

BS 5655-6:2011



BSI Standards Publication

Lifts and service lifts –

Part 6: Code of practice for the selection, installation and location of new lifts

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Summary of pages

This document comprises a front cover, an inside front cover, pages i to iv, pages 1 to 76, an inside back cover and a back cover.

Foreword

Publishing information

This part of BS 5655 is published by BSI and came into effect on 30 November 2011. It was prepared by Technical Committee MHE/4, *Lifts, hoists and escalators*. A list of organizations represented on this committee can be obtained on request to its secretary.

Supersession

This part of BS 5655 supersedes BS 5655-6:2002, which is withdrawn.

Relationship with other publications

This part of BS 5655 should be read in conjunction with BS 7255, which gives recommendations for safe working on lifts that are additional to the features recommended in this part of BS 5655 and are applicable when installing, examining, inspecting, testing, servicing, repairing, dismantling and demolishing permanent lift installations.

This part of BS 5655 paraphrases many of the requirements specified in all other relevant standards (listed in the bibliography). This indicates what information is to be exchanged between the interested parties and the sequence of events from the preliminary planning stage to the putting into service of the installation.

Lifts selected in accordance with Clause 11 are generally suitable for use by persons with impaired mobility. It might be necessary to specify additional features to suit certain disabilities (details can be found in BS 8300 and BS EN 81-70). Subject to certain limitations, the provision of vertical access for persons with impaired mobility can be achieved by the provision of powered lifting platforms.

Information about this document

This is a full revision of the standard, and introduces the following principal changes:

- the clauses on technology have been updated;
- energy efficiency considerations have been included;
- the annexes have been updated and three new annexes have been included covering traffic control systems, energy efficiency and the principal requirements in the provision of lifts for persons with impaired mobility.

Use of this document

As a code of practice, this part of BS 5655 takes the form of guidance and recommendations. It should not be quoted as if it were a specification and particular care should be taken to ensure that claims of compliance are not misleading.

Any user claiming compliance with this part of BS 5655 is expected to be able to justify any course of action that deviates from its recommendations.

Presentational conventions

The provisions in this standard are presented in roman (i.e. upright) type. Its recommendations are expressed in sentences in which the principal auxiliary verb is "should".

Commentary, explanation and general informative material is presented in smaller italic type, and does not constitute a normative element.

Contractual and legal considerations

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

Compliance with a British Standard cannot confer immunity from legal obligations.

1 Scope

This part of BS 5655 gives recommendations for the selection, installation and location of new passenger and passenger/goods lifts in the classifications given in Table 1. It also gives recommendations for issues relating to the selection and installation of lifts, such as building design.

This part of BS 5655 is applicable only for the early stages of a project for clients, architects, principal contractors, building owners, building managers, developers, general and specialized engineering consultants, lift contractors and other interested parties.

Table 1 **BS ISO 4190-1 and BS ISO 4190-2 classification of lifts**

Class	Purpose
Class I	Lifts designed for the transport of persons
Class II	Lifts designed mainly for the transport of persons but in which goods may be carried
Class III	Lifts designed for health care purposes, including hospitals and nursing homes
Class IV	Lifts designed for the transport of goods that are generally accompanied by persons
Class VI	Lifts designed to suit buildings with intensive traffic, i.e. lifts with speeds of 2.5 m/s and above

This part of BS 5655 does not give recommendations for existing lift installations.

NOTE Although this part of BS 5655 does not give recommendations for existing installations, it may be used as guidance when making alterations to such installations.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

BS 476 (all parts), *Fire tests on building materials and structures*

BS 1363-2, *13 A plugs, socket-outlets, adaptors and connection units – Part 2: Specification for 13 A switched and unswitched socket-outlets*

BS 2853, *Specification for the design and testing of steel overhead runway beams*

BS 5606:1990+A1:1998, *Guide to accuracy in building*

BS 5900, *Specification for powered domestic lifts with partially enclosed cars and no lift-well enclosures*

BS 6440, *Powered vertical lifting platforms having non-enclosed or partially enclosed liftways intended for use by persons with impaired mobility – Specification*

BS 7255, *Code of practice for safe working on lifts*

BS 7375, *Distribution of electricity on construction and demolition sites – Code of practice*

BS 7671, *Requirements for electrical installations – IEE Wiring Regulations – Seventeenth edition*

BS 8300, *Design of buildings and their approaches to meet the needs of disabled people – Code of practice*

BS 8486-1, *Examination and test of new lifts before putting into service – Specification for means of determining compliance with BS EN 81 – Part 1: Electric lifts*

BS 8486-2, *Examination and test of new lifts before putting into service – Specification for means of determining compliance with BS EN 81 – Part 2: Hydraulic lifts*

BS 9999, *Code of practice for fire safety in the design, management and use of buildings*

BS EN 81 (all parts), *Safety rules for the construction and installation of lifts*

BS EN 12015, *Electromagnetic compatibility – Product family standard for lifts, escalators and moving walks – Emission*

BS EN 12016, *Electromagnetic compatibility – Product family standard for lifts, escalators and moving walks – Immunity*

BS EN 60269 (all parts) [BS 88 (all parts)], *Low-voltage fuses*

BS EN 60947-3, *Low-voltage switchgear and controlgear – Part 3: Switches, disconnectors, switch-disconnectors and fuse-combination units*

BS ISO 3864-1, *Graphical symbols – Safety colours and safety signs – Part 1: Design principles for safety signs and safety markings*

BS ISO 3864-3, *Graphical symbols – Safety colours and safety signs – Part 1: Design principles for graphical symbols for use in safety signs* ¹⁾

BS ISO 4190 (all parts), *Lift (Elevator) installation*

BS ISO 7010, *Graphical symbols – Safety colours and safety signs – Registered safety signs*

3 Terms and definitions

For the purposes of this part of BS 5655 the following terms and definitions apply.

3.1 balancing weight

mass that saves energy

3.2 car

part of a lift that carries passengers and/or other loads

NOTE Referred to as a “carrier” in *The Supply of Machinery (Safety) Regulations 2008* [1].

