

AS/NZS 4431:1996

Australian/New Zealand Standard®

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**Guidelines for safe working  
on new lift installations in new  
constructions**

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- AS
- 3012 Electrical installations—Construction and demolition sites
- 3190 Approval and test specification —Residual current devices (current-operated earth-leakage devices)
- NZS
- 4332P Non-domestic passenger and goods lifts

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The following interests are represented on Committee ME/4:

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Association of Consulting Engineers, Australia  
Association of Independent Lift Companies  
Australian Assembly of Fire Authorities  
Australian Building Codes Board  
Australian Chamber of Commerce and Industry  
Australian Construction Services, Department of Administrative Services  
Building Owners and Managers Association of Australia  
Department of Training and Industrial Relations, Qld  
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Health and Safety Organization, Vic.  
Institution of Engineers, Australia  
Lift Manufacturers Association of Australia  
Metal Trades Industry Association of Australia  
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## PREFACE

This Standard was prepared by the Joint Standards Australia/Standards New Zealand Committee ME/4 on Lift Installations.

The objective of this Standard is to provide those responsible for lift installations in new buildings with guidelines to safe working provisions and practices.

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## STANDARDS AUSTRALIA/STANDARDS NEW ZEALAND

### Australian/New Zealand Standard

#### Guidelines for safe working on new lift installations in new constructions

#### SECTION 1 SCOPE AND GENERAL

**1.1 SCOPE** This Standard recommends safe working provisions and practices (supported by training) for those responsible for, and involved in, new lift installations and new construction. This Standard is not intended to be solely for the lift contractor, but is also intended to provide guidance for the builder and other associated trades.

The recommendations relate to the safety of persons when entering and leaving the work area on a lift installation and while working there; they also relate to the safety of others in the vicinity, whether working or not, who may be endangered by the action of those working on lifts. It should be appreciated that not every recommendation in this Standard can be applied to all types of lifts.

In general, the Standard relevant to a particular type of lift will specify the minimum technical requirements applicable.

**1.2 DEFINITIONS** For the purpose of this Standard, the definitions contained within AS 1735.1 and that below apply.

**1.2.1 Competent person**—a person who has acquired through training, qualification, or experience, or a combination of these, the knowledge and skills enabling that person to perform the tasks recommended by this Standard.

**1.3 REFERENCED DOCUMENTS** The following documents are referred to in this Standard:

AS	
1269	Acoustics—Hearing conservation
1418	Cranes (including hoists and winches) (known as the SAA Crane Code)
1418.7	Part 7: Builders' hoists and equipment
1576	Scaffolding
1576.1	Part 1: General requirements
1576.4	Part 4: Suspended scaffolding
1657	Fixed platforms, walkways, stairways and ladders—Design, construction and installation
1674	Safety in welding and allied processes
1674.1	Part 1: Fire precautions
1735	Lifts, escalators and moving walks
1735.1	Part 1: General requirements
1735.2	Part 2: Passenger and goods lifts—Electrical
1735.3	Part 3: Passenger and goods lifts—Electrohydraulic
1735.10	Part 10: Tests
1891	Industrial safety belts and harnesses
2626	Industrial safety belts and harness—Selection, use and maintenance

- AS
- 3012 Electrical installations—Construction and demolition sites
- 3190 Approval and test specification—Residual current devices (current-operated earth-leakage devices)
- NZS
- 4332P Non-domestic passenger and goods lifts

## SECTION 2 JOB SITE INSPECTION

### 2.1 ACCESS TO WORK AREAS

**2.1.1 Safety assessment** Before work commences, an initial site safety assessment should be made by a person who is competent to do so. This assessment should identify and record at least the following, as appropriate:

- (a) There are safe means of access to, and egress from, each place of work.
- (b) The anticipated equipment required to carry out the work and the arrangements made for that equipment to be available at the appropriate time.
- (c) Any potential hazards that may be present in the work area.

**2.1.2 Oil refineries, power stations, gas installations, marine installations and chemical works** In such cases, certain safe systems of work or permit to work systems might be needed as agreed with the site management.

Particular attention should be paid to the safety of personnel engaged in other work services within the working area.

**2.1.3 Atrium areas and liftwells not totally enclosed** Before any work is carried out, and while work is being carried out in the atrium areas, or in a liftwell that is not totally enclosed (with the exception of the openings for doors which are covered by Clause 3.4), any open side of the liftwell should be suitably enclosed, or guarded to protect people working in the atrium area or the liftwell where not totally enclosed.

**2.2 PERIODIC ASSESSMENT** Subsequent to the initial safety assessment, periodic assessment of site conditions should be made.

## S E C T I O N 3 S I T E E S T A B L I S H M E N T

### 3.1 SITE ESTABLISHMENT SAFETY

**3.1.1 Procedures** Procedures should be established for all activities to be performed at the workstation to ensure the safe execution of such tasks.

A minimum of two persons should be on any job site.

Training should be in accordance with Clause 14.1.

**3.1.2 Protective equipment** Appropriate protective equipment, e.g. safety foot wear, safety helmets, gloves, hearing protectors, respirators, face masks and safety harnesses, should be provided and used by personnel according to site conditions and the work to be done. Such equipment should be maintained in serviceable condition and replaced as necessary.

**3.1.3 Emergency and rescue procedures** Rescue and recovery procedures for people supported by a safety harness, should be in accordance with Appendix A.

Additional procedures should be set up for other emergencies and rescue situations.

**3.2 DELIVERY OF SITE ESTABLISHMENT EQUIPMENT** The work area should be checked for structural suitability, and adequate means should be available for the moving of equipment. Off-loading and storage areas should be suitably protected.

**3.3 ARRANGEMENT OF LIFTWELL DECKING REQUIREMENTS** When it is intended to work in the liftwell at more than one level at a time, protective decking should be provided above each working area. A protection deck should be designed for a distributed safe working load of not less than 5 kPa (510 kg/m<sup>2</sup>). Installation of heavy equipment should not be carried out whilst persons are working below the protection deck, unless an agreed safe procedure has been developed.

### 3.4 ENTRANCE PROTECTION

**3.4.1 Liftwell enclosures** The minimum requirements for the guarding of openings in liftwell enclosures during installation should be as follows:

- (a) Guards to cover the full width and height of the liftwell enclosure openings, with a minimum depth of 600 mm between the guard and the liftwell wall, to be provided and securely fixed.
- (b) A top cover to be provided for the full area of the guard.
- (c) The guard and door to be covered by wire mesh having a maximum aperture of 50 mm × 50 mm × 2.5 mm minimum thickness.
- (d) A hinged door to be provided, with a minimum height of 2000 mm and a minimum width of 1000 mm, and with a night type latch that—
  - (i) is not capable of being locked in the open position;
  - (ii) does not require a key to open it from within the guard enclosure; and
  - (iii) is guarded to prevent the door being opened from outside the guard enclosure by means other than a key.
- (e) The clearance between the bottom of the guard and the floor to be a maximum of 10 mm.
- (f) A toe guard 150 mm high to be provided for the full width of the guard.

- (g) Where guards are removed to allow for completion of wall and floor finishes, the landing doors to be effectively held closed by the door locks, or other means, unless Item (j) applies. Where any significant gaps between the building structure and the landing entrance occur, temporary sealing should be applied to prevent objects entering the liftwell.
- (h) Guards may be removed after the door locks are fitted and mechanically operational. However, where entrances are fitted with external unlocking devices, guards should remain in place.
- (i) Where Item (h) above applies, the minimum depth between the guard and the liftwell may be reduced to 450 mm (see Figure 3.4(B)).
- (j) The lift is not to operate under power without guards, unless the door locks are in circuit.
- (k) The following notice in permanent characters, to be exhibited in a prominent position on every door:

DANGER  
ENTRY OF UNAUTHORIZED  
PERSONS PROHIBITED

The word 'DANGER' should be in letters not less than 25 mm high and the remainder of the notice in letters not less than 10 mm high.

NOTE: An example for guarding of openings in liftwell enclosures is shown in Figures 3.4(A) and 3.4(B).

**3.4.2 Bank of lifts in a foyer** Where a bank of lifts is situated in a foyer, the foyer may be enclosed at each end by a guard which extends across the full width of the foyer, with the exception of a door, and the following requirements should apply:

- (a) The guard to extend to a minimum height of 2000 mm.
- (b) The guard and door to be covered by solid panels of 10 mm min. thickness or wire mesh which has a maximum aperture of 50 mm × 50 mm × 2.5 mm min. thickness.
- (c) A hinged door to be provided, with a minimum height of 2000 mm and a minimum width of 1000 mm, and with a night type latch that—
  - (i) is not capable of being locked in the open position;
  - (ii) does not require a key to open it from within the guard enclosure; and
  - (iii) is guarded to prevent the door being opened from outside the guard enclosure by means other than a key.
- (d) The following notice, in permanent characters, to be exhibited in a prominent position on every door:

DANGER  
ENTRY OF UNAUTHORIZED  
PERSONS PROHIBITED

- (e) Every opening in the liftwell enclosure within the enclosed areas to be guarded by a guardrail or fence of a height not less than 900 mm above the floor of the landing together with a toeboard 150 mm high fixed at the level of the floor of the landing.
- (f) The guardrail or fence described in Item (e) the above to be set back not less than 600 mm or more than 900 mm from the line of the liftwell enclosure wall. Where people will be working below the levels at which this guard is provided, the decking required by Clause 3.3 will apply, or full height guarding complying with Clause 3.4.1 will apply.

NOTE: Examples of the above guarding are shown in Figures 3.4(C) and 3.4(D).

### 3.5 LIGHTING AND POWER

**3.5.1 General** Adequate lighting for the lift installation and adequate provision of power for safe access, safe working conditions and safe egress should be provided. The lighting and power circuits should be in accordance with AS 3012.

Electrical supply wiring should be from a separate final sub-circuit protected by a residual current device (RCD) of a type II (30 mA maximum) complying with AS 3190.

Main switches should be located and tagged to reduce the chance of being switched off by other persons on site.

Lighting may have either temporary or permanent wiring. Fluorescent lighting units of not less than 36 W or equivalent temporary lighting should be installed to illuminate each workstation. Such lighting should be mechanically protected.

