BS 5900:2012

BSI Standards Publication

Powered homelifts with partially enclosed carriers and no liftway enclosures – Specification

bsi.

...making excellence a habit.™

Publishing and copyright information

Published by BSI Standards Limited 2012

ISBN 978 0 580 65633 0

ICS 91.140.90

The following BSI references relate to the work on this standard:
Committee reference MHE/4
Draft for comment 11/30194292 DC

Publication history

First published March 1980
Second edition, April 1991
Third edition, August 1999
Fourth (present) edition, April 2012

Amendments issued since publication

Date	Text affected

Contents

Foreword *iii*

Introduction *1*

1 Scope *2*
2 Normative references *2*
3 Terms and definitions *3*
4 General requirements for homelifts *5*
4.1 General *5*
4.2 Pattern of use *6*
4.3 Guarding *6*
4.4 Rated speed *6*
4.5 Rated load *6*
4.6 Load control *6*
4.7 Carrier floor dimensions *6*
4.8 Mechanical strength of the homelift *6*
4.9 Resistance to operating forces *6*
4.10 Protection of equipment against harmful external influences *7*
4.11 Carrier support/guide system *7*
4.12 Safety gear and over-speed governor *7*
5 Access for maintenance, repair and inspection *9*
5.1 Working areas on the carrier *9*
5.2 Working areas under the carrier *9*
5.3 Access to equipment and machinery *9*
6 Driving units and drive systems *10*
6.1 General requirements *10*
6.2 Braking system *11*
6.3 Stopping/levelling accuracy *11*
6.4 Emergency/manual operation *12*
6.5 Additional requirements for rope and chain suspension drive *12*
6.6 Additional requirements for screw and nut drive *13*
6.7 Additional requirements for hydraulic drive *14*
7 Electrical equipment *20*
7.1 Power supply *20*
7.2 Conductors of different circuits *20*
7.3 Insulation resistance of the electrical installation *20*
7.4 Drive contactors *21*
7.5 Motor and brake supply *21*
7.6 Enclosure requirements and electrical creepage and clearance distances *21*
7.7 Electromagnetic compatibility *22*
7.8 Protection against electrical faults *22*
7.9 Electric safety devices *22*
7.10 Protection of the driving motor *25*
7.11 Electrical wiring *25*
7.12 Additional requirements for battery powered supply *25*
7.13 Control devices *26*
7.14 Electrical socket outlet *28*
8 Liftways *28*
8.1 General *28*
8.2 Inspection doors and traps *28*
8.3 Liftway protection *28*
9 Carrier construction *29*
9.1 Protection of access sides *29*
9.2 Protection during door operation *29*
9.3 Door unlocking zone *29*
9.4 Door locking devices *29*
9.5 Door emergency unlocking *30*

9.6 Protection of non-access sides *30*
9.7 Tip-up seat *30*
9.8 Floor covering *30*
9.9 Lowest level carrier access ramp *31*
9.10 Glass *31*
9.11 Edge and surface protection *31*
9.12 Fire protection *32*
9.13 Behaviour of homelift in the event of fire *32*
9.14 Carrier illumination *32*
10 Information *33*
10.1 General *33*
10.2 Signals and warning devices *33*
10.3 Documents *34*
10.4 Verification tests on each machine before first use *35*
10.5 Dismantling *36*

Annexes
Annex A (informative) List of significant hazards *37*
Annex B (informative) Guidance for the exchange of information between manufacturer/supplier and specifier *41*
Annex C (informative) Recommendations for the provisions and use of specially adapted control devices, switches and sensors *43*
Annex D (normative) Verification of safety requirements and/or protective measures *44*
Annex E (normative) Determination of fire resistance *47*
Annex F (informative) In-use periodic examinations, servicing and tests *48*
Annex G (informative) Certificate of acceptance from purchaser/user after initial tests and examination *49*
Annex H (informative) Certificate for test and examination after installation of homelift *50*

Bibliography *53*

List of figures
Figure 1 – Example of a homelift at a lower landing and mid-travel *5*
Figure 2 – Charging supply for battery – powered homelifts *26*
Figure 3 – Typical load plate *33*
Figure G.1 – Typical certificate of acceptance *49*
Figure H.1 – Example of a certificate for test and examination after installation of homelift *50*

List of tables
Table 1 – Insulation resistance *20*
Table 2 – Electrical safety devices *23*
Table 3 – Push button control devices *27*
Table 4 – Joystick control devices *27*
Table 5 – Rocker switch control devices *27*
Table 6 – Glass panels *31*
Table A.1 – Significant hazards relating to the general design and construction of homelifts *37*
Table D.1 – Means of verification of the safety requirements and/or measures *44*

Summary of pages

This document comprises a front cover, an inside front cover, pages i to iv, pages 1 to 54, an inside back cover and a back cover.

Foreword

Publishing information

This British Standard is published by BSI Standards Limited, under licence from The British Standards Institution, and came into effect on 30 April 2012. 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 British Standard supersedes BS 5900:1999, which will be withdrawn on 30 April 2013.

Relationship with other publications

Standards for related devices suitable for use by persons with impaired mobility are BS EN 81-40, BS EN 81-41 and BS 6440.

Information about this document

BS 5900:2012 applies to powered homelifts with partially enclosed carriers and no liftway enclosures serving two floors in private dwellings only.

This is a full revision of the standard. The principal changes are to update the text to meet the essential health and safety requirements of Machinery Directive 2006/42/EC [1] as enacted as the Supply of Machinery (Safety) Regulations 2008 [2].

Presentational conventions

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

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.

This page deliberately left blank

Introduction

This British Standard may be used as a means to address relevant health and safety requirements of Machinery Directive 2006/42/EC [1], and additionally specifies minimum requirements for the provision of powered homelifts in private dwellings.

NOTE As a general rule, the Lifting Equipment and Lifting Operations Regulations 1998 [3] do not apply to homelifts in private dwellings. However, in some circumstances where a carer is employed in assisting the user to use the homelift, the regulations might apply.