3.3 CDM co-ordinator

person who advises and assists the Client to co-ordinate health and safety aspects of a notifiable project

NOTE The CDM co-ordinator is also the duty holder under the *Construction (Design and Management) (CDM) Regulations 2007* [2].

3.4 client

person who seeks the services of another to carry out a construction project or carries out the project themselves

NOTE The client is also the duty holder under the *CDM Regulations 2007* [2].

¹⁾ In preparation.

3.5 contractor

person (including a client, principal contractor, lift contractor) who carries out or manages construction work

NOTE The contractor is also the duty holder under the CDM Regulations 2007 [2].

3.6 control system

system that controls the manner in which the lift and doors operate

3.7 counterweight

mass that ensures traction

3.8 designer

person (including a client, principal contractor or a lift contractor) who prepares or modifies a design or who arranges or instructs any person to do so

NOTE The designer is also the duty holder under the CDM Regulations 2007 [2].

3.9 entrance

complete landing door assembly, together with its surround

3.10 firefighters lift

lift designated to have additional protection, with controls that enable it to be used under the direct control of the fire brigade in fighting a fire

3.11 fire resistance

ability of a component or construction of a building to satisfy, for a stated period of time, some or all of the appropriate criteria specified in BS 476 (all parts)

3.12 goods/passenger lift

lift intended mainly for the transport of goods, which are generally accompanied by persons

3.13 group of lifts

two or more lifts that are electrically inter-connected

3.14 levelling

operation that improves the accuracy of stopping at landings

3.15 lift contractor

party that is contracted to supply and install the lift(s)

3.16 owner

legal entity having right of possession of a lift and responsibility for its safe working

NOTE The owner is usually the landlord or proprietor of the building in which a lift is situated.

3.17 machinery space

space inside or outside a well where the machinery, as a whole or in parts, is placed

3.18 machine room

room in which a machine or machines and/or the associated equipment are placed

3.19 machine-room-less lift

passenger or goods/passenger lift, which does not require a separate machine room and where the machine is generally located in the well and the control panel is integrated into the wall of the well

NOTE A machine-room-less lift is commonly referred to as an MRL lift.

3.20 notified body

body appointed to carry out one or more of the conformity assessment procedures

3.21 observation lift

lift that provides a panoramic outlook

NOTE The well for such a lift can be partially enclosed.

3.22 passenger

person transported by a lift in the car

3.23 principal contractor

person appointed by the client, who carries out or manages construction work

NOTE 1 The principal contractor is also the duty holder under the CDM Regulations 2007 [2].

NOTE 2 The principal contractor is commonly referred to as the “main contractor”.

3.24 pulley room

room, not containing a lift machine, in which pulleys are located

NOTE This room can also contain other equipment, such as the overspeed governor(s) and electrical equipment associated with a lift.

3.25 pulley space

space inside or outside a well where pulleys are placed

3.26 putting into service

making available for use a lift that has undergone examinations and tests

3.27 rated load

load which the equipment has been designed to carry

3.28 rated speed

speed at which the equipment has been designed to operate

3.29 re-levelling

operation, after the lift has stopped, to permit the stopping position to be corrected during loading or unloading, if necessary by successive movements

3.30 starts per hour (electric traction lifts)

number of times during 1 h that the drive motor is energized in order for the lift to travel between any two floors in either direction

3.31 starts per hour (hydraulic lifts)

number of times during 1 h that the pump motor is energized in order for the lift to travel between any two floors in the upwards direction

3.32 user

person making use of the services of a lift installation

NOTE A user is not necessarily the same as a passenger.

3.33 well

space in which the car, the counterweight or the balancing weight travels

NOTE This space is normally bounded by the bottom of the pit, the walls and the ceiling of the well.

4 Contract and project guidance

4.1 Exchange of information

NOTE 1 Lifts are classified in BS ISO 4190 (all parts); see Table 1.

Although the rated load can range from 320 kg to 2 500 kg and the rated speed can range from 0.4 m/s to 1.0 m/s for hydraulic lifts and 0.63 m/s to 6.00 m/s for electric traction lifts, the lift contractor should establish the clients requirements at an early stage. If rated loads and/or rated speeds outside these ranges are required, they should be discussed in detail between the lift contractor and the client's representative.

If the projected lift installation is one of the arrangements described, the preliminary plan for the installation, in particular the traffic sizing (see Clause 6), should be established, and general planning details should be determined by the architect, or any person assuming such function. The details for a lift system installation should be finalized at the earliest possible stage. Before an order is finalized, a detailed investigation should be completed (see A.1), after which the client's representative should reach an agreement with the principal contractor.

NOTE 2 Attention is drawn to the requirements of the Lifts Regulations 1997 [3] and the CDM Regulations 2007 [2].

NOTE 3 A typical checklist for the exchange of information is given in A.1.

4.2 Lift invitation to tender

4.2.1 General

The client's representative should issue an invitation to tender and allow a period of two weeks to six weeks for the lift contractors to tender.

4.2.2 Tender documents

The tender documents should state each particular project's details and include items that are relevant to the lift work of the particular project in accordance with A.2. They should also state the standards to which equipment should conform to.

Lifts to be installed in new buildings should conform to BS EN 81-1 and BS EN 81-2.

NOTE 1 Attention is particularly drawn to the Lifts Regulations 1997 [3] with regard to new lifts.

New lifts in existing buildings should conform to BS EN 81-1:1998+A3, 5.7.1 and 5.7.3 and BS EN 81-2:1998+A3, 5.7.1 and 5.7.2. Where building restrictions, or special types of load, preclude the use of such lifts, additional data should be included in the tender documents as necessary (see 5.9).

NOTE 2 Attention is drawn to the Lifts Regulations 1997 [3], which require a Design Examination Certificate to be obtained under certain circumstances.