**3.5.2 Emergency lighting upon loss of normal lighting.** Emergency lighting should be provided to allow safe egress from the workstation upon loss of normal lighting. The emergency lighting should be provided for a minimum of one hour.

**3.6 TEMPORARY VENTILATION** Adequate ventilation should be provided at the workstation.

Work procedures which generate quantities of dust, fumes, mist, vapours and the like, are to be performed in such a way as to prevent the build-up of hazardous levels. Where this is not practical, measures should be taken to control or reduce the hazard in the workstation, i.e. by providing portable mechanical ventilation to draw fresh air supply to the work area and remove the contaminated air.

If it is not possible to otherwise reduce the hazard, the use of personal protective equipment should be considered as a means of protection only.

Where personal protective equipment is used, all personnel required to use it should be trained in correct selection, use, maintenance and care of such equipment.

**3.7 NOISE** Work which generates noise should be performed in such a way as to minimize hazardous noise levels.

The use of personal protective equipment should be considered only as a last means of protection.

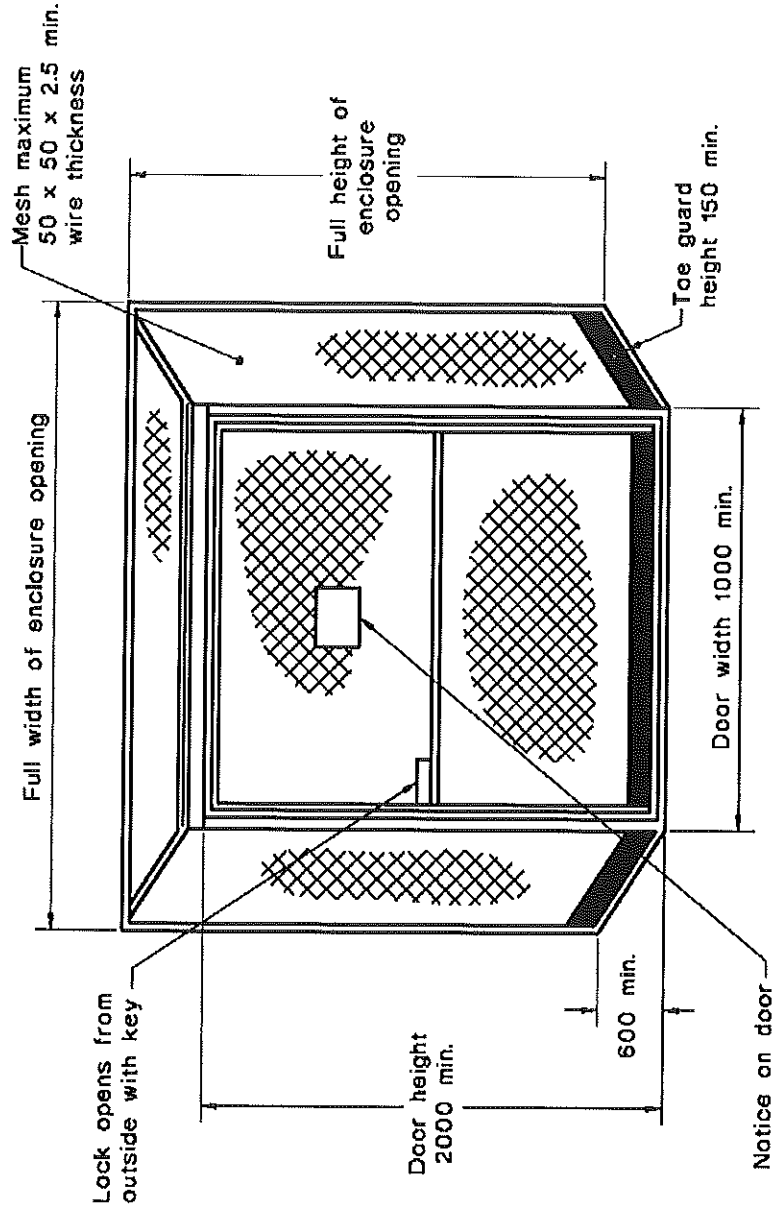
Where personal protective equipment is used, all personnel required to use it should be trained in correct selection, use, maintenance and care of such equipment.

**3.8 WEATHERPROOFING** Precautions should be taken to ensure that the workstation and environment are maintained in a hazard-free state, for example free from water or moisture build-up, ice or fog which could increase the risk of slippage, electrocution or visual impediment.

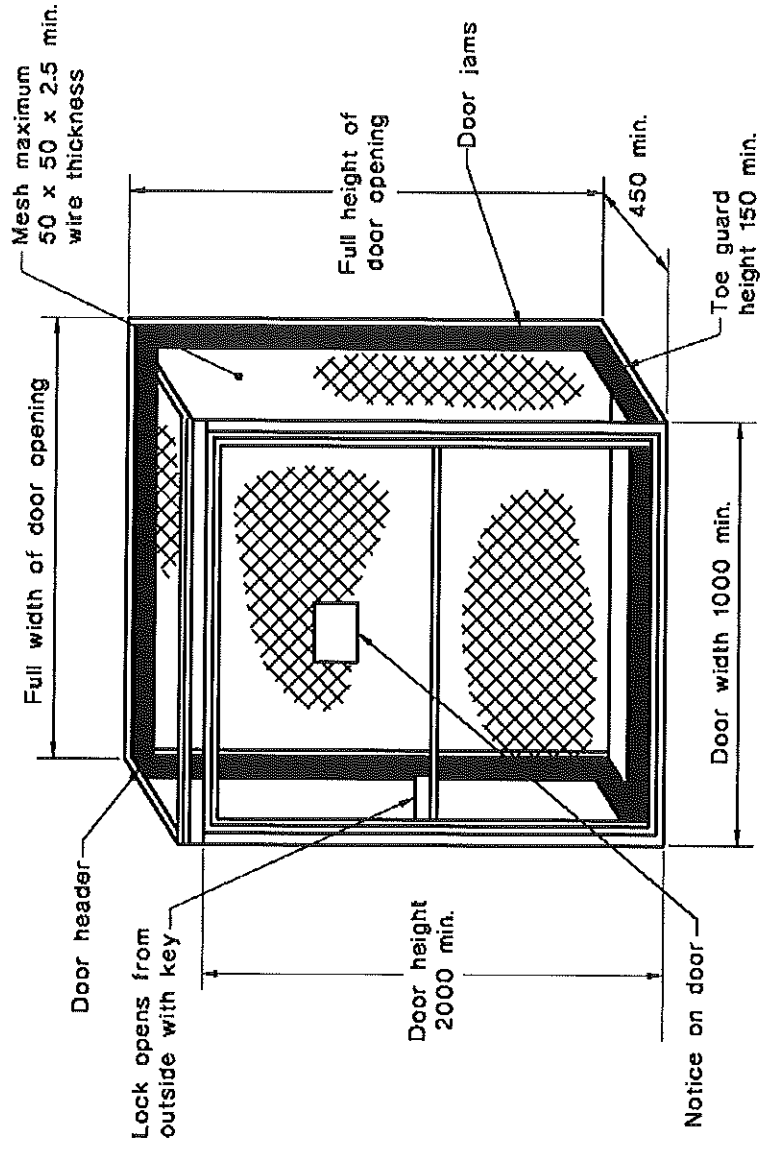
**3.9 CONSTRUCTION OPENINGS** Ready and safe means of access and egress should be provided in the path of travel of each lift at intervals not exceeding 12.2 m during the initial phases of lift installation work.

All openings should provide access and egress between the liftwell and a permanent floor or landing. Where blind sections of the liftwell exceed 12.2 m between permanent floors or landings, the opening should be provided at the first available permanent floor or landing.