It is assumed that the powered homelift operates in an ambient temperature in the range 5 °C to 40 °C. For temperatures outside this range, additional measures might be necessary.

This British Standard does not specify requirements for:

- severe conditions (e.g. extreme environments, strong magnetic fields);
- lightning protection;
- potentially explosive atmospheres;
- the handling of materials, the nature of which could lead to dangerous situations;
- homelifts of which the primary function is the transportation of goods;
- homelifts prone to vandalism;
- earthquakes or flooding;
- fire-fighting and evacuation;
- noise and vibrations;
- the design of concrete, hardcore, timber or other foundation or building arrangement;
- the design of anchorage bolts to the supporting structure;
- type A, B or C wheelchairs as defined in BS EN 12183 and/or BS EN 12184;
- balancing weights or counterweights.

This revision of BS 5900 deals with all significant hazards relevant to homelifts, when they are used as intended and under the conditions foreseen by the manufacturer. A list of significant hazards is given in Annex A.

In order to determine the specific characteristics of the homelift, at least the following issues need to be discussed between the supplier and the specifier:

- environmental conditions;
- civil engineering considerations;
- other aspects related to the place of installation, including safe use of the homelift;
- the use and places of use of the machinery;
- fire protection requirements;
- suitability for the user.

Annex B gives information on issues which specifiers are expected to discuss with the supplier in order to select and specify a suitable homelift.

It is assumed that a homelift conforming to this standard is for the use of persons capable of using it safely and unaided, either after having been fully instructed in its use, or having observed clear and simple instructions permanently displayed on the equipment. Persons not capable of safe unaided use of the homelift may be transported under the care of a fully instructed attendant for whom additional control facilities can be provided if required. Recommendations for specially adapted control devices are given in Annex C.

1 Scope

This British Standard specifies requirements for the design, manufacture, installation, commissioning, testing, maintenance and dismantling of new permanently installed electrically powered homelifts with the following characteristics:

a) travelling vertically between two predefined levels along a guided path where the inclination to the vertical does not exceed 15°;

b) supported or sustained by wire rope or chains, hydraulic cylinder (direct or indirect), screw and nut;

c) penetrating a single floor;

d) affixed to a building structure;

e) where the carrier is partially enclosed;

f) having a speed not greater than 0.15 m/s.

This British Standard is applicable to homelifts that are installed in private dwellings and are intended for the transport of persons with impaired mobility, standing or seated, with or without a wheelchair.

NOTE Although this British Standard is applicable to new homelifts, it can also be used as guidance for the refurbishment and re-installation of existing homelifts.

2 Normative references

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

BS 476-20, *Fire tests on building materials and structures – Part 20: Method for determination of the fire resistance of elements of construction (general principles)*

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

BS EN 81-1:1998+A3:2009, *Safety rules for the construction and installation of lifts – Part 1: Electric lifts*

BS EN 81-2:1998+A3:2009, *Safety rules for the construction and installation of lifts – Part 2: Hydraulic lifts*

BS EN 349, *Safety of machinery – Minimum gaps to avoid crushing of parts of the human body*

BS EN 953, *Safety of machinery – Guards – General requirements for the design and construction of fixed and movable guards*

BS EN 1363-1, *Fire resistance tests – Part 1: General requirements*

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 12183, *Manual wheelchairs – Requirements and test methods*

BS EN 12184, *Electrically powered wheelchairs, scooters and their chargers – Requirements and test methods*

BS EN 12385-4, *Steel wire ropes – Safety – Part 4: Stranded ropes for general lifting applications*

BS EN 13411 (all parts), *Terminations for steel wire ropes*

BS EN 50214, *Flat polyvinyl chloride sheathed flexible cables*

BS EN 60204-1:2006+A1:2009, *Safety of machinery – Electrical equipment of machines – Part 1: General requirements*

BS EN 60529:1992, *Specification for degrees of protection provided by enclosures (IP code)*

BS EN 60947-1:2007, *Low-voltage switchgear and controlgear – Part 1: General rules*

BS EN 60947-4-1:2010, *Low-voltage switchgear and controlgear – Part 4-1: Contactors and motor-starters – Electromechanical contactors and motor-starters*

BS EN 60947-5-1:2004+A1:2009, *Low-voltage switchgear and controlgear – Part 5-1: Control/circuit devices and switching elements – Electromechanical control circuit devices*

BS EN ISO 12100, *Safety of machinery – General principles for design – Risk assessment and risk reduction*

BS EN ISO 13857:2008, *Safety of machinery – Safety distances to prevent hazard zones being reached by upper and lower limbs*

ISO 606, *Short-pitch transmission precision roller and bush chains, attachments and associated chain sprockets*

3 Terms and definitions

For the purposes of this British Standard, the terms and definitions given in BS EN ISO 12100 and the following apply.

3.1 boarding point
space at the entrance to a carrier (at any level) to permit manoeuvring, boarding and alighting of users, with or without wheelchairs

3.2 carrier
part of a homelift by which persons are supported in order to be lifted or lowered

3.3 carrier enclosure
enclosing bodywork of the carrier

3.4 competent person
person, suitably trained and qualified by knowledge and practical experience, and provided with the necessary instructions to enable the required work to be carried out safely

3.5 direct acting homelift
hydraulic homelift where the ram or cylinder is directly attached to the carrier

3.6 down direction valve
electrically controlled valve in a hydraulic circuit for controlling the descent of the carrier

3.7 guide
component that guides the carrier

3.8 homelift
lift serving fixed landing levels in a private dwelling

NOTE Sometimes referred to as a through-the-floor lift.