4.2.3 Additional items for tender documents

4.2.3.1 General

The tender documents should indicate if any additional items beyond those specified in BS EN 81-1:1998+A3 and BS EN 81-2:1998+A3 are included, such as the dismantling of an existing lift, vision panels, forced ventilation, landing architrave, level of fire resistance, any special controls, firefighters lifts and designations (see 7.2.3) and any temporary or beneficial use (see 4.5.4).

Where applicable, the principal contractor should specify the building construction for the well and machine room, provide notes on possible fixings for guides, etc., and indicate any special installation method for the lift that might be required on system building sites (see 4.5.3).

NOTE 1 This can necessitate agreement between the principal contractor and the lift contractor before a tender can be submitted.

NOTE 2 Annex B gives guidance regarding interface fixings for steel-framed buildings.

Particular consideration should be given to lifts that are to be installed in adverse conditions, e.g. chemical works, lifts used with power trucks and lifts used in vandal-prone situations (see BS EN 81-71:2005) and similar applications. The necessary measures to be provided to deal with these environments should be specified in the tender documents.

4.2.3.2 Finishes

Finishes should be specified in the tender documents (see also 4.3.5). The provision of architraves, or finish surrounds for doors, should be the agreed between the lift contractor and the client's representative.

NOTE A list of possible finishes is given in A.2.2.

4.2.3.3 Other items

A number of other items are associated with a lift installation, of which some should be provided by the principal contractor and some should be provided by the lift contractor. The limits of responsibility should be understood by all parties and clearly set out in the tender documents, particularly with respect to design and build projects.

NOTE Details of the items typically supplied by the lift contractor are given in A.2.3 and details of the items typically supplied by the principal contractor are given in A.2.4.

4.2.3.4 Inserts

Depending on the construction methods used, inserts for attaching equipment might be required and the builder should have primary responsibility for the supply and installation of inserts. Before a tender is offered, the builder and the lift contractor should agree the exact specification and set it out in the enquiry documents, particularly with respect to dimensions and tolerances (see Annex B).

4.2.3.5 Building contract programme

The tender documents should indicate, as accurately as possible, the building contract programme as it affects the lift contractor, and a mutually acceptable programme should be agreed.

NOTE Attention is drawn to the Lifting Operations and Lifting Equipment Regulations (LOLER) 1998 [4] and to local regulations and byelaws with regard to access, storage and crane facilities.

4.2.4 Pre-construction information

NOTE 1 Attention is drawn to the CDM Regulations 2007, Regulation 17(1) [2], which requires the client to provide the CDM co-ordinator with health and safety information relating to the project.

Pre-construction information should be provided by the client to designers and contractors as part of the bidding process and planning work. It should contain project specific health and safety information to enable the identification of hazards and risks associated with the lift design and construction work; these should include:

- a) description of the project;
- b) client's considerations and management requirements;
- c) environmental restrictions and existing on-site risks;
- d) significant design and construction hazards;
- e) description of the health and safety file.

NOTE 2 Attention is drawn to the Approved Code of Practice to the CDM Regulations, Appendix 2 [5], which details the pre-construction information required.

4.2.5 Tender submissions

Tender submissions should be returned to the person issuing the invitation to tender, and should include all requested information (see 4.2.2), additional items (see 4.2.3) to support the tender bid.

Tender submissions should clearly state all assumptions made and deviations proposed.

Any information regarding the health and safety of any person carrying out the construction work or information that might justify a revision of the construction phase plan should be included. The level of detail of the information should be proportionate to the risks involved in the project.

NOTE Attention is drawn to the Control of Asbestos Regulations 2006, r4(9)(c) [6].

4.3 Acceptance of tender and subsequent procedure

COMMENTARY ON 4.3

The procedure indicated in 4.3.1, 4.3.2, 4.3.3, 4.3.4, 4.3.5 and 4.3.6 relates to the most common case, where the lift contractor is a contractor under the CDM Regulations 2007 [2].

4.3.1 Order

The principal contractor, other contractor or client should place an order with the selected lift contractor. If alternative schemes have been offered, the order should clearly indicate which has been accepted.

4.3.2 Lift contractor's programme

At the time of order, the lift contractor's programme for manufacture and installation of the lift should be agreed. The lift contractor's programme should cover each lift separately and should indicate the dates when:

- a) the order was placed;
- b) the lift site is to be ready for work to start;
- c) the provision of lift electricity supplies is needed;
- d) the lift should be completed;
- e) handover and CE marking is to be done.

The period between order and delivery of materials should fall into two stages:

- 1) the finalizing of details; and
- 2) the actual production of the equipment, which is dependent on the first stage.

Within the first stage, other dates should be considered, such as when:

- i) all relevant building information is to be available;
- ii) the builders' drawings, prepared by the lift contractor, is to be available;
- iii) the layout drawings is to be approved;
- iv) the finishes are to be finally accepted and approved.

NOTE For additional information relevant to programming the site work, see 4.4 and 4.5.

4.3.3 Drawings

After the order has been placed, the lift contractor should supply drawings that show the builders' work required, the point loadings and machine room layouts, etc., giving minimum dimensions and tolerances. To enable these to be prepared, the client's representative should provide the lift contractor with the relevant detailed building plans.

4.3.4 Approval of drawings

The client's representative should give written approval of the drawings (referred to in 4.5.3) that are submitted by the lift contractor (after modification, if necessary, and within the limitations of the information provided). At the same time, the client's representative should obtain any additional copies that might be needed for distribution to other concerned parties.

4.3.5 Selection of finishes

Decisions regarding the client's choice of finishes (see 4.2.3.2), such as architrave finishing, decorative features, decorative finishes, colours, etc., should be communicated by the client's representative to the lift contractor no later than when the drawings are approved.

NOTE 1 Delays in these decisions can adversely affect the completion of the contract.

NOTE 2 Attention is drawn to the Equality Act 2010 [7]. Also see Clause 11 and C.3.

4.3.6 Electricity supplies to lift

The lift contractor should provide the client's representative with details in the tender return documents of the electrical power supply needed to install the lift.

