

Specification for powered domestic lifts

Committees responsible for this British Standard

The preparation of this British Standard was entrusted by the Mechanical Handling Standards Policy Committee (MHE/-) to Technical Committee MHE/4, upon which the following bodies were represented:

Associated Offices Technical Committee	Institution of Environmental Health Officers
British Broadcasting Corporation	Institution of Mechanical Engineers
British Lift Association	Institution of Plant Engineers
British Railways Board	Institution of Production Engineers
British Retailers' Association	Lloyds Register of Shipping
Chartered Institution of Building Services Engineers	London Underground Ltd
Department of the Environment (Property Services Agency)	National Association of Lift Makers
Electrical, Electronic, Telecommunications and Plumbing Union	National Health Services
Engineer Surveyors Section of the MSF	Post Office
Federation of Wire Rope Manufacturers of Great Britain	Royal Association for Disability and Rehabilitation
Health and Safety Executive	Scottish Development Department
Independent Engineering Insurers' Committee	

The following bodies were also represented in the drafting of the standard, through subcommittees and panels:

Association of Loading and Elevating Equipment Manufacturers	Institute of Trading Standards Administration
Association of Metropolitan Authorities	London Fire and Civil Defence Authority
British Federation of Care-home Proprietors	Registered Nursing Home Association
Consumer Policy Committee of BSI	Trades Union Congress
Department of Trade and Industry (Consumer Safety Unit, C A Division)	

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Foreword

This British Standard has been prepared under the direction of the Mechanical Handling Standards Policy Committee. It is a revision of BS 5900:1980 which is withdrawn. As part of this revision the title of the standard has been changed to reflect the limited application of these lifts.

It is intended that equipment manufactured in accordance with the requirements specified in this standard is for installation in private dwellings (defined in 1.2.41) only and will be capable of being operated in the normal domestic environment. This standard is not suitable for lift installations in any other premises where lifts in accordance with BS 5655 should be installed.

A lift complying with this standard should be used only by persons either capable of using it safely and unaided after having been fully instructed in its use or by persons who, if not so capable, only use it when adequately attended by an able-bodied person fully instructed in the safe and proper use of the equipment.

This standard specifies requirements for five types of electrically powered domestic lift including minimum safety features. Provision is made for either rope or chain drive or for hydraulic drive. Requirements for other types of drive systems e.g. rack/pinion, screw/nut will be included later.

Appendix A is included to assist potential purchasers by highlighting various important aspects that should be investigated when considering the installation of a lift for a specific user. Appendix A also gives guidance on the provision of operating instructions for the user, the services that should be provided and the considerations arising from changes of user or use.

In order to assist the introduction of this revised standard, all new and replacement powered domestic lifts tendered for within a period of six months following the date of publication of this edition of the standard, may comply with the requirements of the earlier standard BS 5900:1980 or this revision. The requirements of this 1991 edition only will be applicable to all new installations which are tendered for after that six month period.

Additional information about lifts is available from a number of sources, including the Disabled Living Foundation and similar information services, and local authority social services departments.

Three related British Standards for similar devices for use by disabled persons in private dwellings are:

BS 5776, *Specification for powered stairlifts*.

BS 5965, *Specification for manually driven balanced personal homelifts*.

BS 6440, *Code of practice for powered lifting platforms for use by disabled persons*.

A further British Standard relevant to this specification is BS 7255 "Code of practice for safe working on lifts".

Copyright is waived by BSI in respect of the forms for certification in Appendix C and Appendix F. Enquiries concerning bulk printed supplies of these forms should be addressed to BSI Sales Department, Linford Wood, Milton Keynes, MK 14 6LE.

A British Standard does not purport to include all the necessary provisions of a contract. Users of British Standards are responsible for their correct application.

Compliance with a British Standard does not of itself confer immunity from legal obligations.

Summary of pages

This document comprises a front cover, an inside front cover, pages i to iv, pages 1 to 52, an inside back cover and a back cover.

This standard has been updated (see copyright date) and may have had amendments incorporated. This will be indicated in the amendment table on the inside front cover.

Section 1. General

1.1 Scope

This British Standard specifies requirements for the design, construction and installation of powered domestic lifts, which are designed for use by persons with impaired mobility travelling between fixed floor levels in private dwellings.

This standard also specifies the minimum safety provisions relating to the operation and maintenance of these lifts to safeguard against the risk of accidents associated with the operation of this equipment.

This standard specifies requirements for five types of lifts that travel a maximum vertical distance of 12 m, and that have either a totally enclosed car or a partially enclosed car and that are either suspended by ropes or chains or driven by hydraulic machinery.

In addition to stating the responsibilities of the manufacturer, this standard also details information to be provided on special features and actions, given in 1.3.4, 1.4, and 8.2 and supported by guidance to the purchaser given in Appendix A.

NOTE The titles of the publications referred to in this standard are listed on the inside back cover.

1.2 Definitions

For the purposes of this British Standard the following definitions apply.