3.9 indirect acting homelift
hydraulic homelift where the ram or cylinder is connected to the carrier by means of suspension (e.g. by ropes, chains)

3.10 liftway
space through which a carrier and its load travels

3.11 load cycle
start (acceleration from rest to rated speed), over the total travel, a stop (deceleration from rated speed) and a return travel (start and stop) to the initial position

3.12 over-speed governor
device that, when the carrier attains a pre-determined speed, causes the homelift to stop and if necessary causes the safety gear to be applied

3.13 partially enclosed carrier
carrier without a roof, comprising a platform, permanent sides and an entrance which is protected by a door or door-and-ramp system

3.14 person with impaired mobility
person for whom stairs are a barrier to vertical travel

3.15 pressure relief valve
valve which limits hydraulic pressure to a pre-determined value by exhausting fluid

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

3.17 rated load
load for which a homelift has been designed

3.18 rated speed
design speed of the carrier

3.19 safety circuit
electrical or electronic circuit with an equivalent degree of safety to a circuit containing electrical safety contacts

3.20 safety gear
mechanical device for stopping and maintaining the carrier stationary in case of over-speeding in the downward direction and/or breaking of the suspension

3.21 self-sustaining system
system that, under free running conditions (i.e. with the brake released), ensures that the speed of the platform decreases

3.22 sensitive edge
device to provide protection against a trapping, shearing or crushing hazard

3.23 sensitive surface
device similar in effect to a sensitive edge (**3.22**) but so arranged as to protect a surface

3.24 shut-off valve
manually operated two-way valve which can permit or prevent flow in either direction

3.25 unlocking zone
zone, extending above and/or below a carrier's stopping level, within which the carrier floor has to be positioned to allow the door or door-and-ramp system that closes the entrance of the carrier to be unlocked

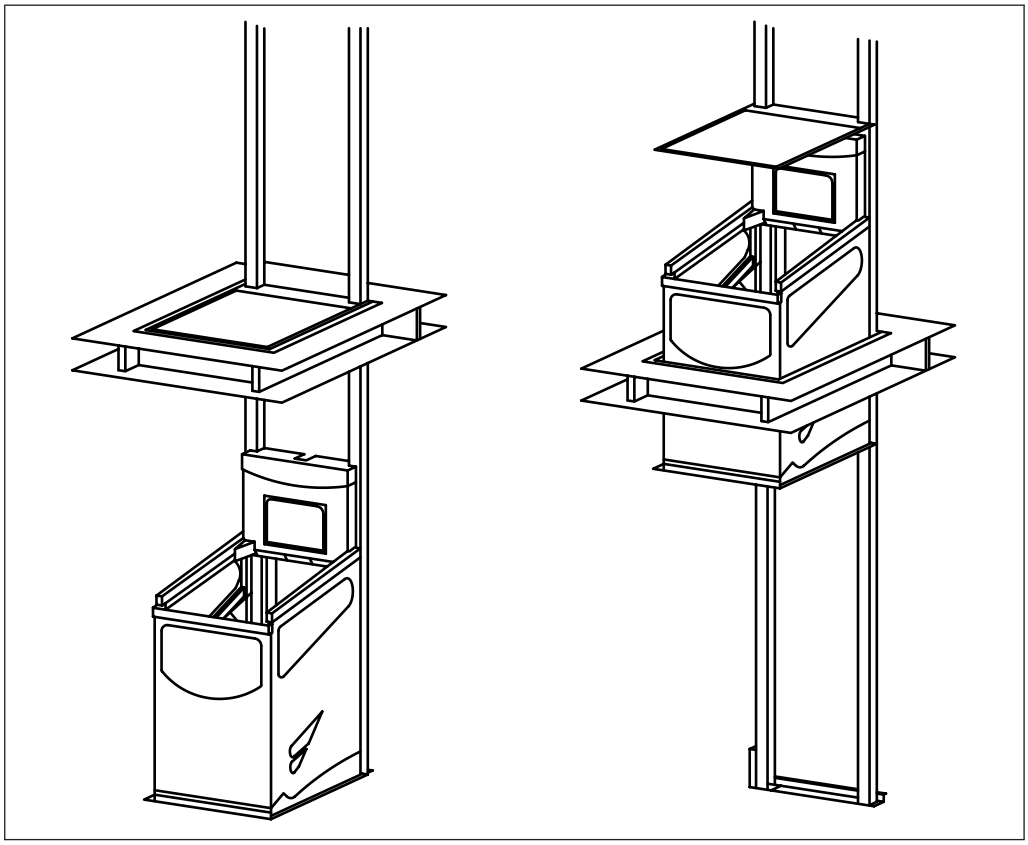
4 General requirements for homelifts

4.1 General

Machinery shall be designed in accordance with this British Standard, and shall be verified in accordance with Annex D.

NOTE Figure 1 shows a typical homelift at two positions in its travel. Other arrangements are possible.

Figure 1 **Example of a homelift at a lower landing and mid-travel**



4.2 Pattern of use

The design of the homelift shall be such that it can perform at least ten load cycles (see **3.11**) per hour with maximum rated load.

4.3 Guarding

Exposed rotating or moving parts (e.g. gearing of the drive unit) with the potential to cause personal injury shall be guarded. Access panels shall be secured by means requiring the use of a tool or key for their release.

Guarding shall be designed and constructed in accordance with BS EN 953, BS EN ISO 13857:2008 and BS EN 349.

4.4 Rated speed

The homelift shall have a rated speed not greater than 0.15 m/s.

4.5 Rated load

The rated loads shall be as follows:

a) at least 115 kg for a lone user, either seated or standing;

b) at least 205 kg, but not more than 500 kg, for a user in a wheelchair able to be accommodated on the carrier.

4.6 Load control

The homelift shall be fitted with an overload device, which shall prevent travel in the upwards direction (with 75 kg overload), and safe travel in the downwards direction shall be possible with the minimum static load (**4.8**).

NOTE The overload device may be a pressure switch, pressure relief valve or power monitoring of the drive system.

In either case the doors shall remain unlocked or able to be unlocked (without the use of a tool) in the unlocking zone.

4.7 Carrier floor dimensions

The clear loading area of the carrier, including any safety devices, but excluding hand rails, shall not exceed 1.54 m^2.

