure

In the event of an open-circuit failure of the door reopening initiating devices or of their wiring, the door shall not continue to close at normal operating speed, but may continue to close at a lower speed provided that the kinetic energy of the door does not exceed 3.4 J, and an audible warning is sounded in the car.

D3.5.4 Secondary device

Where a secondary door reopening device is used for purposes other than the protection of passengers, failure of this device need not cause a reduction in door speed.

APPENDIX E
HYDRAULIC SYSTEM COMPONENTS

(Normative)

This Appendix states the requirements for components of oil hydraulic systems used in lifts. The content is substantially the same as in NZS 4332.

E1 Pump relief valve

E1.1 Provision

Each pump or group of pumps shall be equipped with a relief valve.

E1.2 Type and location

The relief valve shall be located between the pump and the check valve, and shall be of such a type and so installed in a bypass connection that the valve cannot be shut off from the hydraulic system.

E1.3 Setting

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

E1.4 Size

The size of the relief valve and bypass shall be sufficient to pass the maximum rated capacity of the pump without raising the pressure more than 20% above that at which the valve opens. More than one relief valve may be used to obtain the required capacity.

E1.5 Sealing

Relief valves having exposed pressure adjustments shall have their means of adjustment sealed after setting to the correct pressure.

NOTE – No relief valve is required for centrifugal pumps driven by induction motors provided that the shut-off or maximum pressure which the pump can develop is not greater than 135% of the design working pressure at the pump.

E2 Flow restriction valve

A flow restriction valve shall be provided for every direct-acting electrohydraulic lift and shall comply with the following requirements:

(a) The valve shall not be electrically operated;

(b) The valve shall be installed in the pressure-line as close as practicable to the cylinder;

(c) In the event of pressure-line failure, the valve shall operate to restrict the down speed of the lift carrying 125% load to not more than 0.3 m/s;

(d) The valve shall be set to operate at a lift speed not exceeding 30% above the normal full-load down speed of the lift;

(e) Where the rated speed exceeds 0.5 m/s the valve shall be of a cushion-closing type;

(f) The valve shall be tested as follows:

(i) An overspeed test, simulating a broken line condition or loss of pressure, shall be carried out on site to demonstrate its effective operation

(ii) Where the pipe or valve capacity limits the ability to overspeed the lift, factory certified test certificates detailing the flow required to actuate the valve shall be provided by the manufacturer

(iii) Where external adjustment to the valve is provided, the overspeed test on site shall be performed.

E3 Hydraulic lines – General

E3.1 Permitted types

Hydraulic lines shall be either rigid metallic pipes, or flexible hydraulic hoses, or a combination of both.

E3.2 Length

The length of hydraulic lines shall be as short as possible and the number of joints and fittings shall be kept to the reasonably practicable minimum.

Joints shall not be used in hoses to achieve the required length.

E3.3 Supports

Hydraulic lines shall be supported to eliminate undue stresses in pipes, joints and fittings, particularly at any section subject to vibration. Piping supports to restrain transverse motion shall be provided near changes in direction and particularly near valves and joints and shall comply with the requirements of 3.2.2 of this Standard.

E3.4 Joints and connections

Joints and connections of hydraulic lines external to the power unit shall be welded flange fittings or flared screwed connections complying with ISO 8434-2. However, where the pressure in a hydraulic line does not exceed 3.5 MPa, taper-to-taper screwed connections may be used.

E3.5 Sound-isolating joints

Approved sound-isolating joints may be used in the pressure pipe, provided that failure of the resilient sealing element shall not permit separation of the connected parts. Such joints, where used, shall be factory made and fitted requiring only assembly in the field.

E4 Rigid hydraulic lines

E4.1 Material

All hydraulic pipes, fittings and flanges shall be of steel and shall comply with an approved standard specification suitable for the use of pressurised oil lines in hydraulic lift installations, such as AS 1074 for pipes and AS 1074, or part 3 or part 4 of BS EN 10253 for fittings.

E4.2 Wall thickness

The wall thickness of steel piping shall be not less than that determined by the following formula:

$$t = \frac{PD}{2S} + C \qquad \text{Equation E1}$$

where:

t = minimum wall thickness, in millimetres

P = working pressure, MPa

D = outside diameter of pipe, in millimetres

C = for threaded pipe up to 9.5 mm 1.25

= for threaded pipe over 9.5 mm .... depth of thread, in millimetres

= for grooved pipe .... depth of groove, in millimetres

= for other pipe of unreduced thickness .... zero

S = allowable stress (that is, 0.4 times the yield strength), MPa.