A permanent power supply (at 400 V $+10_{-5}$ %) should be provided for final commissioning and testing.

If a permanent supply is not available, a temporary supply should be provided that is equivalent to the permanent supply.

NOTE If an electrical supply is not available when needed, this can cause additional works and delays.

4.4 Coordination of site work

4.4.1 Pre-construction and site meetings

On large sites regular meetings should be held to ensure the successful progress of site work and full cooperation between all parties.

Programmes for the construction work (taking place in the part of the building containing the lift) should only be made following consultation between all parties concerned. Critical dimensional tolerances (see 5.2) should be fully discussed at this stage; correction after wells have been formed can result in time delays.

4.5 Construction phase plan and health and safety file

4.5.1 Construction phase plan

NOTE Attention is drawn to the CDM Regulations 2007, Regulation 23 [2], and Approved Code of Practice to the CDM Regulations, Appendix 3 [5], for details on the construction phase plan.

The principal contractor is responsible for drawing up the construction phase plan, which should be prepared before work commences, has been developed in discussion with the lift contractor and other affected contractors and kept up-to-date as the work progresses. The construction phase plan should include:

- a) a description of the work;
- b) management of the work;
- c) arrangements for controlling significant site risks;
- d) management of the health and safety file;
- e) details of the lift contractors work for inclusion in this plan. The level of detail of the information should be proportionate to the risks involved in the project.

4.5.2 Health and safety file

NOTE 1 Attention is drawn to the CDM Regulations 2007, Regulation 14 [2], which require the client to appoint a CDM coordinator to produce a health and safety file. The Approved Code of Practice to the CDM Regulations [5] gives further details on the contents of the health and safety file.

The production of the health and safety file should, at least, include the following information:

- a) a record or "as built" drawings and plans to be used throughout the construction phase;
- b) general details of the construction methods and materials used;
- c) details of the equipment and maintenance facilities;
- d) maintenance requirements, including cleaning;
- e) manuals produced by specialist contractors;
- f) details of the location and nature of services, including emergency and fire-fighting systems.

During the construction phase the principal contractor and other contractors should provide all relevant information to the CDM coordinator to enable the file to be reviewed, amended or additions made.

NOTE 2 The health and safety file alerts persons to the risks to be managed during the repair, service, renovation or demolition of the structure and plant after the lift has been put into service.

4.5.3 Preparatory work on site

The lift contractor should make periodic visits to the site before the starting date to check progress on the well construction and discuss relevant matters with the principal contractor. The lift contractor should check that all building work has been carried out in accordance with the agreed dimensions in 5.2. Immediately before the lift installation is to start, the lift contractor should check that site conditions are fit to permit the installation to proceed.

NOTE A typical list of preparatory work is given in A.3.

In certain system buildings and buildings of over ten floors, it can be necessary, by prior agreement, to start erection before the top portion of the well has been constructed, in which case the contractor should temporarily deck out and waterproof. This is a special condition that should be included in the pre-tender health and safety plan [see 4.2.4e) and 4.5.8] and should be specified at the time of the tender enquiry.

4.5.4 Delivery of material

The lift contractor should advise the principal contractor when equipment is ready for dispatch. The principal contractor, in consultation with the lift contractor, should make arrangements on site to receive and unload the equipment with appropriate hoisting tackle, slings, supports, etc, as near as possible to the well.

4.5.5 Storage and protection

Provision should be made by the principal contractor for storing, protecting and preserving against loss, deterioration or damage, all material on the site.

NOTE Attention is drawn to the adverse effect of damp conditions on electrical equipment, steel wire ropes and guide rails.

Lift equipment should receive a protective coat of paint at the works before dispatch to site. A finishing coat should either be applied on site or applied at the works with retouching carried out on site where necessary. If there is any additional painting to be done due to adverse site conditions and damage to decorative finishes, this should be subject to separate negotiation between the lift contractor and the client.

4.5.6 Services of other trades

Where the lift contractor requires the services of joiners, bricklayers and other trades, due notice should be given to the principal contractor of the work to be done by other trades so that work can be planned accordingly.

4.5.7 Scaffolding, fencing, etc.

Scaffolding, timbers, rollers and similar plant to be used for the unloading and installation of the lift, and also for the proper guarding and close fencing of the well, should be provided, erected and maintained by the principal contractor.

The well should not be used as a means of disposal for rubbish from the upper floors.

The well and machine room should be handed over to the lift contractor complete. Other trades should not be allowed to work in them during the installation of the lift, except by arrangement with the lift contractor and under the provisions of a safe system of work in accordance with BS 7255.

4.5.8 Special installation procedures

Where there is insufficient time for the lift(s) to be installed in the conventional fashion, (i.e. after the well is completely built or with industrialized multi-storey buildings) special procedures should be employed.

NOTE Methods of construction differ in detail: for example, it could be necessary to use a crane to lower and position lift equipment into the progressively rising top of the well (see 4.5.3).

The principal contractor should provide a suitable portable cover for the completed portion of the well in order to protect the lift erectors working below. When the top of the well has been reached, it should be capped immediately with a precast load-bearing floor slab on to which is lowered the pre-assembled machine room equipment. The principal contractor should then complete and weatherproof the machine room as swiftly as possible.

On all such projects the closest cooperation between the principal contractor and the lift contractor should be brought about by regular meetings from an early stage.

4.5.9 Connecting to power supply

The lift contractor should inform the principal contractor of the date the power supply to the lift is needed for installation so that suitable arrangements for connection can be made (see 4.5.6, 8.3 and 8.4).

4.5.10 Use of the lift prior to acceptance

Until the lift is put into service, it should not be used by any persons other than those involved in the actual installation of the lift.

4.6 Procedure following acceptance tests, including inspection and maintenance

COMMENTARY ON 4.6

Attention is drawn to LOLER 1998 [4], which require lifts in certain premises to be examined at intervals, e.g. within every period of 6 months, by a person competent to carry out such examinations, who is required to report on a prescribed form. The reports are normally kept in a register by the building owner or occupier. A LOLER test is not normally required at the time of commissioning a new lift.