4.8 Mechanical strength of the homelift

The carrier, and its associated suspension attachments and its guides, shall be designed to support a minimum static load of 625 kg.

4.9 Resistance to operating forces

The complete homelift installation shall resist, without permanent deformation, the forces imposed on it during normal operation, during the application of the safety devices and at impact on mechanical stops when travelling at the rated speed, when carrying the rated load multiplied by a coefficient of 1.1. However, local deformation arising from the safety gear gripping device is permissible provided that it does not affect the operation of the homelift or any of its safety devices.

Guiding components, their attachments and joints shall withstand deflections due to uneven loading without affecting operation.

When the following fatigue stress test is carried out, there shall be no deterioration to the homelift that could adversely affect its normal use. If necessary, friction components shall be replaced.

- The test shall be carried out for all load-bearing components and joints that are critical to fatigue. The test shall take into account the degree of stress fluctuation and the number of stress cycles, which can be a multiple of the number of load cycles.
- The test shall be carried out over the maximum travel with 33.33% of the load cycles at no load, with 33.33% of the load cycles at half of the rated load and 33.33% of the load cycles at rated load.
- At least 50 000 load cycles shall be tested.

4.10 Protection of equipment against harmful external influences

Where components, such as the power pack, are installed outdoors, they shall have a sufficient degree of protection for any electrical equipment depending on site conditions, which shall be not less than class IP54 as defined in BS EN 60529:1992.

*NOTE Other protection might be necessary; see **B.1.3**.*

4.11 Carrier support/guide system

The carrier support system shall be such that the carrier access edges cannot tilt more than ±10 mm from the horizontal when supporting an evenly distributed load of 1.25 times the rated load.

The carrier support/guide system structural members shall meet the design requirements of this British Standard.

NOTE 1 Generally the support/guide structural members are made of metals such as steel, cast iron, aluminium alloy or other equivalent malleable and ductile metals/alloys.

NOTE 2 The effects of ageing, operating temperature range and fire resistance should be taken into account.

The guide rails, their joints and attachments shall be designed according to the minimum static load in order to withstand the loads and forces imposed on them.

Deflections of the guide rails during operation shall be such that:

- unintended unlocking of the door does not occur;
- the operation of the safety devices is not affected; and
- collision of moving parts with other parts is not possible.

4.12 Safety gear and over-speed governor

4.12.1 Safety gear

4.12.1.1 General

The carrier shall be provided with a safety gear meeting the requirements of BS EN 81-1:1998+A3, **F.3**. The safety gear shall operate to stop and sustain the carrier with the minimum static load as defined in **4.8**, multiplied by a coefficient of 1.25, except in the following circumstances:

a) on direct acting hydraulic drives; or

b) when the carrier is driven by a self-sustaining rotating screw and nut, together with a safety nut.

The safety gear shall be fitted to the carrier.

When the safety gear is applied, no decrease in the tension of any rope or chain or other mechanism used for applying the safety gear or motion of the carrier in the downward direction shall cause the safety gear to be released from its operation.

The safety gear shall be capable of stopping and sustaining the carrier, carrying its rated load, within a distance of 150 mm from where the safety gear is engaged.

The safety gear shall grip the guide rail, or equivalent element, securely.

Any shaft, jaw, wedge or support that forms part of the safety gear and that is stressed during its operation shall be made entirely of a material that meets the design requirements of this British Standard.

NOTE 1 Generally, any shaft, jaw, wedge or support is made of metals such as steel, cast iron or other equivalent malleable and ductile metals/alloys.

NOTE 2 The effects of ageing, operating temperature range and fire resistance should be taken into account.

The application of the safety gear shall not cause the carrier to tilt more than 56 mm from the horizontal.

4.12.1.2 Actuation

The safety gear shall be either:

a) mechanically tripped before the carrier exceeds a speed of 0.3 m/s by an over-speed governor; or

b) on indirectly suspended hydraulic lifts only, tripped by a safety rope which is independent of the means of suspension, or by slackening or breaking of a suspension rope or chain.

4.12.1.3 Release

Release of the safety gear shall be possible only by raising the carrier. It shall not be possible for the homelift to be put back into service without manual resetting.

4.12.1.4 Access to the safety gear

The safety gear shall be so positioned that it is accessible for inspection, testing and resetting. It shall be protected by covers, which shall be removable only with a tool or key.

4.12.1.5 Electrical checking

When the safety gear is engaged, a bistable electrical device conforming to **7.9** and activated by the safety gear shall immediately initiate stopping and shall prevent the further starting of the machine.

4.12.2 Over-speed governor

4.12.2.1 General

The over-speed governor shall meet the requirements of BS EN 81-1:1998+A3, **F.4**.

The over-speed governor or another device shall, by means of an electric safety device conforming to **7.9**, initiate the stopping of the lifting machine no later than the moment the tripping speed of the over-speed governor is reached.

If, after release of the safety gear (**4.12.1.3**), the over-speed governor does not automatically reset itself, an electric safety device conforming to **7.9** shall prevent the starting of the homelift.

If the over-speed governor derives its drive from a main suspension chain or rope, the safety gear shall be operated by a mechanism actuated by the breaking or slackening of the means of suspension.

4.12.2.2 Over-speed governor ropes and safety ropes

The minimum breaking load of the rope shall have a safety factor of at least 8, which shall be calculated as 8 times either:

a) the tensile force produced in the rope of the over-speed governor, or the safety rope, when tripped (using a friction factor μ_{max} equal to 0.2) for traction type over-speed governors; or

b) the tensile force specified by the manufacturer that is required to operate the safety gear, or the clamping device for safety ropes.

The ratio of the pitch diameter of the pulleys for the over-speed governor rope to the nominal rope diameter shall be not less than 30:1.

In the event of breakage or excessive rope stretch of the over-speed governor rope, the machine shall be stopped by an electric safety device conforming to **7.9**.

The over-speed governor shall be capable of producing a tensile force in the over-speed governor rope of three times that necessary to engage the safety gear.