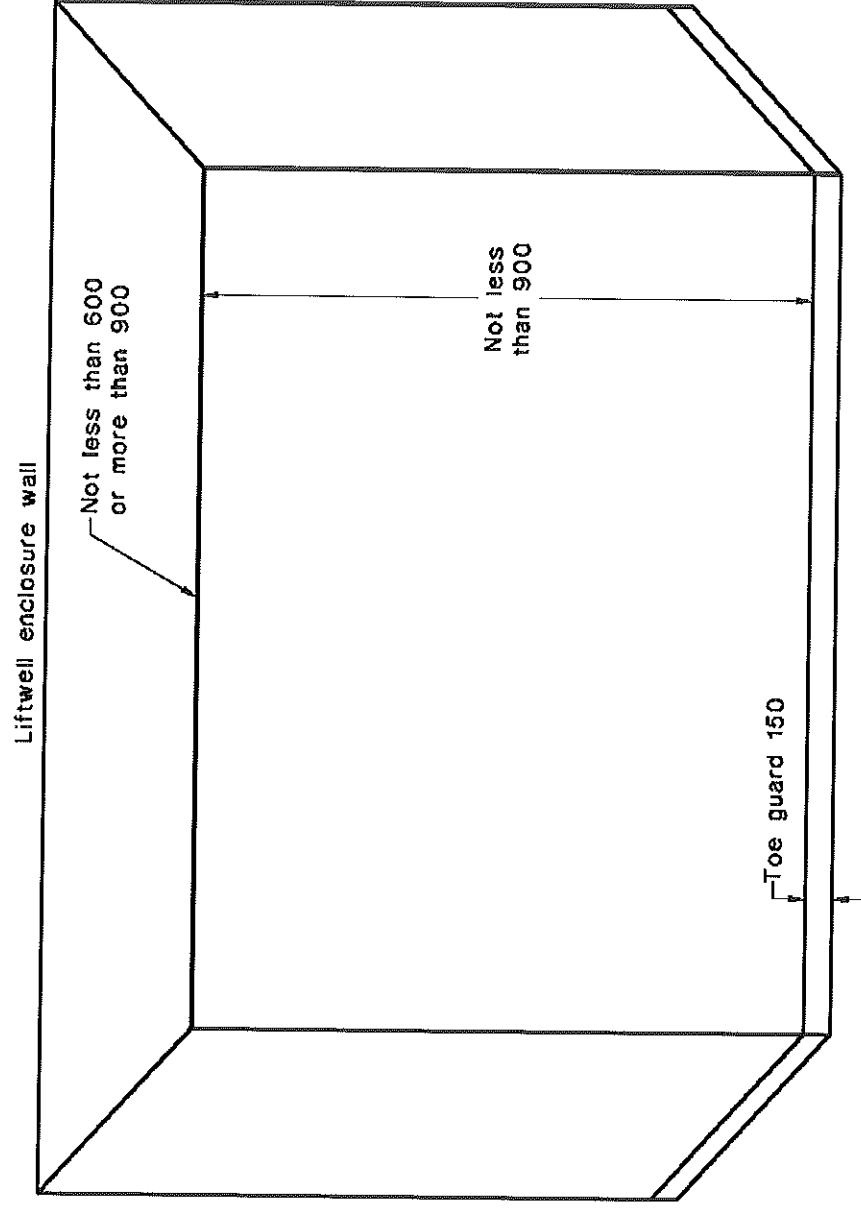




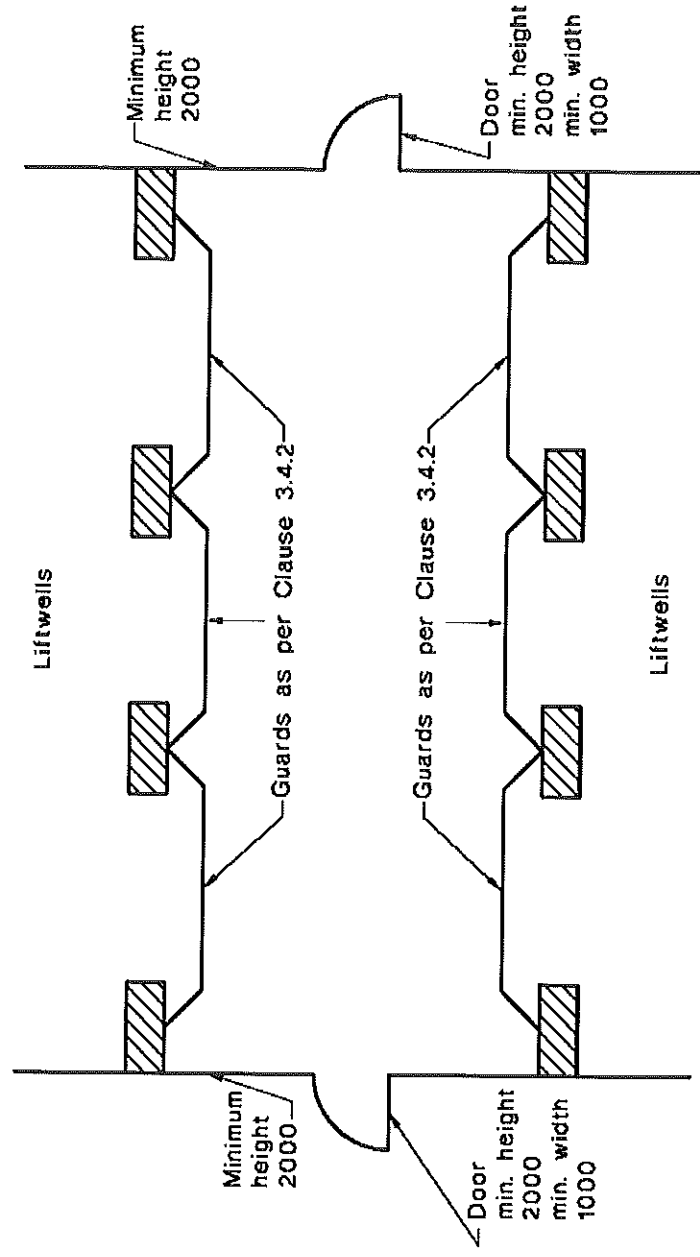
DIMENSIONS IN MILLIMETRES  
 FIGURE 3.4(A) AN EXAMPLE OF GUARDING FOR OPENINGS IN LIFTWELL ENCLOSURES



DIMENSIONS IN MILLIMETRES  
 FIGURE 3.4(B) AN EXAMPLE OF GUARDING WITH LANDING DOORS FITTED AND DOOR LOCKS ADJUSTED TO KEEP DOORS CLOSED



DIMENSIONS IN MILLIMETRES  
FIGURE 3.4(C) AN EXAMPLE OF GUARDING IN AN ENCLOSED FOYER AREA



DIMENSIONS IN MILLIMETRES  
FIGURE 3.4(D) TYPICAL LAYOUT OF GUARDING IN AN ENCLOSED FOYER AREA WITH LIFT ENTRANCE INSTALLED

The means of access and egress can be by rough or finished door openings provided at floors where final landing entrances are to be installed, or temporary openings not less than 1 m wide x 2 m high at floors where it is not intended to install final landing entrances.

Where a liftwell is to contain multiple lifts, construction openings are to be provided for each lift and the openings for all lifts are to be located at the same permanent floor or landing.

All openings are to be guarded on the floor or landing side by guarding described in Clause 3.4.

When it is not intended to install permanent landing entrances in temporary provided openings, such openings may be permanently closed when the appropriate lift car platform has been installed and can be raised and lowered under power between permanent openings. Control should be by means of continuous pressure push buttons.

### **3.10 AMENITIES AND EMERGENCY PROVISIONS**

**3.10.1 Amenities** Amenities should include, as a minimum, the following:

- (a) Dining facilities.
- (b) Water.
- (c) Cooling and heating facilities for food.
- (d) Washing areas and toilets.
- (e) Rubbish disposal and vermin protection.

**3.10.2 First aid** Facilities and procedures including first aid, should be available for dealing with emergencies on site.

**3.11 COMMUNICATION** Communication on site can be very difficult due to background noise and other workers using similar communication devices. The use of non-essential radios on site during commissioning or times when communication is critical to the work being performed should not be permitted.

To maintain a high level of safety for persons working on the lift installation, the following should be considered:

- (a) Emergency numbers and procedures should be included in the site instructions.
- (b) Communication device(s) suitable for the particular site conditions should be selected.
- (c) The persons using such devices should agree on how the messages will be transmitted and received.
- (d) Any numbers or call signals adjacent to each communicating device should be displayed.
- (e) It should be ensured that no other group is using a system that would allow interference with the system in use.
- (f) The effectiveness of the system should be tested at the beginning of each day, as faults on the system or changes in the building structure may adversely affect good communication.
- (g) There should be an appropriate audible device that operates when the lift is moving.
- (h) Calling out signals from the machine room to the car and vice versa may be difficult in high-rise buildings; a more reliable means should be adopted.

## SECTION 4. INSTALLATION METHODS IN LIFTWELLS

- 4.1 FALSE CAR (GUIDED WORK PLATFORM) (See Appendices B and C for details.)
- 4.2 PLATFORM WITH AND WITHOUT CAR ENCLOSURE FITTED (See Appendix D for details.)
- 4.3 FIXED PLATFORM (See Appendix E for details.)
- 4.4 SUSPENDED SCAFFOLDING (SWING STAGES) (See Appendix F for details.)
- 4.5 JUMP FORM, SLIP FORM OR SIMILAR CONSTRUCTION (See Appendix G for details.)
- 4.6 MAST CLIMBERS (See Appendix H for details.)
- 4.7 SCAFFOLDING IN LIFTWELL (See Appendix I for details.)
- 4.8 SCAFFOLDING FREE SYSTEM (See Appendix J for details.)
- 4.9 PRE-ASSEMBLED LIFTWELLS (See Appendix K for details.)

---

## SECTION 5 MECHANICAL HANDLING

The estimation of loads and the selection of suitable handling equipment needs to be fully understood. Specialized training on the selection of chain blocks, slings and methods of rigging is required to ensure that loads are moved in a safe manner.

In any lifting, tensioning or staying system, the safe working load of each component should take account of the conditions and should be compatible with the loads inherent in and applied to, the system. Each component should readily connect with each adjacent component. Therefore, it is important that prior to use, the components of lifting systems be quickly and positively identified for size, lifting capacity and quality grade.

When items of the lifting system have various load capacities, the load lifted should be limited to the item of equipment with the lowest load rating. All rigging and lifting equipment should be visually inspected for defects and deformation at regular intervals. Defective devices should be tagged as 'unserviceable' and removed from service.

Equipment crates and bundles delivered to sites should have the weight characteristics clearly identified or available on site.

## S E C T I O N 6 P I T S

**6.1 ACCESS** Before entering any pit, a safety check should be made in respect of the presence of water, rubbish and fire/fume hazards. Precautions should be taken to ensure that all guards and entrance protection are in position. Where building design permits, the incorporation of pit access doors should be strongly promoted.

Pit props for electrohydraulic lifts are to be fitted if a person is likely to enter the pit while the hydraulic system is being worked on as required by AS 1735.3.

**6.2 DEEP PIT** Where the depth of the pit does not provide a convenient working level, working platforms may be required prior to permanent flooring being installed. Sump covers should be provided before work is commenced in the pit area.

Regular housekeeping should be carried out to ensure that a build-up of trip hazards and fire/fume hazards such as polystyrene and paper are minimized.

**6.3 PIT EQUIPMENT** All pit equipment, hoisting equipment and tools should be positioned using recommended handling systems.

**6.4 VENTILATION** (See Clause 3.6 for details).

**6.5 WATER HAZARD** Work should not be carried out in any lift pit where the level of water is higher than the top of the sump.

**6.6 BUFFERS** Buffers should be fitted prior to lift car and counterweight being under power. Where oil buffers are fitted, a check should be made for the correct type and amount of oil.

## SECTION 7 MACHINE AREAS

**7.1 TEMPORARY, PREFABRICATED OR PERMANENT MACHINE ROOM** Prior to commencing work in a temporary prefabricated or permanent machine room, care should be taken to ensure the following:

- (a) The structure is of adequate strength.
- (b) Safe access and egress is provided.
- (c) Sufficient working space and access is available where equipment is to be installed.
- (d) The machine room is lockable.
- (e) All penetrations to liftwell are suitably covered, or coamings are fitted.

**7.2 ELECTRICAL SUPPLY** Where possible, the lifts should be permanently connected to the relevant power supply. When temporary electrical submain cabling is used it should be—

- (a) clearly labelled;
- (b) mechanically protected; and
- (c) used with cables that are adequately sized and fault protected for the intended load.