4.6.1 Acceptance procedure

NOTE 1 Attention is drawn to the Lifts Regulations 1997, Regulation 13 [3], for information on placing of lifts on the market.

The lift should be tested, before being put into service, in accordance with the appropriate part of BS EN 81 (all parts) and with BS 8486-1 and BS 8486-2 as applicable.

The client should accept the lift on completion of these tests and provide a suitable telephone line to connect to a rescue service. Special arrangements (see 4.6.3 and 4.6.4) should be made if there is to be a period between the lift being put into service and the lift going into normal service.

NOTE 2 It is advisable for the client to arrange insurance cover for the lift.

4.6.2 Maintenance

To ensure the continuance of satisfactory and safe operation, the client (or building occupier) should arrange for the completed lift to receive regular servicing by persons competent to carry out these tasks at such intervals as the type of equipment and intensity of usage demand.

NOTE 1 Such service can be secured under a service contract. It is preferable and normal for the lift contractor to be entrusted with the servicing during the guarantee period of a new lift. The scope of a service contract can be extended to cover intermediate service calls, repairs and replacement of worn parts. Any guarantee provided by the lift contractor is generally conditional upon the lift receiving regular and adequate servicing and covers the free replacement of parts that prove defective through reasons of faulty materials or workmanship during the guarantee period. The guarantee period is typically 12 months and is known as the Defects Liability Period.

All maintenance should take account of the lift contractor's instruction manual supplied with the installation in order to ensure:

- a) the application of safe systems of work;
- b) all parts are kept in good working order (see BS EN 13015).

Throughout the lifetime of the installation, the owner of the lift should ensure, in the interests of safety and operating efficiency, that:

- 1) the equipment is not misused;
- 2) unauthorized persons are not permitted to enter the well or machine rooms.

Cleaning of the well and machine rooms/spaces should only be performed by the lift contractor or by other under the supervision of the lift contractor.

NOTE 2 Attention is drawn to the regulations listed in Annex C.

4.6.3 Lift not in immediate use (caretaker maintenance)

When conditions do not permit a lift to be put into normal service immediately following completion and acceptance, it should be immobilized.

Until the lift is put into normal service, the principal contractor should put in place effective precautions against damage to:

- a) finishes;
- b) equipment from dampness and builders' debris.

NOTE A separate service contract is usually made with the lift contractor to pay regular visits during this period to inspect, lubricate and report on the condition of the lift. During the inspection the lift is typically not moved under power. A date is typically agreed with the lift contractor from which the guarantee period (see 4.6.2, Note 1) commences.

4.6.4 Temporary use of lifts

If the client intends to permit temporary use of a lift by another party, such as the principal contractor, before putting it into normal service but after the acceptance procedure (see 4.6.1), then the responsibilities of those concerned should be clearly defined and agreed.

The temporary use of a lift should be decided at the same time that the lift contractor is appointed, taking into account the conditions under which it is likely to take place.

A permanent two-way voice communication system with a rescue service should be available at all times in accordance with BS EN 81-28.

4.6.5 Cleaning

During the acceptance procedures checks should be made of the condition and repair of decorative finishes, before the lift contractor leaves the site, as deterioration of decorative finishes can occur owing to adverse site conditions both before and after completion of the installation.

After any period of caretaker maintenance (or temporary service), the lift should be checked and any further general cleaning down should be carried out before the lift is taken into normal service. The lift contractor should be instructed accordingly to undertake this work and, if any damage has occurred, to repair this at the same time.

During the lifetime of the lift, cleaning of various parts, e.g. the glass in an observation lift, should be carried out when necessary. Cleaning of the well and machine rooms/spaces should only be performed by the lift contractor or by others under the supervision of the lift contractor.

5 Building construction for lift installations in accordance with BS EN 81 (all parts)

COMMENTARY ON Clause 5

This clause gives additional recommendations and guidance that builds upon the requirements in BS EN 81 (all parts). The full requirements for building construction for electric and hydraulic lifts are given in the BS EN 81 (all parts). The majority of the details described here have been extracted and paraphrased from those standards.

5.1 General

Where building work (such as fixings, cutting away for switches and making good) is needed, reference should be made to the drawings supplied by the manufacturer of the equipment.

The access route into and through the building for introducing large or heavy components, e.g. hydraulic jack, pre-assembled car and lift machine, etc. should be planned at an early stage.

If, owing to building restrictions, hydraulic jacks cannot be accommodated in a single length, special arrangements can be necessary and the lift contractor should be consulted.

5.2 Dimensional tolerances

5.2.1 General

The architect, or any person assuming such functions, in agreement with the builder, should ensure that either the well dimensions are sufficient for the lift to be installed or add additional tolerances to the target size dimensions for the well.

5.2.2 Well dimensions

COMMENTARY ON 5.2.2

Lifts have to move vertically through a building and the car and landing door equipment have to interconnect so the plumbness of the well and the alignment of the landing openings are of paramount importance. It is therefore important that the well is not built to the usually applied construction industry practices, which allow deviations from the target sizes as both increased and decreased dimensions. It is also important to ensure that the well is built to a high degree of verticality, i.e. plumb. Decreased dimensions are thus not acceptable to the lift industry and allowances need to be made by the architect, builder or structural engineer to accommodate the high degree of verticality needed. Failure to do so can result in significant reworking and serious delays.

During the building construction, the principal contractor should apply the guidance given in BS 5606; in particular see BS 5606:1990+A1, Figure 2, for the specification of target sizes for lift wells.

NOTE 1 BS 5606 is a guide for ensuring accuracy in building construction, which indicates the expected limits of building accuracy for different types of construction.

The plan dimensions of wells should be provided by the lift contractor and define the minimum clear plumb sizes.