1.2.1

approach ramp

a hinged flat surface, attached to the car, that, when lowered, provides access to the car and, when raised, restrains a wheelchair

1.2.2

authorized person

an individual who has:

- a) undergone such training and has sufficient knowledge and experience of the relevant type of lift to enable him to recognize potential danger of such a lift; or
- b) been instructed on the specific task assigned to him and in the avoidance of any potential hazards of it, and who, if necessary has been given a degree of training relevant to that task.

1.2.3

barrier

a device comprising a bar, or assembly of similar elements, so arranged as to protect the car entrance

1.2.4

brake

an electromechanical mechanism employed to bring the car to rest and hold it in this position

1.2.5

buffer

a resilient stop at the end of the travel of the car or counterweight

1.2.6

car

the load-carrying unit complete with its platform, frame attachments and car enclosure

1.2.7

car enclosure

the enclosing bodywork of the car

1.2.8

chain

a transmission chain that, if used as part of a drive system, either transmits rotary motion from one shaft to another or transmits motion directly to the car and/or counterweight

1.2.9

chainwheel

a wheel having machine-cut teeth designed to engage with a chain

1.2.10

car top clearance

the minimum vertical clear distance between the highest point of the car and its equipment and the lowest point of any roof, floor, overhead beam or other overhead obstruction within the lift well

1.2.11

car bottom clearance

the minimum vertical clear distance within the lift well between the pit floor, or ground floor if a pit is not provided, and the lowest point of the car frame, when the car rests on its fully compressed buffers or is at ground floor level, whichever is appropriate

1.2.12

contactor

an electromagnetically operated device of suitable rating for switching a mains electrical power circuit

1.2.13

control devices

manually operated switches, push-buttons or other devices used to control the lift

1.2.14

controller

an assembly of electrical contactors, relays and/or other components, mounted within a cabinet, for controlling the lift

**1.2.15
counterweight**

a weight or series of weights used to counterbalance the weight of the car and part of the rated load

**1.2.16
direct acting lift**

hydraulic lift where the ram or cylinder is directly attached to the car or its sling

**1.2.17
disabled person**

a person with impaired mobility

**1.2.18
domestic lift**

a permanent lifting equipment, installed to serve fixed landing levels in a private dwelling, that comprises a car, whose dimensions and means of construction clearly permit the access of passenger(s) and/or a passenger in a wheelchair, guided by rigid vertical guides

**1.2.19
door**

the sliding, folding or hinged portion of the car or lift well enclosure that closes the access openings between car and landing

**1.2.20
door lock**

an electromechanical device used to lock a car or landing door, the unlocking of which is controlled by the position of the car

**1.2.21
down direction valve**

electrically controlled valve in a hydraulic circuit for controlling the descent of the car

**1.2.22
electrical anti-creep system**

a combination of precautions against the danger of creeping

**1.2.23
final limit switch**

an electrical safety switch positively and mechanically operated by the car in the event of overtravel

**1.2.24
floor stopping switch**

a switch or combination of switches arranged to bring the car to rest automatically at or near the landing of any preselected floor, including the terminal floor

**1.2.25
follow-through**

the amount of additional free movement provided in the actuation of an electrical switching device after the electrical contact has been broken

**1.2.26
guard**

a substantially constructed device designed to prevent accidental contact with a potentially dangerous component

**1.2.27
guides**

components that guide the car and the counterweight, if fitted

**1.2.28
guide bracket**

a member attached to the building or structure and to which the guides are fixed

**1.2.29
guide shoes or guide rollers**

attachments to the car frame and the counterweight, if fitted, that provide continuous alignment with the guides

**1.2.30
hydraulic lift**

lift in which the lifting power is derived from an electrically driven pump transmitting hydraulic fluid to a jack, acting directly or indirectly on the car (multiple motors, pumps and/or jacks may be used)

**1.2.31
indirect acting lift**

a hydraulic lift where the ram or cylinder is connected to the car or the car sling by suspension means (e.g. ropes, chains)

**1.2.32
jack**

a combination of a cylinder and a ram or piston forming a hydraulic actuating unit

**1.2.33
journey**

movement of the car between any two levels which incorporates one start and one stop

**1.2.34
landing**

an area for access to the car at each level served

**1.2.35
manual operation**

a method of moving the car by hand

1.2.36**non-return valve**

a valve which allows flow in one direction only

1.2.37**overspeed governor**

a device which, when the lift attains a predetermined speed, causes the lift to stop, and if necessary causes the safety gear to be applied

1.2.38**partially enclosed car**

a car, without a roof, comprising a platform and permanent sides, except for entrances which are protected by doors or ramps and barriers

1.2.39**pit**

that part of the lift well that is below the level of the lowest landing served

1.2.40**pressure relief valve**

a valve which limits the pressure to a predetermined value by exhausting fluid

1.2.41**private dwelling**

a self-contained building used as a single-family dwelling having one or more storeys or levels, and that has its own main entrance door situated at ground level or at any level that serves as ground level

1.2.42**rated load**

the load for which the equipment has been built and for which normal operation is guaranteed by the vendor

1.2.43**rated speed**

the speed of the car for which the equipment has been built and for which normal operation is guaranteed by the vendor

1.2.44**runby**

the maximum distance normally travelled by the car beyond the terminal floor when the car is brought to rest