**7.3 WARNING SIGN** Appropriate signage should be displayed indicating the following:

- (a) Safe working loads on lifting points.
- (b) Emergency egress.
- (c) Machine room entrance door(s), e.g.

**DANGER  
ENTRY OF UNAUTHORIZED  
PERSONS PROHIBITED.**

NOTE: The word 'DANGER' should be in letters not less than 25 mm high and the remainder of the notice in letters not less than 10 mm high.

- (d) Where temporary power is being used. A sign indicating the source of power supply is to be placed adjacent to the main switch.
- (e) Operating equipment (such as circuit-breakers, controllers, machine, governor and the like).

**7.4 VENTILATION** (See Clause 3.6 for details.)

**7.5 WEATHERPROOFING** (See Clause 3.8 for details.)

**7.6 EQUIPMENT HANDLING AND INSTALLATION METHODS** Prior to installing machine room equipment, a procedure should be established that will allow the required work to be carried out in a safe manner.

**7.7 LIGHTING** (See Clause 3.5 for details.)

**7.8 MACHINE ROOM GUARDING** Temporary guarding between items of machine room equipment on a multilift installation may be required to maintain a safe working environment during progressive commissioning or installation (see Clause 10.15(k).)

**7.9 BRAKE SETTING, TRACTION OR BALANCE** Brake adjustment may be pre-set during manufacture, but to ensure the brake has sufficient force to hold the car or bring it to rest during construction some simple checks should be made. These checks include, but are not limited to, ensuring the drum is clean and free from rust, that there are no damaged parts and spring settings are to the manufacturer's specifications. These checks should be made and re-evaluated during the construction phase in conjunction with the traction ratio checks. (See also Clause 11.6.)

The respective mass of the car and the counterweight should be taken into account when consideration is given to which is more likely to move under gravity. The important factor in this may be at which end of the liftwell the car was assembled. If the car is to be moved up the liftwell or has been assembled at the top of the liftwell, it should not be moved before the safety gear and governor are operational, in order to prevent uncontrolled movement of the car if the brake tension is inadequate.

Testing the brake effectiveness at slow speed should be carried out with the heavier of car or counterweight near its respective buffer.

The brake setting should be checked each time major items such as car enclosure, counterweight weights or compensating ropes are added.

## SECTION 8 CARS

- 8.1 GENERAL** Prior to installation, there should be safe access to and egress from landings to the desired installation position before commencing with the installation.
- 8.2 INSTALLATION OF CAR FRAME** A pre-determined position should be established in the liftwell where the installation of the car frame is desired. As soon as practicable, the safety gear should be activated and a safety sling fitted to the car frame.
- 8.3 LIGHTING** (See Clause 3.5.)
- 8.4 PRE-ASSEMBLED CAR** Access for pre-assembled cars should be arranged through the top of the liftwell or at selected landings.
- 8.5 LIMITED ROOF LOADS** A car roof should not be subjected to loads in excess of its design strength, e.g. heavy equipment such as chain blocks, sheaves and counterweight fillers should not be placed on the roof. The area around and on top of the trapdoor should be kept clear at all times.
- 8.6 INSTALLATION OF CAR ENCLOSURE** The car enclosure should be reviewed for component design and sizes. Plan the best method and order of installation.
- 8.7 SAFETY GEAR** It is not always possible to check and finally adjust safety gear at the early stage of construction. The following basic checks should assist in establishing that the safety gear is not prevented from working:
- (a) Check that rollers, jaws or wedges are free to move.
  - (b) Check that the running clearance to the rail is satisfactory.
  - (c) Check that the load and speed of safety gear complies with contract conditions.
  - (d) Check if condition of rail surface is clean and if it is to be dry or lubricated.
  - (e) Trip the governor, then move car down to ensure the governor will pull the safety gear onto the rails and stop and hold the car.
  - (f) Ensure that the bottom governor wheel and weight are functioning correctly.
- 8.8 GOVERNOR ROPE ATTACHMENT** Before movement of car frame, up or down the liftwell, and prior to roping, special precautions should be taken to ensure that any failure of lifting equipment does not allow the car frame to fall. It is therefore important to ensure that the governor, governor rope and attachments to the safety gear are fitted and adjusted. This procedure will ensure the holding of the car in the event of any lifting failure.
- 8.9 CAR TO COUNTERWEIGHT BALANCE** Unless care is taken during construction, it is possible to have a traction ratio that is not adequate to hold or move the car (see Clause 7.9 and 11.6.)



## SECTION 9 COUNTERWEIGHT

**9.1 GENERAL** A counterweight, as the name implies, consists of a certain mass. To handle this mass safely, proper rigging and restraining techniques, correct lifting equipment with the appropriate safety factors and clear liftwell access should be considered and employed at all times.

**9.2 TOP OR BOTTOM INSTALLATION** Depending on the site circumstances, the counterweight may be installed at the top or at the bottom of the liftwell. However, for safety and material handling reasons the latter option should be given preference as in most cases the counterweight is not fitted with safety gear.

**9.3 FRAME AND TANK** Frame and tank type counterweights should be installed empty.

NOTE: If substantial lifting facilities are available, this recommendation may not be necessary.

All counterweight fillers should be secured so they cannot fall out or become dislodged during any operational or testing situation.

Tank filler should be dry when transferred to the counterweight.

**9.4 SOLID COUNTERWEIGHTS** These types of counterweights need additional care in lifting because of their high single unit mass. Protection of landing door sills or the edge of floor slabs, or both, may be required. In addition, the counterweight needs special attention, such as being retained in position when standing vertically in the liftwell. Suitable guide shoes should be fitted prior to disconnecting the lifting equipment (see Section 5).

**9.5 COUNTERWEIGHT SAFETY GEAR** After the installation of counterweights at either the bottom or the top of the liftwell, care should be taken prior to moving the counterweight before the lifting ropes are attached (see Clause 9.2).

Where the counterweight has been fitted with safety gear the operational features of the safety gear should be checked before the lift is moved under power. At the early stages of counterweight movement, the most important checks are to ensure that the safety gear will stop a free fall or runaway condition in the event of suspension loss. (See Clause 7.9 regarding brake settings.)

**9.6 GUIDE SHOES (ASSEMBLY)** The guide shoes should be positioned and adjusted prior to moving the counterweight.

**9.7 COUNTERWEIGHT BALANCE** The installer should understand the importance of traction ratio and how progressive assembly of car or counterweight can vary this ratio (see Clause 7.9).

**9.8 COUNTERWEIGHT GUARDS** Prior to placing the lift in operation, all necessary counterweight guards should be installed.

## SECTION 10 LIFTWELLS

**10.1 GUARDING** For details of the guarding required for liftwells, refer to Clause 2.1.3 and Clause 3.4.

**10.2 TRIMMER BEAMS** Trimmer beams are for the support of the lift equipment and should not be used as standing areas or for storage of tools or equipment.

**10.3 RAILS AND BRACKETS** All rails, hoisting equipment and tools should be positioned using recommended handling systems and particular care should be taken to ensure rails do not slip from slings or clamps when being handled.

Effective communications between winch operator, rail slinger and installer should be maintained at all times.

Where rail packing is used, it should be of metal and installed in a manner that ensures there is no likelihood of this packing becoming dislodged.

**10.4 RAILS** Rail ends and fish plates should be cleaned of protective coating prior to installation.

Prior to the running of the lift installation, rails should be cleaned of protective coatings. This is particularly important for Type B (sliding) safety gear.

**10.5 RAIL INSTALLATION** The top length of rail should finish clear of the liftwell top slab to allow for building compression. Also adequate clearance should be provided between rail fixing and rail fish plate.

Each run of car and counterweight rails should be so located that guiding members of the car and counterweight frames cannot travel beyond the ends of the guide rails when the car or counterweight are on compressed buffers.

**10.6 WALL FIXINGS** The selection of wall fixings will depend on the particular application, such as the fixing of auxiliary non-load-bearing parts or the fixing and support of major load bearing items. Fixing should be considered in relation to the material into which it will be placed. Inspections or checks should be made by the installer to ensure the proper use of fixings.

**10.7 LIGHTING AND POWER** (See Clause 3.5).

**10.8 VENTILATION** (See Clause 3.6.)

**10.9 FIRE PREVENTION** Care should be taken to avoid the accumulation of flammable materials or litter at the workstation, especially when flame cutting or welding is in progress. In these latter circumstances, fire extinguishers should be located in the vicinity.

**10.10 GROUTING** During grouting, precautions should be taken to prevent grout falling down the lift liftwell.

**10.11 SMALL CAR IN LARGE LIFTWELL** Where a space between the edge of the car top and the liftwell enclosure exceeds 450 mm, suitable precautions should be taken which may include but are not limited to the following:

- (a) A vertical screen for the full length of the lift travel.

- (b) A horizontal extension of the car top.
  - (c) Other suitable precautions, e.g. an improved safe system of work.
- As the fitting of guardrails around the top of the car may, under certain circumstances, introduce particular hazards, it should be considered only if the precautions listed in Items (a) to (c) are not appropriate.

NOTES:

- 1 Permanent means may be required by AS 1735.2.
- 2 Guardrails should not reduce the required overruns.

**10.12 GUARDING MULTILIFT INSTALLATIONS** When working on a lift adjacent to a lift in normal operation, or when working in a liftwell adjacent to a builder's lift/hoist, a protective screen should be provided between the lifts.

**10.13 ACCESS AND EGRESS** Clear access and egress should be provided to and from each liftwell at intervals of not exceeding 12.2 m. Such access and egress should be guarded as described in Clause 3.9.

**10.14 FLEXIBLE TRAVELLING CABLE** Flexible travelling cables may require special handling equipment due to their weight.

**10.15 PRECAUTIONS WHEN OPERATING A LIFT AT FAST SPEED** Riding on top of the car at speed in excess of 1.0 m/s should be carried out only when the speed is required to determine the cause of some abnormal condition that cannot be observed at inspection speed. As soon as possible after such observation, the speed should be reduced. Leaning over the side of the car while the car is moving should be avoided.