E4.3 Plain end metallic non-ferrous piping or tubing

Plain-end metallic non-ferrous piping or tubing shall have a wall thickness not less than that determined by Equation E1 using C = zero.

E5 Hydraulic lines – Hoses

E5.1 Material

For flexible hose, proof of its suitability for its intended use shall be submitted. Proof shall be provided by an independent specialist and shall take into account all parts of the system such as operating temperature range, pressure, flow, restrictions, fluid type, and grade. The proof shall demonstrate that the hose conforms to an appropriate material Standard and has a minimum burst pressure of at least four times the maximum working pressure of the system.

E5.2 Hose fittings

Hose fittings shall be factory fitted and of a non-reusable (swaged) type.

E5.3 Location

Hose assemblies shall be visible and able to be inspected.

The locations of hoses and connections shall permit replacement of the hoses and the connections.

Flexible connections shall not be installed between the cylinder and the flow-restriction valve required by 9.2.7 of this Standard.

E5.4 Supports

Hoses shall be supported to prevent undue stress on the hose and its fittings. Distances between centres of adjacent supports shall not exceed 3 m vertically or 1 m horizontally.

Because of possible flexing of hoses during lift operation, they may require additional fixings to maintain the required car running clearances.

Loops and bends shall be adequately supported or guarded where they could be stood upon.

During construction, horizontal runs of flexible hose in the liftwell shall be covered to prevent damage caused by falling objects.

E5.5 Installation

Hydraulic hoses shall be installed in accordance with recommended practice, examples of which are illustrated in Figure E1. Incorrect practices, examples of which are illustrated in Figure E2, shall not be used.

The radii of bends in hoses shall be not less than those recommended by the manufacturer.

Long lengths of hose shall be supported before and after the bends to reduce the strain on the hose and its fittings.