1.2.45**rupture valve**

a valve designed to close automatically when the pressure drop across the valve, caused by the increased flow in a predetermined flow direction, exceeds a pre-set amount

1.2.46**safety factor**

the ratio, for a particular material under stated conditions, of the yield load to the highest load that can be imposed upon a member

1.2.47**safety gear**

a mechanical safety device attached to the lift car to stop and maintain the car and counterweight, if fitted, within the guides

1.2.48**safety rope**

an auxiliary rope attached either to the car and counterweight or to the car and a fixed point for the purpose of tripping a safety gear in case of breakage of the suspension

1.2.49**safety switch**

an electrical switch whose contacts are opened by positive mechanical action

1.2.50**sensitive edge**

a protective safety device attached to any edge of the car

1.2.51**sensitive surface**

a safety device similar in effect to a sensitive edge but so arranged as to protect a whole surface, such as the underside of the lift car or other large area

1.2.52**shut off valve**

a manually operated two-way valve which can permit or prevent flow in either direction

1.2.53**slack rope/chain switch**

a switch, or combination of switches, arranged to stop the lift if any of the suspension ropes/chains slacken by a predetermined amount

1.2.54**totally enclosed car**

a car that is permanently enclosed to its full height on all sides and with a roof and platform but with provision for an entrance or entrances having a door or doors

1.2.55**travel**

the vertical distance between the top and bottom landing levels served by the lift

1.2.56**unlocking zone**

a zone, extending above and below the stopping level, in which the car floor has to be positioned to enable the landing door, and the car door, to be unlocked

1.2.57**user**

the person(s) for whom the lift is installed

1.2.58**well**

the space in which the car and the counterweight, if fitted, travels. This space is bounded by the bottom of the pit, the walls and roof of the well

1.2.59**well enclosure**

any structure that separates the well from its surroundings

1.3 Design considerations**1.3.1 Pattern of use**

The design of the lift shall take account of the pattern of use to which it will be subjected, e.g. the user requirements as outlined in A.2.1. It shall also be capable of meeting a duty cycle of not less than 15 journeys per hour.

1.3.2 Protection against hazards

Protection against all of the following possible hazards shall be incorporated:

- a) shearing, crushing, trapping or abrading;
- b) falling;
- c) physical shock;
- d) electric shock;
- e) fire, attributable to use of the lift.

1.3.3 Design features

All components shall be designed to take account of all static and dynamic loads and forces.

NOTE 1 Components should be of sound mechanical and electrical construction using materials that are free from obvious defects and that are of adequate strength and suitable quality. It should be ensured that the dimensions specified in this standard are maintained despite wear. Means should also be provided to minimize the transmission of noise and vibration to any surrounding walls and other supporting structures.

The landing doors, vision panels and landing enclosures shall give a minimum standard of fire resistance of not less than half hour in accordance with the relevant schedules of the current Building Regulations (see 2.2, 3.2, 4.2, 5.2 and 6.3).

NOTE 2 The lift and its lift well should not be made of materials likely to become dangerous through too great flammability or through the nature and quantity of gas and fumes they may generate.

1.3.4 Special design features

All relevant information concerning the following special design features shall be ascertained in order that the appropriate equipment will be prescribed.

a) *Location of lift.* Full details of a suitable location for the lift well, with sufficient space in front of the lift entrances at each landing served. This area is to have sufficient space to allow the opening of the landing door where fitted, without obstructing the expected use of the area. In addition, if necessary, details of adjoining rooms or areas and the space above and below the floors served (see A.2.3).

b) *Building construction.* Details (see A.2.3) of the building construction where the lift well is to be located, to ensure that the following requirements are met:

- 1) that the floors can support any loads imposed upon the lift structure or guides, and that the wall can support suitable fixings for the structure, guides and lift well enclosure;
- 2) that an aperture of sufficient size can be cut through the upper floor(s) without loss of structural integrity;
- 3) where applicable, that there is sufficient headroom at the top floor level to house, and to give safe and convenient access to, the winding gear and control equipment;
- 4) that a pit, if required, can be constructed below the lowest landing level.

c) *User.* The nature of the disability, the relevant residual function of the user, and the need for personal assistance. In addition, where appropriate, whether a walking aid, wheelchair or other physical assistance is normally necessary to be transported with the user (see A.2.2).

1.3.5 Maintenance and repair

The lift shall be designed, constructed and installed in such a manner that periodic inspection, testing, maintenance and repairs can be safely and readily carried out.

1.3.6 Documentation

The purchaser of the lift shall be provided with comprehensive technical literature which shall include the following information as a minimum:

- a) the name and address of the manufacturer;
- b) full operating instructions;
- c) inspection and servicing recommendations (see section 8 and A.1)
- d) an electrical wiring diagram showing the electrical connections and components together with all necessary identification markings;

- e) the name and address of persons to contact in the event of an emergency or a breakdown;
- f) an acknowledgement that the purchaser and/or user has received proper instruction and demonstration on the correct and safe usage of the lift.