5 Access for maintenance, repair and inspection

5.1 Working areas on the carrier

Where machinery is to be maintained or inspected from the carrier, the following requirements shall be met.

a) Where there is a risk of crushing, a mechanical device shall be fitted and shall ensure a minimum 300 mm clear space between the parts of the carrier and rigid parts of the liftway.

b) Any necessary devices for emergency operation and for dynamic tests (such as brake tests, safety gear tests) shall be arranged so that they can be operated from outside the liftway.

5.2 Working areas under the carrier

Where the design of the homelift requires that it is to be maintained or inspected from underneath the carrier, the following requirements shall be met.

a) A manually positioned mechanical blocking device shall be provided to enable the carrier to be held in a raised position.

   1) The blocking device shall stop the carrier travelling downwards at rated speed with a load of 1.1 times the rated load.

   2) The blocking device shall be clearly marked with its intended purpose and position.

b) Any necessary devices for emergency operation and for dynamic tests (such as brake tests, safety gear tests) shall be arranged so that they can be operated from outside the liftway.

5.3 Access to equipment and machinery

Where applicable, machinery and equipment shall be located inside a machinery cabinet, which shall consist of imperforate walls, floor, roof and access panels or door(s).

Any door(s) shall:

a) not open towards the inside of the cabinet;

b) be provided with a key-operated lock;

c) be capable of being re-closed and re-locked without a key.

Any access panels shall be capable of being removed only using a key or a tool.

There shall be no openings other than:

1) ventilation openings for cooling;

2) necessary openings for the functioning of the homelift between the non-enclosed liftway and the machinery cabinet.

The machinery cabinet openings shall conform to the following requirements.

i) The openings shall be protected in accordance with BS EN ISO 13857:2008.

ii) The ingress protection shall be at least IP2X as specified in BS EN 60529:1992 (see **4.10** for outdoor installation of components).

6 Driving units and drive systems

6.1 General requirements

Drive systems shall meet the requirements in **6.1** to **6.4** for all systems, together with the additional requirements in **6.5**, **6.6** or **6.7** as appropriate for the specific type of system.

All types of drive systems, except hydraulic, shall be powered in both directions of travel.

After the fatigue tests specified in **4.9** have been carried out, the safety factors of geared drive units shall remain within the specified limits.

Unless forming an integral part of the shaft or other driving unit, every sheave, rope drum, spur gear, worm and worm wheel, pinion or brake drum shall be fixed to the shaft or driving unit by one of the following methods:

a) sunk keys;

b) splines;

c) cross-pinning.

If single chain or belt intermediate drives are employed, then the output drive gearing shall be on the load side of the chain or belt intermediate drive, and either:

1) the output drive gearing shall be self-sustaining; or

2) the brake shall be on the load side of the chain or belt intermediate drive, and a minimum of two belts or chains shall be used. The integrity of the chain or belt shall be monitored electrically by an electric safety device according to **7.9** that disconnects the supply to the motor and brake in the event of breakage of any chain.

If a system with a two-chain intermediate drive is used, the intermediate chain shall be monitored by an electric safety device according to **7.9** that disconnects the supply to the motor and brake in the event of breakage of any chain.

Exposed rotating or moving parts, such as pulleys, chain wheels and sprockets, with the potential to cause injury shall be guarded.

The protection devices used shall be constructed so that the rotating parts are visible, and do not hinder examination and maintenance operation. If the protection devices are perforated, the gaps shall conform to BS EN ISO 13857:2008, Table 4.

When a self-sustaining system is tested under free running conditions (i.e. with the brake released), when carrying the rated load plus 75 kg, the carrier shall decelerate.

6.2 Braking system

An electro-mechanical friction brake shall be fitted (except on hydraulically driven homelifts which conform to **6.7**), which shall be capable of bringing the carrier smoothly to rest and holding it firmly in position, when loaded with the rated load plus 75 kg. It shall also be capable of holding the carrier firmly with the minimum static load stated in **4.8**. The brake shall be capable of being mechanically applied and electrically held off. The brake shall be designed not to release in normal operation unless the electrical supply is simultaneously applied to the homelift motor.

Brake linings shall be made of flame-retardant, self-extinguishing material and shall be designed so that wear does not reduce the security of their fastenings. Residual magnetism shall not prevent the brake from being applied when the electrical supply to the driving motor is interrupted.

Except in the case of self-sustaining drive systems, all the mechanical components of the brake which take part in the application of the braking action on the drum or disk shall be installed in two sets. If one set of the components is not working, a sufficient braking effort shall still be available to slow the carrier, when travelling downwards at rated speed and with rated load.

NOTE Any solenoid plunger is considered to be a mechanical part; any solenoid coil is not.

Any brake capable of being released by hand shall require a constant force to keep the brake held off.

If coil springs are used to apply the brake shoes, such springs shall be in compression.

The component on which the brake operates shall be coupled to the drum or sprocket or nut or screw by direct and positive mechanical means, unless either the final driving element is self-sustaining, or a system with two-chain intermediate drive is employed.

The supply to the brake shall be in accordance with **7.5**.

Whenever the motor of the homelift functions as a generator, it shall not be possible for the supply to the electric device operating the brake to be fed from the driving motor.

6.3 Stopping/levelling accuracy

In use:

a) the stopping accuracy of the carrier shall be ±10 mm;

b) a re-levelling accuracy of ±20 mm shall be maintained;

c) stopping distances, except for sensitive surfaces and sensitive edges in accordance with **9.11.3**, shall be no greater than 20 mm in response to operation of an electric safety device.

6.4 Emergency/manual operation

6.4.1 General

An emergency control device shall be provided.

The time to move the carrier to the nearest boarding point where the door can be opened shall be not more than 15 min.

This emergency operation shall be possible with full control of the movement and from a position outside the liftway.

The emergency control device shall be positioned so that it is accessible and shall be activated by use of a key or protected by covers, which shall only be removable with a tool or key.

NOTE It is recommended that emergency operations are carried out by a trained and competent person.