Lifts should only be operated at fast speed during installation work in the following circumstances:

- (a) All landing entrances are permanently installed, complete with electromechanical locking devices and mechanical self-closing devices.
- (b) All door-locking devices are electrically in circuit.
- (c) Car and counterweight buffers are installed and arranged for their designed operation.
- (d) Car and, where applicable, counterweight safety gear, including governor devices, has been installed and adjusted for the designed operation.
- (e) Top and bottom terminal speed limiting devices, where required, have been installed and are fully operational.
- (f) Safety operating switches have been installed in the well, on the car and in the lift machine room, and are fully operational.
- (g) The lift car superstructure is installed complete with car doors and top of car operating buttons.
- (h) The lift machine room door, locking device and prescribed signage, are installed as required under AS 1735.2.
- (i) The lift machine room lighting and switching are installed and operational.
- (j) Where lifts are located immediately adjacent in the same liftwell enclosure, one of the following should apply:
  - (i) A fixed screen should be placed between respective liftwells.
  - (ii) Adjacent lifts should have all the following items:
    - (A) Lift car superstructures installed.

- (B) All electromechanical devices installed on the lift car.
  - (C) All landing entrances permanently installed.
  - (D) All landing door electromechanical locking devices and closers installed.
  - (E) Traction drive machinery including car and counterweight roping installed.
- (k) Where rotating lift machinery is located in the lift machine room with that for other lifts currently being installed and not having works noted under Item (j) above completed, the following should be provided:
- (i) 'Fixed danger' signage, warning which lifts are capable of running at fast speed, installed within the lift machine room adjacent to the entry door, on the circuit breaker panel and on the relevant controller units.
  - (ii) 'Portable danger' signage, warning the lift can run at fast speed, located immediately adjacent to and in front of the lift and between the lift and the applicable adjacent lifts.
  - (iii) Where necessary, mechanical guarding between the lift and adjacent lifts should be fitted to protect personnel and equipment from coming in contact with the moving machinery.

**10.16 CAR SUPPORT DURING CONSTRUCTION** The means of supporting the car during construction should be positive and not easily or accidentally dislodged or detached, and should not only rely on the safety gear.

**10.17 CANTILEVER CAR SUPPORT** Prior to movement of the car, safety brackets should be in place to retain the car on the guide rails.

**10.18 SIGNAGE** To assist personnel in identifying a liftwell to the associated machine room component in the multilift installations, the following numbering should be provided to avoid confusion:

- (a) Number liftwells adjacent to the top and bottom landing.
- (b) Number the machine room equipment such as circuit-breakers, controller, machine governor and the like.

**10.19 TEMPLATES** Where templates are installed in the top of the liftwell and where a person can stand on them, the following should be considered:

- (a) The template should be strong enough to support persons working in the liftwell and any anticipated loading or it should be supplemented by a working platform (see Appendix E).
- (b) Safe access should be provided to the template or working platform.
- (c) The template should have a maximum load label fitted.

## S E C T I O N 11 R O P E S

**11.1 METHODS OF ROPING** Various roping arrangements are used. That selected will depend upon the type of installation and the machine room position.

The location of rope terminations and access to the top of the car or counterweight should be considered in relation to safe access during roping. Temporary working platforms or walkways may need to be installed to suit the particular roping system employed.

**11.2 CORRECT SIZE AND CONSTRUCTION** Check that the rope complies with the data plate on the machine and governor. Suppliers should be requested to identify each length of rope provided so that it may be matched to the data plates.

All other ropes should be checked to ensure they comply with rope specifications for the particular installation.

**11.3 METHOD OF FIXING** The method of fixings should be as follows:

- (a) *Spliced* Thimbles should be used on ropes to be spliced. Three full tucks should be used on each strand.
- (b) *Swaged* Swaged fittings should be carried out to the manufacturer's specifications.
- (c) *Babbitted rope socket* Special attention should be given to ventilation as babbitt metal contains lead, a highly toxic material. The primary route of exposure is through the inhalation of fumes. Care should be taken to pre-heat the babbitt basket prior to pouring, to prevent the babbitt being chilled by contact with cold metal. The following recommendations should be noted:
  - (i) Disconnect smoke, heat or fire detectors then reconnect after work is complete.
  - (ii) Ensure the ropes to be worked on have not lost their lay where they enter the rope bottle/basket or shackle socket.
  - (iii) Ensure that no strands are bulging out.
  - (iv) Wear the correct eye, face and hand protection.
  - (v) Remove flammable rubbish from workstation.
  - (vi) Do not wear oil-stained clothing.
  - (vii) Have the appropriate fire-extinguisher handy.
  - (viii) Do not spill the molten babbitt.
  - (ix) Keep water away from the molten babbitt/socket.
  - (x) Do not use water to cool the babbitt down.
  - (xi) Do not leave hot babbitt material unattended, either in the ladle or in the bottles.

(d) *Wedge socket* The load-carrying portion of the rope should enter the wedge-type socket in a straight line.

At least one clamp should be placed adjacent to the wedge socket to prevent slackening of the rope around the wedge.

Ensure that the seizing (whipping) of the wire ropes is carried out before cutting or installation into the socket.

Other methods, acceptable under AS 1735.2, may be used.

**11.4 STORAGE** Ropes should be stored in a cool, dry location, which is reasonably free from dust and dirt.

Rope should always be given protection from the weather. If rope is stored in a building under construction, protect from water, sand, lime, plaster, mortar and mechanical damage.

**11.5 HANDLING** Wire rope should be handled carefully so that it is not twisted, untwisted or kinked.

The method of uncoiling ropes from a drum or coil is important. (See Appendix L.)

The following recommendations should be observed:

- (a) Protect ropes from sharp corners or edges with padding.
- (b) Avoid dropping rope from heights.
- (c) Avoid reverse bends.
- (d) Minimize shock loading as over-stressing of the rope will occur. Lower the load onto the ropes smoothly and steadily.
- (e) Do not use frozen ropes.
- (f) Do not use wire rope that has been cut, kinked or crushed.
- (g) Do not use rusty or corroded rope.
- (h) Before lowering or hauling rope, consider its weight. In high-rise buildings, the weight may be substantial.

**11.6 BALANCE/TRACTION AND BALANCE SETTING** During the early stages of construction the car platform may be used as a working stage, and as there is no car enclosure fitted, then the counterweight may only need a reduced weight. Care should be taken to increase the weight of the counterweight when the car enclosure or other items, such as doors or door operator, are added.

Where there is difficulty in establishing the weights required for a suitable traction ratio, assistance should be sought.

## 11.7 COMPENSATION

**11.7.1 Rope** On high-rise installations, the added effect of rope stretch on new lifting and compensating rope can cause the tension weight to land if not monitored. Overruns should be checked to determine which ropes to adjust.

**11.7.2 Chain** The bottom loop on chain compensation should have antisway guards fitted if there is a danger of the chain becoming caught on other equipment.

## SECTION 12 ELECTROHYDRAULIC LIFTS

**12.1 CAISSONS** Where a cylinder or part thereof is below the ground level, it should be enclosed in a waterproof caisson (see AS 1735.3).

The caisson should —

- (a) be fitted with a lid capable of supporting a distributed load of 2.5 kPa (255 kg/m<sup>2</sup>); over 500 mm<sup>2</sup>;
- (b) extend 150 mm above the pit floor; or
- (c) be held down during construction to prevent hydrostatic pressure lifting it.

Any water within the caisson should be removed as soon as possible.

Adequate measures should be taken to restrain the caisson from floating upwards. The lower end should be capable of withstanding the hydrostatic pressures that can prevail. The space between the cylinder and the caisson should be left unfilled.

During the installation of caissons, care should be taken not to damage the protective coating. The back filling around the caisson should be similar to sand or small particle material. On-site fill, e.g. broken bricks, could damage the protective coating.

**12.2 RAMS AND CYLINDERS** Hydraulic rams, both single stage and telescopic, are usually designed to be guided at the cylinder head and the car connection. Rams should not be extended more than about 30% of their stroke unless they are connected to the car. Car connection and alignment should be made when the car connection plate is as close as possible to the top of the cylinder.

**12.3 MULTISECTION** The method of clamping and suspension of ram and cylinder sections, while being joined, should ensure suspended sections do not slip.

**12.4 SAFETY GEAR FOR INDIRECT HYDRAULIC** Before moving the lift, the operation of the safety gear should be checked.

**12.5 DOUBLE-PRESSURE TESTING** The double pressure test as required in AS 1735.3 and AS 1735.10 should be carried out as soon as possible after the hydraulic connections are made and always prior to running the lift. To avoid possible dangers to persons or damage to equipment in the event of a failure during the test, carry out the test with the car of a direct-acting unit near the buffers or for indirect units, after the safety gear is operational.

**12.6 TANKS** Tanks used on electrohydraulic lifts are only for holding the required amount of oil at atmospheric pressure. During installation, the following recommendations should be considered:

- (a) Ensure that the tank is clean inside and that no water has entered the tank prior to or during the early stages of building construction when the tank may have been uncovered.
- (b) In dusty conditions, cover the tank units and ensure the air breather is clean and clear of any foreign material when running the unit.
- (c) When filling and topping up the oil level in tanks, ensure that the lift is at the lowest floor; when the lift is at the highest floor ensure the minimum oil level is correct.
- (d) Oil that is spilt should not be poured back into the tank.

(e) As tanks that are on sound isolation mounts will move under the change in weight as oil is either taken from or returned to the tank, ensure that the pipeline and conduits have enough flexibility to allow movement without undue stress on the fittings.

For effective air circulation and cooling around the tanks do not place them against the machine room walls.

**12.7 PUMPS** The pump is usually selected to suit the operational pressure required and very rarely is it suitable for the pressure required for the double pressure test.

Always ensure the pump runs in the correct direction. Running the pump in the wrong direction can damage it.

**12.8 HYDRAULIC LINES** The installation of hydraulic lines should only be carried out after they have been cleaned internally.

The location and fixing of these lines should ensure that machine room and liftwell clearances are maintained. In the case of flexible hoses, the minimum bending radius should be taken into account along with any permanent or temporary protection that should be provided during the construction and commissioning period. As hose fittings should never be under tension, always allow sufficient length for the hose to flex during operation of the lift. (See AS 1735.3 and NZS 4332 P.)

**12.9 OIL SPILLAGE AND LEAKAGE** Means should be provided to collect any oil leakage from the cylinder packing gland. Spills on the ground should be cleaned up to prevent slipping.