1.3.7 Illumination

The landing areas, the car floor area and the machinery space shall be illuminated to a level of at least 50 lx. The levels of illumination at the landings and in the lift car shall be of equal intensity.

1.4 Building requirements

1.4.1 Lighting

Lighting of the floor area in front of the lift well enclosure at each landing level shall be available at all times (see A.2.3).

1.4.2 Electrical supply

A single phase power supply and effective earth connection, in accordance with the latest edition of the “Regulations for the electrical installations”¹⁾ published by the Institution of Electrical Engineers, shall be available. A supply, which is dedicated solely to the lift, shall originate at the household consumer unit and terminate at a switched fused spur in a position recommended by the lift manufacturer (see A.3)

NOTE If necessary, a three phase and neutral supply may be utilized.

A separately fused lighting supply independent of the lift power supply shall be provided for the car lighting.

1.4.3 Obstructions

The lift well shall be free from all obstructions and services.

1.5 Electrical equipment

1.5.1 Suppression of radio and television interference

The design of the electric motor, contact devices and control devices shall comply with BS 800. Components necessary to give an adequate degree of suppression shall not be used in any part of the circuit where their failure might cause an unsafe condition.

1.5.2 Control and alarm system design concept

1.5.2.1 All control circuits shall be designed to fail safe.

NOTE Although wired control circuits throughout would produce an installation having a very high degree of safety it may be necessary to resort to the use of remote control devices, specially adapted switches and sensors; recommendations are given in Appendix B.

1.5.2.2 Control of movement of the car shall be by control devices located in the car and at each landing level. The control station in the car shall consist of the floor selection devices, a “stop” device and an “alarm” device (see A.2.2.5). The control station at each landing shall consist of a device to call the car. If required, one or more devices shall be provided to despatch the car to any other floor. Switches or other means shall be provided at each landing to control the car illumination (see also 1.3.7 and 1.4.1).

1.5.2.3 The control of the lift shall be automatic to the selected landing and while travelling it shall not be possible to interfere with its journey by pressing any control button with the exception of the “stop” push-button.

1.5.2.4 Every lift having a drum drive or chain suspension shall be provided with a slack rope/chain safety switch in accordance with 7.1.2.

1.5.2.5 No push-button or switch shall be fitted to render the door lock circuit ineffective.

1.5.2.6 Electrical operating devices, whether mounted in or on the lift car or in the lift well, shall be enclosed.

1.5.2.7 A safety stop switch shall be fitted on the top of a totally enclosed car. On or near this switch shall be the word “stop” so placed that there can be no risk of error as to the stop position.

1.5.2.8 An additional safety stop switch shall be provided in the lift well and shall be accessible from the lowest floor or pit level.

1.5.2.9 On/off tumbler-operated key switch(es) shall, when requested by the purchaser, be provided to restrict the use of the lift to the intended user (see item d) of A.2.2.5)

1.5.3 Inspection operation

To facilitate inspection and servicing when the car travel exceeds 3 m, a readily accessible control station shall be provided on the top of the car on lifts built to comply with sections 2 and 3 of this standard. This device shall be brought into operation by a safety switch (inspection operation switch). This switch, which shall be bi-stable, shall be protected against involuntary operation.

¹⁾ Published by and available from Institution of Electrical Engineers, Savoy Place, Victoria Embankment, London WC2R 0BL.

The following conditions shall be satisfied simultaneously.

- a) Engagement of the inspection operation switch shall override the normal controls, including the operation of any automatic doors.

The return to normal service of the lift shall only be effected by another operation of the inspection switch.

If the switching devices used for override are not safety contacts integral with the inspection switch mechanism, precautions shall be taken to prevent all involuntary movement of the car in the event of faults occurring in the circuit.

- b) The downward movement of the car shall be dependent on a constant pressure on a push-button protected against accidental operation and with the direction of movement clearly indicated. Up controls shall not be provided.
- c) The control device shall also incorporate a safety stop switch.
- d) The operation of the lift shall remain dependent on the safety devices.

1.5.4 Safety circuits

1.5.4.1 The motor shall be protected by a cut-out that operates within 10 s of the motor stalling. The cut-out shall be of the manual reset type.

1.5.4.2 The control circuit voltage shall not exceed 55 V and shall be derived from the secondary winding of an isolating transformer complying with BS 3535-1 and BS 3535-2.

One pole of the control circuit voltage supply shall be earthed and the other pole shall be fused as illustrated in Figure 1(a) for an a.c supply, or Figure 1(b), Figure 1(c), Figure 1(d), for d.c supply.

NOTE Some isolating transformers, e.g. toroidals which cannot comply with BS 3535-1 and BS 3535-2 due to the nature of their construction, may be used providing they comply with BS 415.

1.5.4.3 If the drive unit is mounted on the car, the electrical voltages shall be not greater than 110 V r.m.s. between conductors, and not greater than 55 V r.m.s. above or below earth. However, in such installations employing 240 V r.m.s. supplies to the driving motor, an equivalent degree of safety shall be provided by the use of a residual current operated earth leakage circuit-breaker having a current/time characteristic not exceeding 30 mA/30 ms; such a device shall be fitted to protect all the 240 V part of the installation.