Emergency operation of hydraulic lifts shall conform to **6.7.12**.

6.4.2 Rope and chain suspension drives, and screw and nut drives

Emergency operation shall be achieved by means of a manually operated hand-winding device. An electric safety device shall prevent operation of the normal controls. Where the manual effort is greater than 30 N to overcome the brake by emergency hand-winding, and the homelift has a self-sustaining drive system, a means shall be provided of releasing the brake. The means shall not be capable of locking the brake in the released position.

A label in accordance with **10.2.4**, indicating the direction of travel, shall be provided.

6.5 Additional requirements for rope and chain suspension drive

6.5.1 General

Rope and chain suspension systems shall have one of the following two methods of drive:

a) drum and ropes; or

b) sprockets and chains.

6.5.2 Ropes and chains

Carriers shall be suspended from either steel wire ropes, or steel chains with parallel links (Galle type) or roller chains.

Ropes shall conform to BS EN 12385-4, and the nominal diameter of the ropes shall be not less than 6 mm.

Chains shall conform to ISO 606.

The safety factor of the suspension ropes shall be not less than 12. The safety factor of the chains shall be not less than 10.

NOTE The safety factor is the ratio between the minimum breaking load in newtons (N) of one rope (or chain) and the maximum force in this rope (or chain).

There shall be either at least two ropes or at least two chains. The individual ropes or chains shall be independent of each other.

Rope suspension or chain suspension systems shall incorporate a device that, in the event of a slack rope or chain, operates an electric safety device conforming to **7.9** that initiates a break in the electrical supply to the motor and brake and thus prevents any movement of the carrier until the rope or chain is correctly re-tensioned.

6.5.3 Rope/chain terminations

The junction between the rope/chain and the termination shall support at least 80% of the minimum breaking load of the rope/chain.

The ends of the ropes shall be fixed to the carrier and suspension points by means conforming to the BS EN 13411 series.

6.5.4 Pulley, drum and sprocket

The ratio between the pitch diameter of pulleys or drums and the nominal diameter of the suspension ropes shall be not less than 25:1.

The drum shall be helically grooved to match the manufacturer's specification of the ropes used. There shall be only one layer of rope wound on the drum. When the carrier rests on its fully compressed cushioned stops, one and a half turns of rope shall remain in the grooves of the drum. The angle of deflection (fleet angle) of the ropes in relation to the grooves shall not exceed 4°.

All driving sprockets shall be made from metal and shall have a minimum of 16 machine-cut teeth. A minimum of eight teeth shall be engaged. The angle of engagement shall be not less than 140°.

Means shall be provided to avoid jamming owing to mis-feeding or slackening of the chains and to prevent the chains from leaving the sprockets or riding over the teeth of the sprockets.

Guards shall be fitted to prevent trapping hazards between sprocket and chain, or between chain and any other part.

6.5.5 Distribution of load between the ropes or the chains

An automatic device shall be provided for equalizing the tension of suspension ropes or chains.

For chains in the case of multiple return sprockets on the same shaft, these sprockets shall be able to rotate independently.

If springs are used to equalize the tension, they shall work in compression.

6.6 Additional requirements for screw and nut drive

6.6.1 Precautions against free fall and over-speed descent of the carrier

Devices, or combinations of devices and their actuation, shall be provided to prevent an over-speed descent greater than 0.3 m/s.

These devices shall be either:

a) a safety gear and over-speed governor in accordance with **4.12**; or

b) a self-sustaining screw and nut system and a safety nut in accordance with **6.6.2** and **6.6.3**.

6.6.2 Self-sustaining screw and nut system

When a self-sustaining system is tested under free running conditions (i.e. with the brake released), when carrying the minimum static load multiplied by a coefficient of 1.1, the carrier shall decelerate.

6.6.3 Safety nut

An unloaded safety nut shall be provided to carry the load and operate an electric safety device in the event of failure of the driving nut, to provide an equivalent degree of safety to that specified in **4.12.1**. The electric safety device shall conform to **7.9** and shall remove the power from the motor and brake in the event of failure of the driving nut.

In adverse environmental conditions [see **B.1.3**f)], the electric safety device shall be protected against the effects of pollution and vibration.

The safety nut shall be designed such that a safety factor of at least 5.0 is guaranteed under rated load, including any dynamic forces that result from a collapsing load-carrying nut and any associated torque conditions.

6.6.4 Drive of the carrier

Screw and nut drives shall be direct acting. If several screws and nuts are used, the load transmitted to each screw and nut shall be equal.

If the carrier inclination becomes greater than 1.0%, the homelift shall be stopped.

Mechanical fixings shall be provided to prevent separation of sections of a multiple section screw column. Joints in the screw shall be accurately aligned to avoid faulty meshing or damage to the nuts.

Screws and their joints in tension shall be designed such that a safety factor of at least 5.0 is guaranteed under minimum static load, the carrier weight and maximum torque conditions.

Screws and their joints in compression shall be designed on the maximum length of the screw such that a safety factor of at least 3.0 against buckling is guaranteed, when a load is imposed of the minimum static load plus the carrier weight.

The load-carrying nut shall have a hardness less than or equal to that of the mating screw.

The load-carrying nut shall be readily accessible for inspection and the measurement of its wear.

The load-carrying nut shall be designed such that, at state of maximum wear, a safety factor of at least 5.0 is guaranteed under maximum rated load and torque conditions.

The safety nut and its connection to the load-carrying nut shall be designed such that a safety factor of at least 5.0 is provided under rated load and torque conditions, including dynamic forces caused by the collapse of the load-carrying nut.

In case of a homelift with compressive loads on the screw, the connection between the carrier and the nut(s) shall be self-aligning.

The load nut shall be mechanically fixed to the carrier to prevent separation.

6.7 Additional requirements for hydraulic drive

6.7.1 General provisions

Hydraulic drives shall be either direct acting or indirect acting.

If several hydraulic cylinders are used to raise the carrier they shall be hydraulically connected to ensure pressure equilibrium.