**12.10 LIFTING POINT** The lifting point may be in the form of a beam or a lifting eye. In the case of a lifting eye, no lateral loading should be placed on the eye; only vertical loading. Load capacity of beam or eye should be displayed.

**12.11 SUPPORT DURING CONSTRUCTION** For details of car supports refer to Clause 10.16.

**12.12 RAM CONNECTION** Car and ram connection should be made as soon as possible and prior to the car being moved (see Clause 12.2).

**12.13 WORKING ON HYDRAULIC SYSTEMS** Before working on the hydraulic system, lower the car onto either the buffers or pit props, and check that the system pressure is zero. Lock-out and tag the circuit-breaker.

Prior to closing the circuit-breaker, ensure that any movement of the lift through automatic relevelling will not cause any injury or damage.



## SECTION 13 POSSIBLE HAZARDS

**13.1 GENERAL** A hazard may be defined as a dangerous condition, either potential or inherent, which can interrupt or interfere with the progress of a work activity. It should be possible to identify possible hazards from hazard identification and risk assessment. However, it should be recognized that causes of hazard can be variable and include a combination of other possible hazards.

**13.2 TRAVELLING ON TOP OF LIFT CAR** Persons working on lifts are at particular risk when on top of a car which is set in motion when they are unprepared. Examples of accidents associated with moving cars have been due to persons losing their balance, or coming into contact with any of the following:

- (a) Landing entrance sills and lintels.
- (b) Counterweights (counterweights passing the lift car).
- (c) Guide brackets and supports.
- (d) Control switches and inductor blades.
- (e) Sheaves and pulleys (which require guarding).
- (f) Lock rollers.
- (g) Lock vanes.
- (h) Building penetration projections.
- (i) Trimmer beams.

### 13.3 FALLING OBJECTS

**13.3.1 Minimization of risk** When there is a risk from falling objects, the lift installer should minimize that risk as far as is practicable.

The following points should be considered when carrying out hazard identification and risk assessment:

- (a) Persons or machinery working above or below.
- (b) Liftwell openings correctly guarded.
- (c) Liftwell above decked out.
- (d) Loose items left on trimmer beams, ledges and the like.
- (e) Machine room floor penetrations guarded.
- (f) Workstation for housekeeping, kickboards and the like, checked.

The lift installer should have a workstation that does not present the risk of falling. Where this cannot be achieved by other means, fall protection may be provided by the use of safety belts or harnesses attached in accordance with the relevant sections of AS 2626. It is recommended that harnesses be used for restraint and fall protection, and belts for restraint only.

**13.3.2 Work in front of an open liftwell** Where it is necessary to work between the entrance protector (see Clause 3.4) and the open liftwell, one of the following precautions should be taken:

- (a) The power-operated guided-work platform or the lift car platform is, as far as practicable, level with the landing.
- (b) A guardrail is fitted across the opening at a height 900 mm to 1100 mm.

- (c) Fall protection (see Clause 13.3.1) and—
- (i) an anchoring point for a safety line that is capable of withstanding a force of at least 15 kN in a direction that simulates the loading likely to be placed on the anchor in the event of a fall, should be provided;
  - (ii) the safety line used to connect the fall protection system to the anchoring point should be accessible without risk of a fall; the anchoring point should be as high as possible in accordance with AS 2626;
  - (iii) the fall protection system should comply with AS 1891 and AS 2626;
  - (iv) the length of any safety line should limit the possible free fall distance to 1800 mm; and
  - (v) adequate training should be provided (see Clause 14.2).

**13.4 ELECTRICITY** No person should engage in any work on any electrical equipment unless such person has the authority and is suitably trained to do so. All work activity and equipment should be implemented, designed, operated and maintained in such a manner so as not to cause electrocution. As such, no person should engage in any work on 'or near' any live equipment unless —

- (a) suitable precautions are taken to prevent injury;
- (b) all equipment used for electrical purposes is tested and tagged in accordance with the local authority requirements and AS 3012; and
- (c) all electrical tools, leads, lights and winches and the like are protected by a residual current device (see Clause 3.5).

**13.5 SHEAR HAZARD** The movement of doors, car and counterweight are the main areas where a shear hazard may occur. Many of these dangers may exist during construction as some flushing or guards may not be in place due to the assembly of equipment having to remain accessible. These hazards should be monitored during the early stages. Guards and flushing should be fitted as soon as possible, and all other shear hazards minimized. Persons working on the lift should not lean over the side of car while it is running.

**13.6 CRUSHING** Where there is a crushing hazard, the lift installer should minimize the risk by carrying out a hazard identification and risk assessment, followed by suitable safe work practice.

Consideration should be given to the following points when developing safe work practices:

- (a) Before moving the lift, ensure that it is safe to do so.
- (b) Use an audible or visual alarm to warn of lift movement.
- (c) Before working in the pit, ensure that buffers or some similar safety devices are in place to provide person clearance in the event of car or counterweight movement.
- (d) All screens and guards should be fitted as soon as practicable.
- (e) Awareness of person clearance restrictions above crosshead and below safety plank.
- (f) The control of lateral movement when hoisting loads.

**13.7 OVERLOADING EQUIPMENT** Special care should be taken during installation to ensure that all loads to be lifted do not exceed the rated capacity of the lifting equipment. (See Section 5 and Clause 11.6.)

**13.8 FIRE** Fires associated with lifts during construction are usually the result of bad housekeeping. The workplace should be kept clean. Paint thinners, rubbish and heating equipment are all potential dangers. Any welding or cutting should be completed at least one hour before leaving the workplace, so that any smouldering will show up while personnel are still on the job. Access to firefighting equipment, and knowing how to select and use such equipment is very important (see also AS 1674.1).

**13.9 VENTILATION** Enclosed workplaces should be sufficiently ventilated with fresh or purified air. If mechanical ventilation is required, it should include an airflow failure warning device.

**13.10 DROWNING** Where there is a possibility of persons drowning, appropriate precautions should be taken.

**13.11 SLIPPING** People often slip on construction sites due to oil or water on surfaces, or the wearing of incorrect footwear. Poorly lit passageways can add to the danger of slipping, especially when personnel are required to walk out of a brightly lit liftwell. Personnel should be encouraged to walk while on the job; not run.

**13.12 CHEMICAL** When any chemical or substance is brought onto the workplace, it should be accompanied by an appropriate Material Safety Data Sheet (MSDS) and be a recommended product for the task to which it is to be applied. Chemicals should also be correctly stored as required by the MSDS.

In addition, no food or drink container is to be used to store any chemical substance whatsoever.

Workers should understand the MSDS and be aware of any associated potential hazards. Procedures should be in place to minimize the hazards.

Where it is not possible to substitute any hazardous chemical, a recommended application system and protective equipment should be used and monitored.

**13.13 NOISE** All measures should be taken to minimize workers' exposure to excessive noise levels (see AS 1269).

**13.14 MANUAL HANDLING** To avoid accidents/injuries due to manual handling practices, hazard and risk assessment should be carried out.

Areas that are considered high risk should be addressed by any of the following methods:

- (a) Redesign of equipment, materials or plant.
- (b) Appropriate lifting aids.
- (c) Project redesign.
- (d) Appropriate training.

Consideration should also be given to strength, physical ability and history of injury to particular workers as these will modify the risk of injury.

When conducting a risk analysis, the following may be considered:

- (i) Weight of object (or force applied).
- (ii) Work practice (position of body in relation to object).
- (iii) Frequency of lifting.
- (iv) Duration of lifting.

**13.15 HOUSEKEEPING** The responsibility for good housekeeping rests with all parties. In order to have a safe site, cleanliness and tidiness should prevail. Means of achieving this may be summarized as follows:

- (a) Ensuring suitable storage of equipment, tools and clothing.
- (b) Removing all unnecessary items of equipment away from work station.
- (c) Disposing of refuse in appropriate bins.
- (d) Not leaving penetrations unguarded.
- (e) When using mobile work platforms or scaffolding, ensuring all unused equipment is not left lying around.
- (f) Materials, belonging to any trade, should not be placed outside liftwells or machine rooms access ways.
- (g) Removing all rubbish as soon as practicable.

**13.16 FAST SPEED OPERATION OF THE LIFT DURING ADJUSTING AND COMMISSIONING** (See Clause 10.15.)

## SECTION 14 TRAINING

**14.1 GENERAL** The employer should ensure that the employees are adequately trained and possess the necessary skills to perform the required tasks in a safe manner.

There are several subjects offered for specialized training, and it is important that appropriate courses are undertaken and the material updated at regular intervals.

Training may take place in a formal setting such as a college, skills training centre or similar institution, or in an informal setting such as a workshop or on-the-job.

The intended training outcomes should be clearly stated and should reflect the job requirements. All training should be concluded with an assessment of the employee's performance to prove that competency has been attained.

**14.2 TRAINING SUBJECTS** Typical training subjects, in addition to the mechanical and electrical trade subjects, are:

- (a) Occupational Health and Safety Act obligations.
- (b) First aid, including cardiopulmonary resuscitation (CPR).
- (c) National Lift and Escalator Trade Modules (when available).
- (d) Rigging.
- (e) Oxyacetylene cutting.
- (f) Electric arc welding.
- (g) Scaffolding.
- (h) Firefighting equipment.
- (i) Fall protection and rescue training (see Appendix A).

## APPENDIX A

RESCUE AND RECOVERY PROCEDURES FOR PEOPLE SUPPORTED BY A  
SAFETY HARNESS IN A FALL

Before any installation work in a lifewell is carried out on site, there should be established written rescue and recovery procedures for people supported by a safety harness in a fall.

A copy of such written procedures should be kept on site, distributed to all relevant persons on site and made available to all emergency services.