1.5.4.4 Contactors for reversing the direction of travel shall be electrically interlocked.

1.5.4.5 If direction contactors having metal-to-metal contacts are employed to break the circuit to stop the machine, such a circuit shall have at least two independently operated contacts in series.

1.5.4.6 The control system shall not depend upon the closing or maintenance of an electrical control circuit for the isolation of the electrical supply to stop the drive motor and apply the brake.

1.5.4.7 Provision shall be made for a delay of 3 s minimum between the stopping of the lift car and its being restarted in either direction.

1.5.4.8 Control circuits shall be so arranged that an earth fault, open circuit or the discharge or failure of a capacitor does not give rise to an unsafe condition.

1.5.5 Relays and contactors

1.5.5.1 All fixed and moving contacts shall be readily replaceable.

1.5.5.2 Where a pivoted joint of a contactor or relay forms part of the circuit, provision shall be made to bypass such joints with a flexible connection having sufficient current capacity.

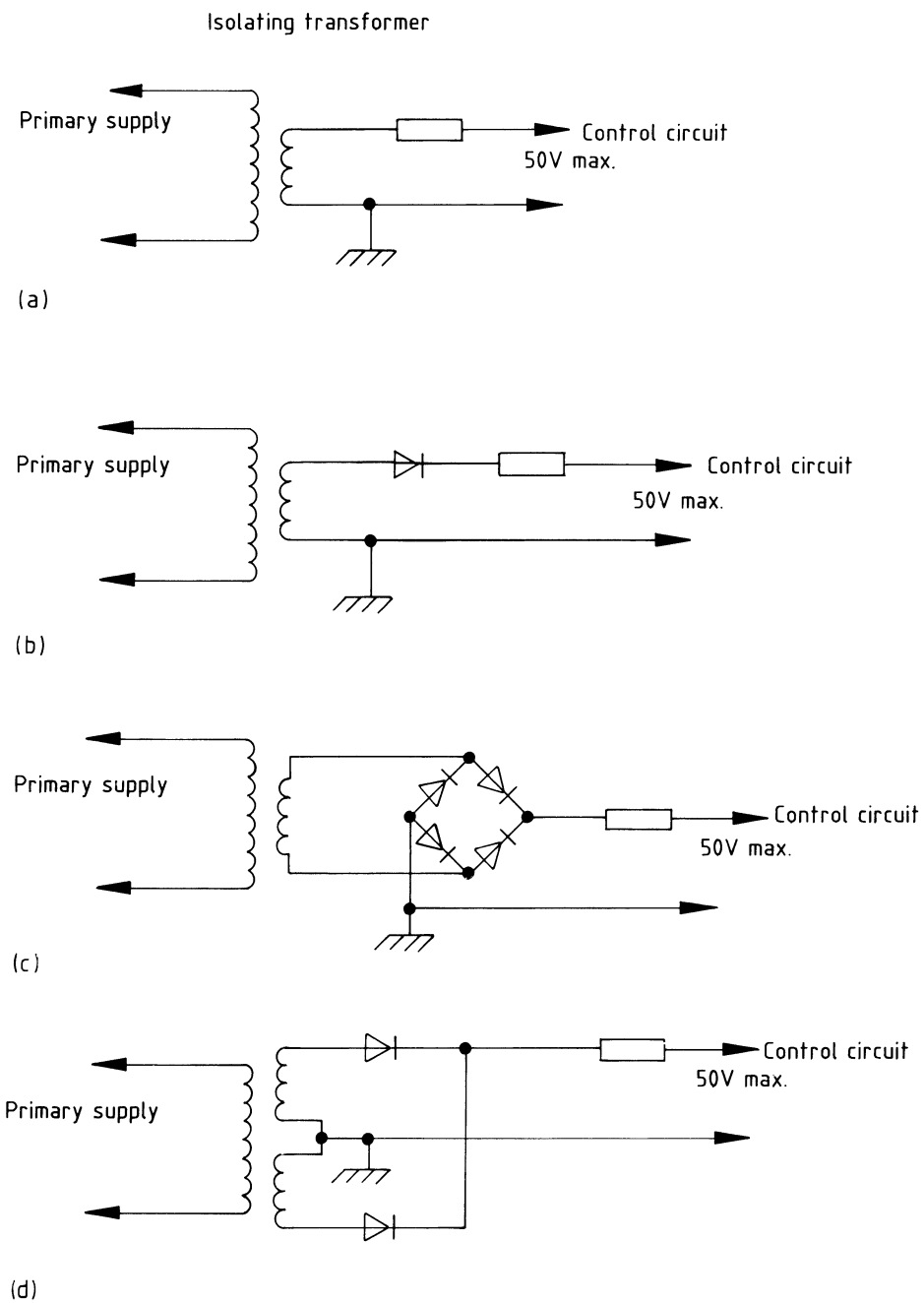
1.5.5.3 Contactors having main contacts in juxtaposition shall be separated by an insulating barrier.