When specifying the well structural dimensions to meet the lift contractor's dimensional requirements, the client's representative should take into account the constructional tolerances appropriate to any particular building technique. They should also ensure that the minimum clear plumb sizes specified by the lift contractor are included in the building design and are obtained in the finished work.

The client's representative, in conjunction with the builder, should ensure that dimensions in excess of the recommended minimum plumb dimensions for wells and openings are not greater than the values given in Table 2, beyond which changes to the design might be necessary.

Table 2 **Limits of accuracy of well plumb dimensions (see BS ISO 4190-1:2010)**

Well height	Limit of accuracy
Storeys	K
<20	+50 mm, –0 mm
>20	+1.0 mm, –0 mm per extra storey up to max. 100 mm

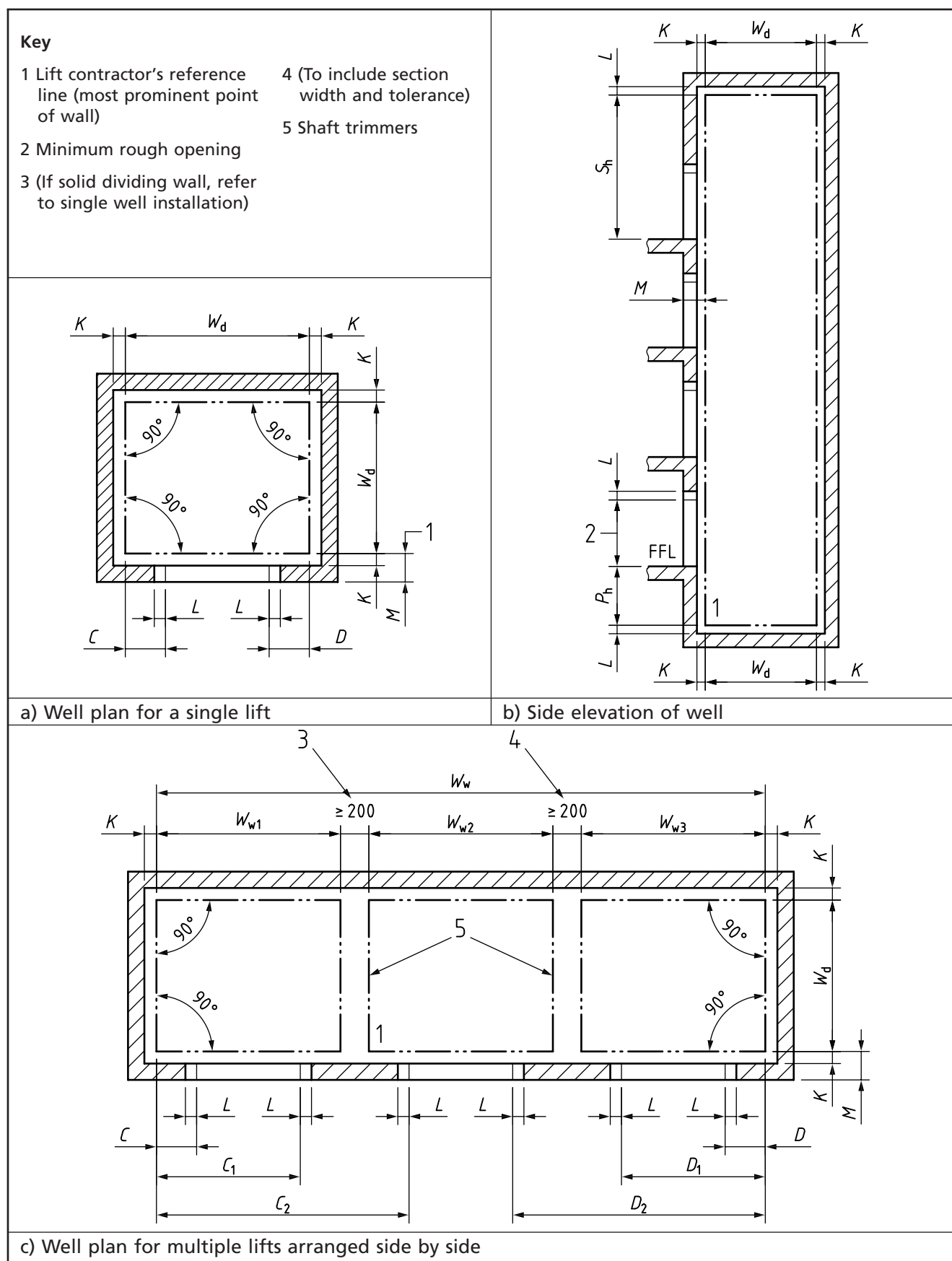
NOTE 2 The dimensional tolerance K shown in Table 2 is a positive value only. Unlike other building tolerances, K cannot have a negative value. If the well is built with a negative value of K , this can require reconstruction of the well in the affected areas or extensive modifications to the lift equipment, if this is possible, resulting in delays.

At the planning stage, the well dimensions should be in accordance with those specified in BS ISO 4190-1 and BS ISO 4190-2, but the dimensions may be increased or decreased at a later stage if necessary to meet the requirements of a specific product.

The structural limits of accuracy pertaining to single and multiple well arrangements should be in accordance with Figure 1. If the net well dimensions W_w (well width) and W_d (well depth) and the nominal structural entrance opening dimensions C and D are defined by plumb lines, the actual wall should not encroach upon the space bounded by those dimensions. In Figure 1 dimension K , which is the limit of accuracy of dimensions W_w and W_d , should not exceed the value given in Table 2 for the relevant well height.

In the case of multiple lifts situated side by side, see Figure 1c), the dimension K is not applicable to the space between the plumb wells and its length should be not less than 200 mm for this space in accordance with BS ISO 4190-1 and BS ISO 4190-2.

Figure 1 Structural limits of accuracy (1 of 2)



5.2.3 Landing door openings

NOTE 1 Attention is drawn to the Building Regulations 2000, Approved Document M [8], in respect of the provision of clear opening widths (i.e. at least 800 mm for lift doors) and landings (i.e. an unobstructed space of at least 1 500 mm by 1 500 mm). Duties under the Equality Act 2010 [7] can also impose additional requirements (see C.3).