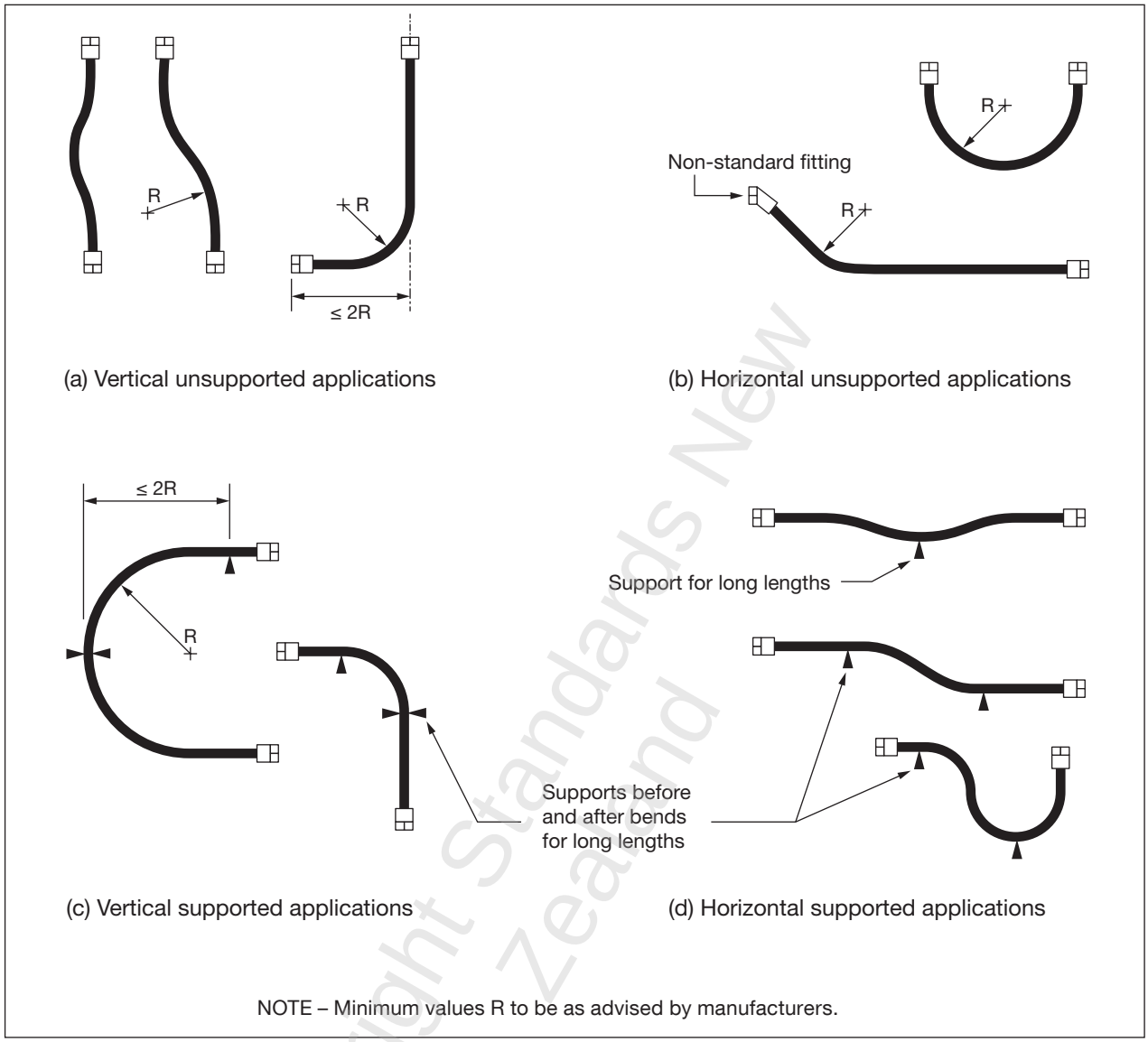


Figure E1 – Recommended practices for positioning hydraulic hoses

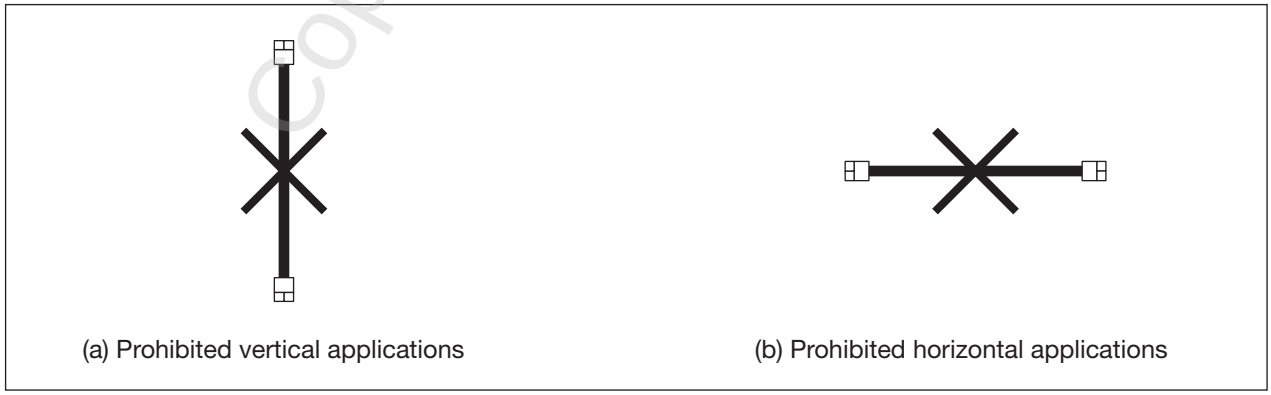


Figure E2 – Non-recommended practices for positioning hydraulic hoses

E6 Tanks

E6.1 Material

Atmospheric storage and discharge tanks shall be of metal or an appropriate plastic. The characteristics of the hydraulic fluid shall be indicated on the tank.

E6.2 Capacity

Tanks shall be of sufficient capacity to provide for a liquid reserve adequate to prevent the entrance of air or other gas into the system.

E6.3 Means of checking liquid level

Tanks shall be provided with a means for checking the liquid level. Such means shall be accessible without the removal of any cover or other part. A dipstick is permissible.

The permissible minimum liquid level with the car at the highest landing served shall be permanently marked with the words:

'LOWEST PERMISSIBLE LEVEL – CAR AT HIGHEST LANDING'

If a dipstick is used it shall be marked with a line worded MIN. and the above notice shall be affixed to the tank adjacent to the dipstick.

If external glass gauges are used they shall be suitably protected.

E6.4 Covers and venting

Tanks shall be covered and suitably vented to atmosphere.

E6.5 Factor of safety

Tanks shall be designed and constructed so that when they are completely filled the factor of safety will be at least 4 based on the tensile strength of the material.

E6.6 Fittings and protection

Tanks and feed pipe connections shall be of fluid-tight construction.

The system shall incorporate a continuous full-flow removable oil filter.

Means for draining the tank shall be provided.

The tank shall be clearly visible for examination and be of a material, or have a protective coating of a substance unaffected by the working fluid.

NOTES

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