1.5.6 Limit safety switches

1.5.6.1 Floor stopping switches and final limit safety switches shall be provided and shall be fully enclosed. These switches shall control at least two separate and independent contactors, both of which shall be operated to complete the motor and brake circuit for each direction of travel. Alternatively, an independent mechanically operated final limit safety switch shall directly open the motor and brake circuits. The opening of the final limit safety switch shall prevent further movement under power of the lift car in both directions of travel until the lift has been correctly repositioned manually and recommissioned by an authorized person.

1.5.6.2 The floor stopping and final limit stopping safety switches shall be securely mounted in such a manner that operation of the switches is not affected by normal lateral movement of the car. The operating cams for these switches shall be of metal or hard plastics material and of sufficient length to maintain the switch in the operated position when the lift car reaches its maximum travel in the up or down direction.

1.5.6.3 The floor stopping switches shall be arranged to stop the lift automatically from any speed obtained in normal operation within ± 12 mm of the levels being served independently of the final limit safety switch and buffers.



NOTE Graphical symbols in accordance with BS 3939.

Figure 1 — Control circuit supply circuit (see 1.5.4.2)

1.5.7 Controller construction

1.5.7.1 Controllers shall be enclosed in imperforate metal enclosures, the cover of which shall be hinged or removable and capable of being secured in the closed position. Removable covers shall be retained by captive devices requiring the use of tools for their removal (see also **1.5.7.9**).

Enclosures containing live parts, including any access cover forming part of that enclosure, shall be capable of withstanding a force of 300 N, being evenly distributed over an area of 2 500 mm² in round or square section, applied to any point perpendicular to the surface.

1.5.7.2 Materials used in the construction of the control equipment shall not support combustion.

1.5.7.3 Electrical and control cables shall be securely clamped at each end, where necessary, to prevent them from pulling from their terminations.

1.5.7.4 The conductors in the cable from the supply outlet specified in **1.4.2** shall have a cross-sectional area compatible with the maximum current to be carried.

1.5.7.5 All terminals throughout the system shall be suitably marked and conductors shall be terminated by soldering, clamping or crimping in such a way that the conductors and the insulation are not damaged.

Terminals for site wiring to the controller shall not be soldered.

1.5.7.6 The insulation of the controller wiring shall be of flame-retardant type.

1.5.7.7 Earth continuity conductors shall be of copper and shall have a current-carrying capacity equal to or greater than the largest current-carrying conductor in the associated circuit.

1.5.7.8 Wiring and components at a potential exceeding 15 V shall not be exposed to touch without first obtaining access through the use of a tool (see **1.5.7.1**).

1.5.7.9 Any nut or screw used for clamping a conductor shall not be used for clamping any other component.

1.5.7.10 Mains input terminals shall be conveniently accessible within the equipment and shall be identified to indicate the correct polarity, i.e. L for live and N for neutral. The main earth terminal shall be located conveniently near the mains input and identified by E or $\perp$.

1.5.7.11 Earthing terminals shall maintain electrical continuity, shall be of the stud type and shall be not smaller than M5. They shall not be used for securing any component nor shall it be possible to loosen the connection without the use of a tool. All earth conductors shall be terminated with suitable crimped or soldered terminations.

1.5.8 Installation

1.5.8.1 All wiring used for the power, control and safety circuits shall be installed in accordance with the latest edition of the "Regulations for the electrical installations"²⁾ published by the Institution of Electrical Engineers, and shall be adequately rated for the maximum current that the cables have to carry.

1.5.8.2 If an electrical supply is required to operate an alarm bell or signal (**A.6.1**) and/or emergency lighting (**A.6.2**), it shall be taken from a battery or other permanently available independent source.

1.5.8.3 All wiring for the power, control and safety circuits shall be routed, or protected, to avoid mechanical damage, and shall have a minimum cross section of 0.75 mm².

1.5.8.4 All exposed metalwork, other than conductors, liable to become electrically charged shall be efficiently bonded and earthed (see **8.1.3**).

1.5.8.5 Travelling cables between the lift well and lift car terminal box shall be suitably clamped to the lift car and lift well in such a way as to prevent chafing and misuse.

1.5.8.6 The travelling cable shall comply with BS 6977.

²⁾ Published by and available from Institution of Electrical Engineers, Savoy Place, Victoria Embankment, London WC2R 0BL.

Section 2. Lifts with totally enclosed car and enclosures at each level

2.1 General safety factor

Unless otherwise stated in this standard, the safety factor for all parts of the equipment shall be not less than 3.

2.2 Lift well enclosure

2.2.1 Interior surfaces

The interior walls of the lift well enclosure shall form a continuous vertical, smooth surface and comply with 2.2.3.3.

NOTE In some installations, the lift enclosure will be required to have fire resistance, and the shaft will have to be constructed as a protected shaft under building regulations (see 1.3.3). The appropriate building control authority should be consulted.

2.2.2 Lighting of the lift well

When the car travel exceeds 3.0 m the well shall be provided with permanent electric lighting, allowing it to be lit during repairs or servicing, even when all doors are closed.

2.2.3 Totally enclosed lift well

2.2.3.1 The lift well shall be enclosed throughout its height, without grillework or openings other than for landings or access doors.