The finished landing openings should be accurate to the size specified by the lift contractor and vertically aligned one above the other for the full travel of the lift.

NOTE 2 When constructing the structural openings in concrete walls to wells, it is often not possible to achieve a degree of accuracy vertically that can allow doors and frames to be inserted in the openings without some form of masking or packing to overcome the inaccuracies.

To achieve a greater degree of accuracy, the building design should be modified so that the nominal landing door opening height is increased from the target finished floor level to each head and the nominal landing door opening to each jamb.

The alignment of the landing face from floor to floor should not vary to a greater extent than can be accommodated by the subsequent front wall finish. The architraves should be set accurately plumb.

NOTE 3 The alignment of the landing face of the front wall of the well is of importance when architraves of fixed dimensions are to be used.

Where architraves are to be supplied by the lift contractor, it should be ensured that:

- a) there is a true alignment of the sill line with the landing along the front line of the well, allowing it to serve as the datum-line for the well dimensions;

NOTE 4 To facilitate accurate alignment of landing sills, it is common practice to provide an independent threshold at each landing, the position of which can be adjusted.

- b) the dimension L in Figure 1, which is the limit of accuracy of dimensions C and D , pit depth P_h and headroom S_h , is not greater than 25 mm;
- c) the distance from the plumb well to the outer face of the front wall, dimension M in Figure 1, does not vary to an extent greater than can be accommodated by the subsequent front wall finish;
- d) the architraves are set plumb;
- e) architraves installed in conjunction with multiple wells are laterally aligned to ensure visual acceptance.

To prevent water from draining into the well from cleaning or sprinkler operation, the landing floor should have a slight slope ('fall') away from the lift entrance.

Where architraves are supplied by the principal contractor, each of the finished openings should be accurately plumb above the one below for the full travel of the lift, and the finished openings should all meet the target size.

5.3 Well construction

5.3.1 General

The counterweight, or the balancing weight, of a lift should be in the same well as the car in accordance with BS EN 81-1:1998+A3, 5.1.2.

5.3.2 Exclusive use of the well

The well should be used exclusively for the lift and should not contain cables or devices, etc., other than for the lift in accordance with BS EN 81-1:1998+A3, 5.8 and BS EN 81-2:1998+A3, 5.8. If the well contains heating equipment for the well (excluding hot water or steam heating), any control and adjustment devices should be located outside the well.

5.3.3 Ventilation of the well

The client's representative, in conjunction with the builder, should advise the lift contractor of any requirement under statutory regulations to ventilate the well.

NOTE Attention is drawn to the Building Regulations [8] and the local fire authority for further requirements on ventilating wells.

Where the ventilation provided naturally is insufficient, as the result of door operations and through gaps around doors, access traps/doors and other openings into the well such as ductwork, special arrangements should be made.

The well should not be used to provide ventilation for rooms other than those for the service of the lifts.

When the well is ventilated via the machine room or pulley room, through trunking to the outside should be used. The vents should be louvred or otherwise protected to prevent rain, snow, birds, etc. from entering the well after construction is completed.

Where lifts with rated speeds exceeding 2.50 m/s are installed, pressure release vents might need to be provided in order to prevent buffeting, which in the case of a single lift the vent should have an area of not less than 0.3 m² and for multiple lifts an additional vent area of 0.1 m² should be provided for each additional lift sharing a common well.

5.3.4 Well containing cars or counterweights belonging to several lifts or service lifts

In the lower part of the well a rigid screen should be erected between the moving parts (car, counterweight or balancing weight) of different lifts or service lifts. This partition should extend from a position not more than 0.30 m above the pit floor to a position not less than 2.50 m above the floor of the lowest landing.

If the horizontal distance between the edge of the car roof and the moving part of an adjacent lift or service lift is less than 0.50 m, the partition should be extended through the full height of the well. The width of the partition should be not less than equal to that of the moving part, or part of this, which is to be guarded, plus 0.10 m on each side.

In every instance, the partition should extend through the full height of the well.

Protection in the well should conform to BS EN 81-1:1998+A3, 5.6 and BS EN 81-2:1998+A3, 5.6.

5.3.5 Well enclosure

Where a well contributes to the prevention of the spread of fire, each well should be totally enclosed by an imperforate wall, floor and ceiling, except for:

- a) landing doors;
- b) inspection and emergency doors to the well and inspection traps;
- c) vent openings for escape of gases and smoke in the event of fire;
- d) ventilation openings;

- e) permanent openings between the well and the machine room or pulley room.

The walls, floor and ceiling of the well should be:

- 1) made of durable materials;

NOTE 1 Attention is drawn to the Building Regulations 2000 [8] and to local regulations and bye-laws in respect of the materials used in the construction of wells.

- 2) treated to prevent the creation of dust;
- 3) of sufficient mechanical strength.

Where glass is used for any part of the well enclosure, it should be laminated.

NOTE 2 The use of toughened glass is not acceptable.

Where a well does not contribute to the prevention of the spread of fire, e.g. observation lifts (see Annex D), it does not need to be totally enclosed and should conform to BS EN 81-1:1998+A3 or BS EN 81-2:1998+A3.

As far as is practicable, the inner surfaces of a well enclosure facing any car entrance should form a smooth continuous flush surface without projections or recesses. Where any projections or recesses cannot be made flush and they project more than 200 mm, they should be bevelled to an angle of 75° from the horizontal above and below the projection by means of metal plates, concrete or other similar non-combustible material. Where practicable, all other inner surfaces of the well enclosure should form a continuous flush surface without projections or recesses.

Permanent electric lighting should be available in the well for each lift, allowing it to be lit during repairs or servicing, even when all doors are closed. The lighting should be controlled from the well and the machine room. This lighting should comprise one lamp positioned not more than 0.5 m from the highest and lowest points in the well with intermediate lamp(s) (see BS EN 81-1:1998+A3, 5.9 and BS EN 81-2:1998+A3, 5.9). The average level of illumination should be not less than 50 lux, measured 1.00 m above the plane of the car roof and pit floor.