The minimum requirements these written procedures should take into account are the following:

- (a) Where a person is supported by a safety harness in a fall is not injured and is within safe and easy reach for recovery purposes, then—
  - (i) a safe method is established before commencement of any recovery operation;
  - (ii) a safety harness is worn by the person performing the recovery procedure; and
  - (iii) the safety harness is not connected to the same anchorage point as the harness of the person to be rescued.
- (b) Where a person supported by a safety harness in a fall is injured or unconscious and is within safe and easy reach for recovery purposes, then—
  - (i) a first aid person ascertains the extent of the injury and whether it is safe to move the person before any recovery procedure is attempted; and
  - (ii) if it is considered safe to move the person, the minimum requirements in Item (a) are taken into account before attempting any recovery operation.
- (c) Where a person is supported by a safety harness in a fall and is not within safe and easy reach for recovery purposes, then—
  - (i) emergency rescue services to attempt to rescue the person;
  - (ii) the persons responsible for contacting and liaising with recognized emergency rescue services should include the following information when calling for assistance:
    - (A) Name of caller.
    - (B) Address of accident.
    - (C) Name of site.
    - (D) Access to site for emergency vehicles and equipment.
    - (E) Location of accident within site.
    - (F) Call-back number.
    - (G) Type of accident.
    - (H) Number of persons involved.
    - (I) Type of machinery involved.
    - (J) Description and dimension of accident scene.
  - (iii) the area where the recovery procedure is to be performed should be cleared and barricaded.

APPENDIX B  
 MAINTENANCE AND INSPECTION PROCEDURE FOR FALSE CARS  
 (GUIDED WORK PLATFORMS)

The following is a recommended maintenance and inspection procedure for guided work platforms:

- (a) *Daily pre-operational check and maintenance* The procedure is as follows:
- (i) Visually check the liftwell to be travelled to ensure path is clear from obstructions.
  - (ii) Visually check the wire rope used for hoisting for broken strands, surface wear, corrosion, wire or strand distortion, reduction in diameter and the lengthening of the lay.
  - (iii) Visually check the wire rope of the device which is operated independent of the hoisting winch and false car safety gear for broken wires, surface wear, corrosion, wire or strand distortion, reduction in diameter and the lengthening of the lay.
  - (iv) Visually check the electric cables of the hoist for cracks, cuts or distortion.
  - (v) Clean the platform.
  - (vi) Check that the handrail and platform fixings are secure.
  - (vii) Inspect the hoisting winch and hitch-plate fixing bolts and nuts for tightness.
  - (viii) Check safety gear manually for operation.
  - (ix) Check that the 'Load Notice' and inspection and maintenance procedures are fixed to the guided work platform.
  - (x) Check wire rope terminations.
- (b) *Periodic tests* The following tests should be carried out at three-monthly intervals:
- (i) The device which is operated independent of the hoisting winch and safety gear should be tested and checked to the manufacturer's specification.
  - (ii) The hoisting winch should be tested and checked to the manufacturer's specification.
- (c) *Commissioning and six monthly tests* After completing the daily operational tests the safety gear should be tested in the following manner:
- (i) Lower the platform to the lowest landing.
  - (ii) Place the rated load on platform.
  - (iii) Disconnect overspeed device which is independent from safety gear.
  - (iv) Lift up the platform (by means other than the winch attached to the platform) to a height of approximately 100 mm.
  - (v) Fit a device to ensure the platform will not fall more than 600 mm should the safety gear fail.
  - (vi) Lift up the platform to a height of approximately 125 mm.
  - (vii) Mark the position on the guide rails.
  - (viii) Allow the platform to fall unimpeded.
  - (ix) Check that the platform stops in a very short distance without any perceptible slide.

- (d) *Operation* The operation of guided work platforms should be checked as follows:
- (i) A hand-pull tension should always be kept on the suspension rope when it is necessary to wind slack rope into the winch.
  - (ii) Any obstructions to movement should be investigated and the problem cleared immediately.
  - (iii) Where it is necessary to remove the winch, rope and safety gear, the platform should be lowered to the lowest level onto stops.
  - (iv) Where ropes or cables hang below the platform care should be taken to ensure they are free to operate and that they do not twist.
  - (v) When using oxyacetylene or arc welding equipment, care is taken to ensure that the flames or electrodes are kept clear of ropes at all times.
  - (vi) Handrails, and toeboards should be correctly fixed and kept in place at all times.
  - (vii) If a light is to be fitted on the platform it should be mounted at least 2 m above the platform.
- (e) *Record of maintenance* A written record of all maintenance, inspection and repairs should be signed by the persons conducting the inspections, maintenance and repairs and be kept on site for the life of the installation work.



APPENDIX C  
FALSE CAR (GUIDED WORK PLATFORM)

The following are recommended minimum requirements for false cars (guided work platforms):

- (a) The hoisting winch should comply with the requirements of AS 1418.7.
- (b) Where the hoisting winch can apply a force which is greater than the design load of the platform or the supporting structure without taking safety factors into consideration, a load limiting device that will prevent the force exceeding the design load, should be fitted. This can be achieved by electrical, mechanical or other means.
- (c) A device which is attached and operated independent of the hoisting winch and safety gear should be provided to stop the platform in the event of overspeeding in the down direction.
- (d) A type A instantaneous safety gear which in the event of the platform becoming separated from the hoisting device will apply and stop the platform without any perceptible slide, should be fitted. Type A instantaneous safety gear does not have to be provided with a safety gear switch or a governor.
- (e) All platforms should have a prominently displayed notice stating the maximum safe working load in kilograms.
- (f) All ropes should be protected against damage for a distance of not less than 2 m from the floor of the platform. Such protection should be removable for inspection.
- (g) A handrail at a height of not less than 900 mm or more than 1100 mm which resists a force of 500 N acting outwards at any point of handrail and toeboard of not less than 150 mm high should be provided on sides of the platform other than entrances.
- (h) The platform should be enclosed on each side other than entrances by vertical bars with a maximum aperture of 450 mm between the intermediate handrail and the kickboard.
- (i) The clearance between the front edge of the platform and the inside face of the liftwell enclosure should not exceed 225 mm. Where no front wall is provided, the front of the platform should be guarded.
- (j) After every installation of the platform and before any work is carried out from the platform and thereafter at six monthly intervals, the safety gear should be tested in accordance with Appendix B, Item (c).
- (k) Before installation or removal of the hoisting winch or rope, the platform should be lowered onto stops and made safe.
- (l) An operation inspection and maintenance procedure should be attached to the platform.
- (m) A written record of all maintenance, inspections and repairs should be signed by the person conducting the inspections, maintenance and repairs and this record should be kept for the life of every installation.
- (n) Where it is necessary to drive the false car above the top of the last guide rail installed, safety measures such as a visual indicator should be installed to indicate that the distance between the top of the false car guide shoe and the top of the last rail installed does not exceed the manufacturer's recommendations.

## APPENDIX D

## PLATFORM WITH AND WITHOUT CAR ENCLOSURE FITTED

**D1 LIFT CAR PLATFORM WITH CAR ENCLOSURE** The recommended minimum requirements, before any work is carried out from the top of a lift car with car enclosure fitted, are as follows:

- (a) The governor rope is connected to the governor and the safety gear on the car.
- (b) The safety gear and governor are tested to the specific requirements of AS 1735.2, based on platform speed.
- (c) The brake is adjusted to stop and hold 125% of the rated load. (See Clause 7.9.)
- (d) The lift car is counter-balanced to suit the load conditions. (See Clause 8.9).
- (e) Adequate lighting is installed on top of and underneath the lift car. (See Clause 3.5.)
- (f) An emergency stop switch of the manually reset type is fitted in conjunction with two continuous pressure control switches which control a minimum of two contactors in each direction.
- (g) The speed of the lift does not exceed 1 m/s.
- (h) For electrohydraulic lifts, the flow restriction valve is adjusted to the manufacturer's specification.
- (i) Where enclosure doors are not fitted, audible alarms are installed on the car platform and sound at all times while the lift is being moved.

**D2 LIFT CAR PLATFORM WITHOUT CAR ENCLOSURE FITTED** The recommended minimum requirements, before any work is carried out from a lift platform without the car enclosures fitted, are as follows:

- (a) The counterweight is balanced to at least the weight of the lift car platform and all equipment mounted there on plus 210 kg.
- (b) The governor rope is connected to the governor and the safety gear on the lift car.
- (c) The safety gear and governor are tested to the specific requirements of AS 1735.2, based on platform speed.
- (d) A notice is prominently displayed stating the maximum safe working load in kilograms.
- (e) The brake is adjusted to stop and hold 125% of the load displayed on the platform, (rated load).
- (f) Adequate lighting is installed on and underneath the platform.
- (g) An emergency stop switch of the manually reset type is fitted in conjunction with two continuous pressure control switches which control a minimum of two contactors in each direction.
- (h) The platform is enclosed on all sides other than entrances by wire mesh with a maximum aperture of 50 mm x 50 mm which has a minimum wire thickness of 2.5 mm to a height of not less than 900 mm or more than 1100 mm.
- (i) The clearance between the front edge of the platform and the inside face of the liftwell enclosure does not exceed 225 mm.
- (j) For electrohydraulic lifts, the flow restriction valve is adjusted to the manufacturer's specification.
- (k) The speed of the platform does not exceed 1 m/s.
- (l) Audible devices as detailed in Clause 3.11(vii) and Clause 13.6(b) are fitted.

**D3 MAINTENANCE OF RECORDS** A written record of all maintenance, inspection and repairs should be signed by the persons conducting the inspections, maintenance and repairs and be kept on site for the life of the installation work.

## APPENDIX E FIXED PLATFORM

The recommended minimum requirements, before work is carried out from fixed work platforms are as follows:

- (a) The work platform should be designed for a distributed safe working load of not less than 2.5 kPa (225 kg/m<sup>2</sup>) (for guidance see Appendix M).
- (b) A copy of the design drawings and computations should remain on site until the work platform has been dismantled.
- (c) Safe access to the work platform should be provided by means of a stairway, ramp, ladder or other suitable means.
- (d) Handrails, midrails and toeboards should be provided in all areas where a person could fall. (See AS 1657.)