2.2.3.2 The structure shall support the enclosure, the landing doors and their locking equipment, all in true alignment.

2.2.3.3 The enclosure shall withstand the application of a force of 300 N evenly distributed over an area of 2 500 mm² in round or square section at any point perpendicular to the surface without permanent deformation and without elastic distortion greater than 10 mm.

2.3 Guides and fixings

2.3.1 Rigid guides shall be used for guiding the lift car, and the counterweight (where fitted), throughout the lift well.

The guides shall be of such length as to prevent any of the car or counterweight shoes from running off the guides.

The deflection of the guides under normal lift operation shall not exceed 3 mm.

2.3.2 The guide bracket fixings shall resist the loads imposed when stopping a car, with its rated load, or counterweight, on application of the safety gear.

The guide fixings and guide bracket fixings shall be designed to prevent any rotary movement of clips, etc. from releasing the guide.

2.4 Buffers

If there is accessible space below the lift well bottom, buffers shall be provided. The buffers shall be so designed that they will not compress fully when struck by the car, with its rated load, or counterweight, at 1.25 times normal rated speed.

2.5 Top and bottom clearances and runbys

2.5.1 Car bottom clearance

A pit shall be provided and the car floor shall stop level with the lowest landing threshold. The bottom runby shall be not less than 25 mm.

2.5.2 Car top clearance

The car top clearance from the nearest striking point for:

- a) a lift without counterweight shall be not less than 50 mm;
- b) a lift with counterweight shall be not less than 75 mm.

2.6 Lift car

2.6.1 Car frame

The car enclosure shall either have an integral metal frame or be carried on a separate metal frame. When supporting the rated load, evenly distributed over its platform, the frame shall withstand the operation of the safety gear without permanent deformation.

At least four renewable guide shoes, or guide shoes with renewable linings, or at least four sets of guide rollers shall be provided, two at the top and two at the bottom of the car frame.

2.6.2 Car enclosure

2.6.2.1 The car enclosure shall be imperforate and shall withstand the application of a force of 300 N evenly distributed over an area of 2 500 mm² in round or square section at any point perpendicular to the surface without permanent deformation and without elastic distortion greater than 10 mm.

2.6.2.2 The lift car shall have a clear interior height of not less than 1.875 m and shall be provided with ventilation and illumination. The diameter or width of any ventilation opening in any panel shall not exceed 10 mm unless a baffle is provided on the outside of the panel.

2.6.2.3 The car top shall be capable of supporting a mass of 150 kg.

2.7 Door construction and clearances

2.7.1 Car doors

The car entrances shall be protected by sliding or folding doors that extend to the full height and width of the entrances.

Whenever practicable, the clear width of the car entrance shall be 800 mm, as recommended in BS 5619.

Where it is not practicable to provide a clear entrance width of 800 mm, the width (see A.2) shall be not less than:

- a) 650 mm, for a car capable of carrying a person within a wheelchair; or
- b) 500 mm, for a car capable only of carrying a sitting or standing user.

The clear height of the car entrance shall be not less than 1.875 m.

2.7.2 Landing doors

All landing openings shall be protected by sliding, folding or hinged doors that extend to the full height and width of the landing opening.

The clear height and width of all landing openings shall not obstruct the car entrance.

2.7.3 Door construction

All landing and car doors shall be imperforate and shall withstand the application of a force of 300 N evenly distributed over an area of 2 500 mm² in round or square section at any point perpendicular to the surface without permanent deformation and without elastic distortion greater than 10 mm.

Where sliding or folding doors are fitted, they shall be guided at the top and bottom to prevent twisting. The guide blocks or rollers shall be easily renewable.

Any projection or recess in the exposed face of the doors shall be kept to a minimum to avoid finger trapping.

2.7.4 Door protection

2.7.4.1 General

The doors and the surrounds shall be designed to prevent jamming which could cause injury to persons or damage to clothing or other objects.

In order to avoid the risk of shearing during operation of the power operated sliding doors, the face of the doors on the car side shall not have any hollows or projections of more than 3 mm and the edges shall be chamfered.

2.7.4.2 Power operated doors

Power operated doors shall be designed to prevent injury to a person if struck by a door panel. To this effect, the following requirements shall be met.

- a) The effort needed to prevent the door closing shall not exceed 150 N. This measurement shall not be made in the first third of the travel of the door.
- b) The kinetic energy of the car door and of the mechanical elements which are rigidly connected to it, calculated or measured at the average closing speed, shall not exceed 7 J.
- c) A sensitive protective device shall automatically initiate re-opening of the door in the event of a person being struck (or about to be struck) by the door in crossing the entrance during the closing movement.
 - 1) The effect of the device may be overridden during the last 50 mm of travel of each door panel.
 - 2) In the case of a system which makes the sensitive protective device inoperative after a fixed period of time, to counteract persistent obstructions when closing the door, the kinetic energy defined above shall not exceed 4 J during movement of the door with the protective device inoperative.

2.7.5 Vision panels

Vision panels shall be fitted in both the car doors and landing doors. Each panel shall coincide at each landing. Landing door vision panels shall be of fire-resisting transparent material and shall not exceed an area of 0.05 m² and have a width not greater than 100 mm.