Indirect acting hydraulic drives shall have suspension ropes or chains conforming to **6.5**.

6.7.2 General requirements for hydraulic cylinders

Hydraulic cylinders shall be calculated in accordance with BS EN 81-2:1998+A3, Annex K to meet the following requirements.

a) A safety factor of at least 1.7 (referred to the proof stress $R_{P0.2}$) shall be provided when the cylinder and ram are subjected to forces resulting from a pressure equal to 2.3 times the full load pressure.

b) For the calculation [1)] of the elements of telescopic hydraulic cylinders with hydraulic synchronizing means, the full load pressure shall be substituted by the highest pressure that occurs in an element due to the hydraulic synchronizing means.

c) In the thickness calculations, a value shall be added of 1.0 mm for cylinder walls and cylinder bases, and 0.5 mm for walls of hollow rams for single and telescopic hydraulic cylinders.

d) Hydraulic cylinders under compressive loads, when in their fully extended position, and under the forces resulting from a pressure equal to 1.4 times full load pressure, shall have a safety factor of at least 2.0 against buckling.

e) A safety factor of at least 2.0 (referred to the proof stress $R_{P0.2}$) shall be provided when hydraulic cylinders are under tensile loads resulting from a pressure equal to 1.4 times the full load pressure.

f) The design of the stop shall be such that the average retardation of the carrier does not exceed 1.0 g_n and, in the case of an indirect acting homelift, that the retardation does not result in the rope or chain becoming slack.

Hydraulic cylinders shall meet the following additional requirements.

1) A means shall be provided to stop the ram at the end of its stroke.

2) The following items shall be mechanically protected:

   i) rupture valve(s)/restrictor(s);

   ii) rigid pipes connecting a rupture valve(s)/restrictor(s) with the cylinder;

   iii) rigid pipes connecting rupture valve(s)/restrictor(s) with each other.

3) The hydraulic cylinder shall be provided with an air-venting device, if required.

6.7.3 Connection carrier/ram (hydraulic cylinder)

For a direct acting homelift, the connection between the carrier and the hydraulic cylinder shall be such as to ensure that all the forces are axially applied. The connection means shall be secure.

For an indirect acting homelift, the head of the ram (cylinder) shall be guided, except for pulling hydraulic cylinders, where the pulling arrangement prevents bending forces on the ram. No parts of the ram head guiding system shall be incorporated within the vertical projection of the carrier.

6.7.4 Telescopic hydraulic cylinders

Telescopic hydraulic cylinders shall meet the requirements in this subclause in addition to the general requirements for hydraulic cylinders specified in **6.7.2**.

Stops shall be provided between successive sections to prevent the rams from leaving their respective cylinders.

The length of the bearing of each section of a telescopic hydraulic cylinder without external guidance shall be not less than 2.0 times the diameter of the respective ram.

Telescopic hydraulic cylinders shall be provided with mechanical or hydraulic synchronizing means.

[1)] Abnormally high pressure conditions can sometimes arise during installation because of incorrect adjustment of the hydraulic synchronizing means. This should be taken into account.

When ropes or chains are used as synchronizing means, the following requirements shall be met.

a) There shall be at least two independent ropes or chains.

b) Guards shall be fitted to prevent trapping hazards between pulleys and sprockets.

c) The safety factor (see Note) shall be not less than:

   1) 12 for ropes;

   2) 10 for chains.

   NOTE The safety factor is the ratio between the minimum breaking load in newtons (N) of one rope (or chain) and the maximum force in this rope (or chain).

   The maximum force shall be calculated using the following data:

   i) the force resulting from the full load pressure;

   ii) the number of ropes (or chains).

d) A device shall be provided which prevents the speed of the carrier in downward movement exceeding the rated speed downward, v_d, by more than 0.15 m/s in the event of failure of the synchronizing means.

6.7.5 Piping

6.7.5.1 General

All hydraulic system components, piping and fittings that are subject to pressure shall:

a) be appropriate to the hydraulic fluid used;

b) be protected against damage during installation, e.g. any abnormal stress due to fixing, torsion or vibration;

c) be protected against damage, in particular of mechanical origin.

Pipes and fittings shall be appropriately fixed and accessible for inspection.

If pipes (either rigid or flexible) pass through walls or floors, they shall be protected by means of ferrules, the dimensions of which shall allow the dismantling of the pipes for inspection, if necessary.

No coupling shall be sited inside a ferrule.

6.7.5.2 Rigid pipes

Rigid pipes and fittings between the cylinder and any of the following shall be calculated in accordance with BS EN 81-2:1998+A3, Annex K:

a) the non-return valve;

b) the down direction valve(s);

c) the rupture valve.

In the thickness calculations, a value shall be added of 1.0 mm for the connection between the cylinder and the rupture valve, if any, and 0.5 mm for the other rigid pipes.

When telescopic hydraulic cylinders with more than two stages and hydraulic synchronizing means are used, an additional safety factor of 1.3 shall be taken into account for the calculation of the pipes and fittings between the rupture valve (where fitted) and the non-return valve or the down direction valve(s).

6.7.5.3 Flexible hoses

The flexible hose between cylinder and non-return valve or down direction valve shall have a safety factor of at least 8.0 (full load pressure/bursting pressure).

The flexible hose and its couplings between cylinder and non-return valve or down direction valve shall withstand without damage a pressure of 5.0 times full load pressure.

The flexible hose shall be marked in an indelible manner with:

a) the name of the manufacturer or the trade mark;

b) the test pressure;

c) the date of the test.

The flexible hose shall be fixed with a bending radius not less than that specified by the hose manufacturer.

6.7.6 Stopping the machine and checking its stopped condition

An electrical safety device shall be provided that will enable the machine to be stopped. The device shall be controlled as follows.

a) For upward motion, the supply to the electric motor shall be interrupted by at least two independent contactors, the main contacts of which shall be in series in the motor supply circuit.

b) For downward motion, the supply to the down direction valve(s) shall be interrupted either:

   1) by at least two independent electrical devices connected in series; or

   2) directly by the electrical safety device.