APPENDIX F  
SUSPENDED SCAFFOLDING (SWING STAGES)

The recommended minimum requirements before any work is carried out from a swing stage are as follows:

- (a) The swing stage and supporting structure comply with requirements of AS 1576.1 and AS 1576.4.
- (b) Handrails at a height of not less than 900 mm or not more than 1100 mm and toeboards of not less than 150 mm from the floor of the swing stage and a midrail are provided.
- (c) Wire mesh with a maximum aperture of 50 mm × 50 mm and with a wire thickness of not less than 2.5 mm, or other fire-resistant material of equivalent strength and characteristics, is securely fixed between the guardrail and toeboard on all sides and ends.
- (d) A sign which states the rated safe working load is securely fixed to the inside of the swingstage.
- (e) The width of the platform is not less than 600 mm and not more than 900 mm.
- (f) The longitudinal distance between hoisting winches does not exceed 5.4 m centre to centre.
- (g) For access to and egress from the swing stage—
  - (i) a safety harness complying with AS 2626 is worn;
  - (ii) an anchoring point for a safety line for each person is provided that is capable of withstanding a force of at least 15 kN in a direction that simulates the loading likely to be placed on the anchor in the event of a fall; and
  - (iii) suitable tying method has been provided to secure the swing stage against movement during access and egress, and the space between the landing and the swing stage is not more than 225 mm.
- (h) A reliable and efficient communication system is maintained between any person in a swing stage and a person in the building or structure.
- (i) A suitable tying method is provided to secure the swing stage against movement whilst work is carried out from it.
- (j) Adequate training in rescue procedures should be given to persons responsible for the recovery of other persons who have fallen and remain supported by a harness. The recovery procedure should be in accordance with Appendix A.

APPENDIX G  
JUMP FORM, SLIP FORM OR SIMILAR CONSTRUCTION

The following are the recommended minimum requirements that should be observed before and while any work in a liftwell is carried out from a trailing platform of a jump form, slip form or similar construction:

- (a) The platform either—
  - (i) extends over the whole areas of the liftwell when work is being carried out; or
  - (ii) where it does not extend over the whole area of the liftwell, the platform has handrails at a height of not less than 900 mm or more than 1100 mm together with a toeboard 150 mm high fixed at the floor level of the platform and a mid-rail.
- (b) No installation work with the exception of inspection and repair is carried out whilst the jump form, slip form or similar construction is being raised.
- (c) When guiderails or other heavy equipment are being raised or being fixed in position no work is carried out in the liftwell below the trailing platform.
- (d) Before any work is carried out from a trailing platform an agreed work procedure is established after consultation with all contractors responsible for work from the platform.
- (e) A copy of the agreed work procedure is kept on site for the life of the installation work.

## APPENDIX H MAST CLIMBERS

The recommended minimum requirements for use of a mast climber for the installation of lifts are as follows:

- (a) The mast climber complies with the requirements of AS 1418.7.
- (b) Safety gear and an overspeed governor are fitted that comply with the requirements of AS 1418.7.
- (c) The mast climber is tested to the requirements of AS 1418.7.
- (d) The failure of any single magnetically operated switch, contactor or relay to release in the intended manner prevents the mast climber from starting or running.
- (e) A notice is prominently displayed on the platform stating the maximum load. The platform is designed to carry the above load on any portion of the platform.
- (f) A handrail at a height of not less than 900 mm or more than 1100 mm which resists a force of 500 N acting outwards at any point of handrail, and a toeboard of not less than 150 mm high, are provided on sides of the platform other than entrances.
- (g) The platform is enclosed on three sides by wire mesh with a maximum aperture of 50 mm × 50 mm and a minimum wire thickness of 2.5 mm between the handrail and the kickboard.
- (h) The clearance between the front edge of the platform and the inside face of the liftwell enclosure does not exceed 225 mm.

APPENDIX I  
SCAFFOLDING IN LIFTWELL

The recommended minimum requirements where work in a liftwell is carried out from fixed scaffolding are as follows:

- (a) The scaffolding complies with AS 1576.4.
- (b) Safe access to and egress from the scaffolding are provided where necessary.

## APPENDIX J SCAFFOLDING FREE SYSTEM

The recommended minimum requirements when using the scaffold free system for installation of lifts are as follows:

- (a) All hoisting equipment to comply with AS 1418.7 or AS 1735, as appropriate:
- (b) A detailed work procedure is established prior to work commencing that includes at least the following:
  - (i) Roping procedure.
  - (ii) Balance of counterweight compliance with Clause 8.9.
  - (iii) If working off (or from) a lift car platform without car enclosure fitted, compliance with Paragraph D2, Appendix D.
  - (iv) If working off the top of the lift car with car enclosure fitted, compliance with Paragraph D1, Appendix D and if installing trimmer beams or doors or both and frames, consideration should be given to the fitting of a temporary handrail to the top of the car.
  - (v) The movement of the lift car or platform in the liftwell by the lift machine or by power chain block or winch.
  - (vi) Method of installing rail brackets and rails from the pit.
- (c) The safety gear and governor are tested to the specific requirements of AS 1735.2 based on platform speed. The brake should be adjusted to stop and hold 125% of the load displayed on the platform (rated load).

NOTE: Where the lift is electrohydraulic (of the indirect type) and having a speed not exceeding 0.65 m/s, broken rope safety gear operation is permitted.

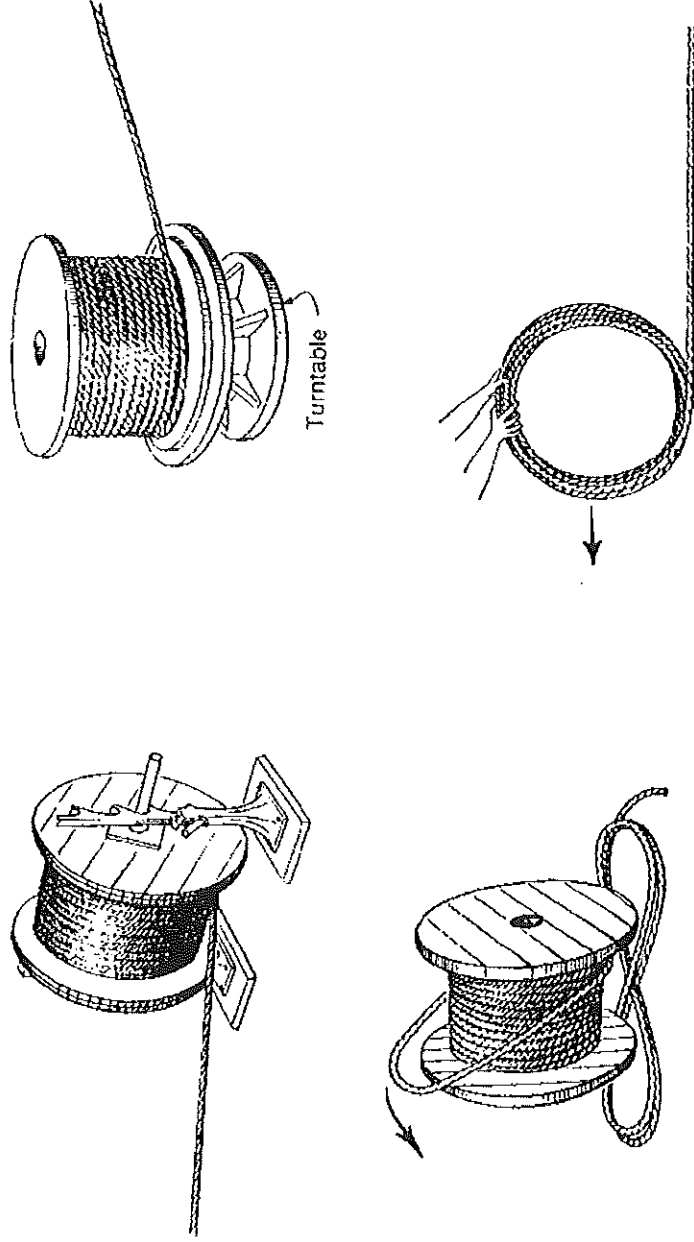


APPENDIX K  
PRE-ASSEMBLED LIFTWELLS

Where pre-assembled liftwells are used, care should be taken to ensure that the lifting gear is adequate and the procedure for installation has been established with other concerned parties.

Care should be taken to ensure that the other parts of the building are not subject to excessive loadings unless they have been designed for such loads.

APPENDIX L  
HANDLING WIRE ROPE



(a) Acceptable methods



(b) Unacceptable methods

FIGURE L1 RIGHT AND WRONG WAYS OF HANDLING WIRE ROPE

APPENDIX M  
RECOMMENDED SIZES OF DECKS AND PLATFORMS

Table M1, M2 and M3 provide the recommended minimum sizes that should be used in the construction of decks and platforms.

For further guidance, see AS 1576.

**TABLE M1  
MAXIMUM SPAN OF TIMBER SCAFFOLD  
PLANKS**

Nominal plank thickness	Maximum span between beams
32 mm (hardwood only)	1.0 m
38 mm	1.5 m
50 mm	2.0 m
63 mm	2.5 m

**TABLE M2  
MAXIMUM SPAN OF BEAMS FOR PROTECTION DECK**

Beam type	When scaffold planks are supported at the following spacings:			
	1.0 m	1.5 m	2.0 m	2.5 m
<i>F7 Oregon</i>				
(on edge)				
200 mm × 50 mm	1.9 m	1.6 m	1.4 m	1.2 m
200 mm × 75 mm	2.4 m	2.0 m	1.7 m	1.5 m
250 mm × 50 mm	2.5 m	2.0 m	1.7 m	1.6 m
250 mm × 75 mm	3.1 m	2.5 m	2.2 m	1.9 m
300 mm × 50 mm	3.0 m	2.4 m	2.1 m	1.9 m
300 mm × 75 mm	3.7 m	3.0 m	2.6 m	2.3 m
<i>Steel</i>				
150 mm UB 14	4.0 m	3.9 m	3.4 m	3.0 m
180 mm UB 18	5.0 m	4.9 m	4.2 m	3.8 m

**TABLE M3**  
**MAXIMUM SPAN OF BEAMS FOR HEAVY**  
**DUTY WORKING PLATFORMS**

Beam type	Maximum span between supports
<i>F7 Oregon</i>	
<i>(on edge)</i>	
200 mm x 50 mm	1.6 m
200 mm x 75 mm	2.5 m
250 mm x 50 mm	2.5 m
250 mm x 75 mm	3.8 m
300 mm x 50 mm	3.6 m
300 mm x 75 mm	5.5 m
<i>Steel</i>	
150 mm UB 14	4.0 m
180 mm UB 18	5.0 m