2.7.6 Clearances

The distance between the lift well side of the car door and the lift well side of the landing door shall not exceed 120 mm. Where the car or landing doors consist of two or more panels, the 120 mm dimension shall apply to the door panel nearest the cill edge.

The distance between the lift well side of the landing door and the lift well edge of the landing threshold shall not exceed 80 mm.

The distance between the car and landing cills shall not exceed 20 mm.

2.8 Locking devices and switches for car and landing entrances

2.8.1 Car doors

An electrical safety switch shall be fitted to prevent the lift from being moved or kept in motion unless each car door is fully closed.

2.8.2 Landing doors

Every landing door shall be provided with a positive locking device in accordance with 2.8.3 so arranged that it shall not be possible to open the doors from the landing side unless the car is within a 75 mm unlocking zone at that particular landing.

An electrical safety switch shall also be fitted to prevent the lift from being moved unless each landing door is fully closed.

Provision shall be made for the opening of every landing door by an authorized person, using an emergency key, irrespective of the position of the lift car.

2.8.3 Door locking devices and switches

Every door locking device and associated switch shall be situated and designed to prevent unauthorized interference with the mechanism. They shall be designed to ensure that any distortion and/or wear of the locking device or switch and door mounted components shall not create a hazard or interference with the safe operation of the lift.

The failure of a spring shall not render a lock unsafe.

Every lock shall be of a type that prevents the opening of a car door(s) or its associated landing door(s) unless the car is within a 75 mm unlocking zone and shall be of a type that either:

- a) prevents any movement of the car until all doors are closed and locked; or
- b) permits movement of the car if the car door(s) or its associated landing door is closed but not locked, and stops the car if door locking is not achieved within each 75 mm unlocking zone.

NOTE Locking devices used with multiple-panel doors may be applied to one panel only provided that the interconnecting mechanism of the door panels is arranged so that the locking of one panel prevents the opening of all panels.

If a safety switch is used to control the unlocking zone, the switch shall be operated positively to both make and break positions by the movement of the car; the action of gravity or a spring shall not be used.

2.9 Speed, loading and car capacity

2.9.1 Rated speed

The rated speed shall not exceed 0.15 m/s.

2.9.2 Rated load

The rated load shall be not less than 150 kg nor greater than 400 kg.

2.9.3 Internal floor area and loading

The rated load shall be based on the effective floor area as shown in Figure 2.

The clear internal width of the car shall be not less than the clear width of the car entrance (see 2.7.1)

2.9.4 Load plate

A load plate shall be securely mounted in a prominent and visible position in the car. The plate shall carry a legend similar in content and layout to the following.

WARNING

THE RATED LOAD IS

..... PERSONS or

..... PERSONS WITH A WHEELCHAIR

or A MAXIMUM WEIGHT OF kg

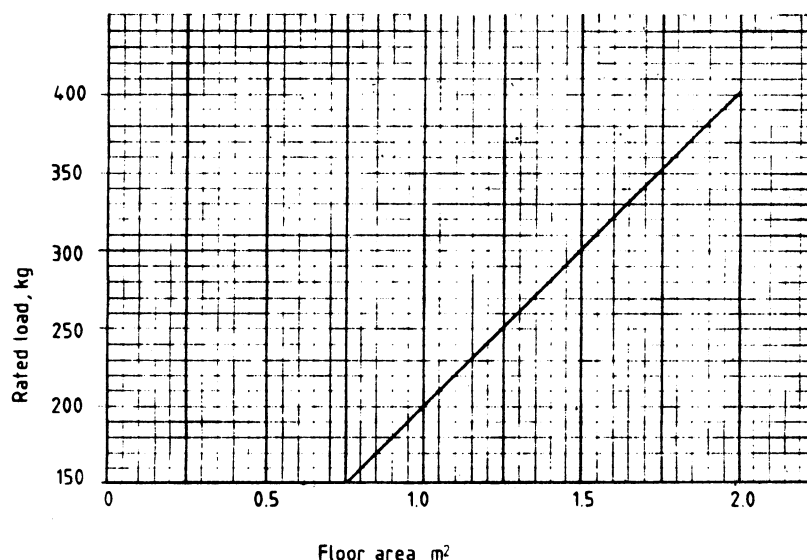


Figure 2 — Internal floor area v. car capacity

The maximum weight displayed on the load plate shall be the rated load.

A typical example of such a load plate is shown in Figure 3.

The height of lettering used on the load plate shall be as specified in Figure 3.

2.9.5 Nameplate

In addition to the load plate specified in **2.9.4**, a nameplate shall be securely mounted in a prominent position stating the manufacturer's name and address, together with the serial number of the machine.

2.10 Requirements for drive

The selected drive method shall be in accordance with one of the appropriate systems specified in section 7.

2.11 Counterweights

All counterweights shall travel between rigid guides, using four guide shoes that are either renewable or have renewable linings.

The counterweights shall be guarded with an imperforate rigid screen extending from a position 0.3 m above the lift pit floor to a position at least 2.1 m above the pit floor.