5.3.6 Load reactions on the building structure

The building structure should be able to support any or all the loads that might be applied by:

- a) the machine (while stationary and running);
- b) the guides in normal operation and during safety gear operation (in either a downward or an upward direction);
- c) the operation of the buffers;
- d) the operation of the anti-rebound device; or
- e) off-centring the load in the car.

Lifts should be not located in stairwells, as special arrangements need to be made to fix the guides, fit support beams, ensure appropriate ride quality and provide continuous enclosures, etc.

To assist the early planning, the guidance of the lift contractor or client's representative should be sought on the load imposed by the lift on the building structure.

5.3.7 Fire resistance

COMMENTARY ON 5.5.7

Attention is drawn to the Building Regulations 2000 [8]. Tests for the various fire resistance ratings referred to in Table 3 are those given in BS EN 81-58:2003. Unlike other fire-resistant doors in a building, lift doors are not thermally insulated. Automatic or self-closing lift doors are not smoke-proof or smoke-tight, particularly in the case of sliding doors.

Table 3 Examples of fire resistance of lift entrances

Type of doors	Fire resistance of the well enclosure	Fire resistance of the lift entrance
	f_r	
Automatically closed doors	$f_r < 1 \text{ h}$	= 30 min
	$1 \text{ h} \leq f_r \leq 2 \text{ h}$	= 1 h
Manually closed doors	$f_r \leq 30 \text{ min}$	= 30 min
	$30 \text{ min} \leq f_r \leq 1 \text{ h}$	= 1 h

Construction materials should be used that do not give off toxic fumes and smoke in the case of a fire. A fire officer/adviser should be consulted to determine the degree of fire resistance needed for the well structure and landing entrances.

When entrances having access to the well require fire resistance, the degree of fire resistance should be not less than:

- a) half that of the enclosure where the lift doors close automatically;
- b) that of the enclosure where the lifts doors are manually closed.

NOTE 1 Examples are given in Table 3.

The client's representative, in conjunction with the builder, should advise the lift contractor of any requirements where landing doors and frames are to have a fire resistance in excess of 2 h.

NOTE 2 This protection, which is not supplied by the lift manufacturer, might be in the form of a roller shutter with a fusible link.

If entrances to wells need to be smoke-tight, auxiliary protective means should be provided in addition to the doors normally provided by the lift contractor.

A firefighters lift should be installed in accordance with BS EN 81-72:2003, Clause 5; this affects the lift, the routing of its power supply cables to the control equipment and its building environment, etc.

5.3.8 Entrances

Access to the car, provided by entrances in the well enclosure, should not be in the path of the counterweight.

Lift entrances that open out into an area exposed to the weather should be suitably protected by canopies, sloped landing levels and weatherproof controls.

5.3.9 Inspection doors, emergency doors and inspection traps

Inspection doors, emergency doors and inspection traps to the well should be provided only for the evacuation of passengers or to provide access for servicing.

Where the well extends for some distance without a landing door, a means of evacuating passengers should be provided.

NOTE This can be as either intermediate emergency doors at intervals not exceeding 11 m or adjacent cars fitted with an emergency door.

The lift contractor should provide any details needed to suit the conditions of a particular building and lift installation to the principal contractor at the earliest possible time.

Inspection doors should have a height of not less than 1.40 m and a width of not less than 0.60 m. Emergency doors should have a height of not less than 1.80 m and a width of not less than 0.35 m. Inspection traps should have a height of not less than 0.50 m and a width of not less than 0.50 m.

The fire resistance of each inspection door, emergency door or inspection trap should be not less than those recommended in 5.3.7 for the enclosure.

Inspection doors, emergency doors and inspection traps should not open towards the interior of the well.

Inspection doors, emergency doors and inspection traps should be provided with a key-operated lock, capable of being closed and locked without a key. The lock should not include a device to retain the bolt in a retracted position. The key should be the same key as for the landing door release. It should have a label attached to it, detailing essential precautions to be taken when using the key.

It should be possible to open inspection doors, emergency doors and inspection traps from inside the well without a key, even when locked. However, operation of the lift should always be dependent upon the closed condition of these doors and traps.

Inspection doors, emergency doors and inspection traps should be imperforate and should conform to the same recommendations for mechanical strength as the landing doors in BS EN 81-1:1998+A3, 7.2.3 and BS EN 81-2:1998+A3, 7.2.3.

A permanent safety sign and warning notice should be displayed on the outside of all inspection doors, emergency doors and inspection traps in accordance with Annex E.

5.3.10 Lift pits

The lower part of the well should consist of a pit, the bottom of which should be smooth and approximately level, except for any buffer and guide bases and water drainage devices. The pit should remain impervious to the infiltration of water, following the building-in of guide fixings, buffers, any grids, etc.

If there is an access door to the pit, other than the landing doors, it should be in accordance with 5.3.9. Such a door should always be provided if the pit depth exceeds 2.50 m. To permit authorized personnel to descend safely into the pit and in the absence of any other access, another permanent means should be provided that is easily accessible from the landing door and does not project into the clear running space of the lift equipment.

Wells should, where ever possible, not be situated above a space accessible to people.

If accessible spaces exist underneath the car or counterweight, the counterweight should be fitted with a safety gear. Where this is not possible, the base of the pit should be designed for an imposed load of not less than 5 000 N/m², and:

- a) there should be a solid pier extending down to solid ground; or
- b) there should be an alternative means to support the loads imposed; or
- c) the counterweight should be equipped with safety gears.

With direct-acting hydraulic lifts, jacks under the car should have lined boreholes. The borehole should be watertight, should have a limit of accuracy within 25 mm of plumb in 3 000 mm and should have its centreline within ± 10 mm, measured at pit floor. The liner should be watertight and non-rusting in order to protect the cylinder from corrosion.