If one of the main contacts of a contactor or one of the electrical safety devices has not opened whilst the carrier is stationary, a further start shall be prevented.

6.7.7 Hydraulic control and safety devices

6.7.7.1 Hydraulic circuit isolation

A means shall be provided to isolate the hydraulic cylinder from the non-return valve and the down direction valve(s) comprising either:

a) a shut-off valve; or

b) quick release couplings, which shall be self-sealing.

6.7.7.2 Non-return valve

A non-return valve shall be provided. It shall be installed in the circuit between the pump(s) and the shut-off valve.

The non-return valve shall be capable of holding the carrier with the minimum static load at any point in its travel when the supply pressure drops below the minimum operating pressure.

The closing of the non-return valve shall be effected by the pressure from the hydraulic cylinder and by at least one guided compression spring and/or by gravity.

6.7.7.3 Pressure relief valve

A pressure relief valve shall be provided. It shall be connected to the circuit between the pump(s) and the non-return valve. The hydraulic fluid shall be returned to the tank.

The pressure relief valve shall be adjusted to limit the pressure to a maximum of 140% of the full load pressure.

Where there are high internal losses (head loss, friction), the pressure relief valve may be set to a greater value, but shall not exceed 170% of full load pressure. In this case, for the calculations of the hydraulic equipment (including hydraulic cylinder), a fictitious full load pressure equal to the following shall be used:

$$\frac{\text{Selected pressure setting}}{1.4}$$

In the buckling calculation (**6.7.2**), the over-pressure factor of 1.4 shall then be replaced by a factor corresponding to the increased setting of the pressure relief valve.

6.7.7.4 Down direction valve

Down direction valves shall be held open electrically, and their closing shall be effected by the pressure from the hydraulic cylinder and by at least one guided compression spring per valve.

6.7.8 Protection against hydraulic system failure

One of the following protection methods shall be used.

a) **Rupture valve**, fitted directly to the cylinder outlet, which in the event of failure of any part of the hydraulic circuit, excluding the hydraulic cylinder, shall arrest the descent of the carrier. The rupture valve shall be:

- integral with the cylinder; or
- directly and rigidly flange mounted; or
- placed close to the cylinder and connected to it by means of short rigid pipes, having welded, flanged or threaded connections; or
- connected directly to the cylinder by threading. In this case, the rupture valve shall be provided with a thread ending with a shoulder, which shall butt up against the cylinder.

NOTE 1 Other types of connections such as compression fittings or flared fittings are not permitted between the cylinder and the rupture valve.

The rupture valve shall be capable of stopping the carrier in downward movement, and maintaining it stationary. The rupture valve shall be tripped at the latest when the speed reaches a value equal to rated speed downward, v_d, plus 0.15 m/s.

Rupture valves shall be selected to be compatible with the same pressure and flow parameters as those used for the cylinder.

The rupture valve shall meet the requirements of BS EN 81-2:1998+A3, **F.7**.

b) **Combination of restrictor, down direction valve and non-return valve**, which in the event of failure of any part of the hydraulic circuit (excluding the hydraulic cylinder) shall prevent the downward speed of the carrier with rated load exceeding the rated speed. In addition, if an emergency stop or safety edge is operated, it shall arrest the descent of the carrier.

All three devices shall be:

- integral with the cylinder; or
- directly and rigidly flange mounted; or

- placed close to the cylinder and connected to it by means of short rigid pipes, having welded, flanged or threaded connections.

NOTE 2 Other types of connections such as compression fittings or flared fittings are not permitted between the cylinder and the devices.

6.7.9 Filters

In the circuit between the tank and the pump(s), and in the circuit between the shut-off valve and the down direction valve(s), filters or similar devices shall be installed. The filter or similar device between the shut-off valve and the down direction valve shall be accessible for inspection and maintenance.

6.7.10 Checking the pressure

A pressure gauge point shall be provided. It shall be connected to the circuit between the non-return valve or the down direction valve(s) and the shut-off valve.

If a pressure gauge is permanently fitted, a shut-off valve shall be provided between the main circuit and the connection for the pressure gauge.

The connection shall be provided with an internal thread of either M 20 × 1.5 or G 1/2 in.

6.7.11 Tank

The tank shall be designed and constructed to facilitate:

a) the checking of the level of the hydraulic fluid in the tank;

b) the filling and draining of the hydraulic fluid.

6.7.12 Emergency operation

*NOTE See also **6.4**.*

6.7.12.1 Moving the carrier downwards

The homelift shall be provided with a manually operated emergency lowering device allowing the carrier, even in the case of a power failure, to be lowered to a level where the user can leave it.

The speed of the carrier shall not exceed 0.08 m/s or the rated speed, whichever is the lower.

The operation of the device shall require a continual manual force, and the device shall be so constructed as to avoid accidental operation when not in use.

In the case of indirect acting homelifts where a slack rope (or chain) condition can occur, manual operation shall not cause the sinking of the ram beyond that causing the slack rope/chain.

The lowering device shall be positioned such that the operator is not exposed to a trapping hazard.

6.7.12.2 Moving the carrier upwards

A hand-pump which causes the carrier to move in the upwards direction shall be permanently installed for every homelift whose carrier is fitted with a safety gear or a clamping device.

The hand-pump shall be connected to the circuit between the non-return valve or down direction valve(s) and the shut-off valve.

The hand-pump shall be equipped with a pressure relief valve set to limit the system pressure to 2.3 times the full load pressure.

6.7.13 Electrical anti-creep system/re-levelling

An electrical anti-creep/re-levelling system shall be provided which shall level the carrier before an out-of-level dimension of 20 mm occurs.

Re-levelling and the anti-creep function shall operate only in the unlocking zone of the corresponding boarding point with the door open or closed.

The anti-creep switching device shall be an electrical safety contact or device conforming to **7.9**.

The carrier shall not be able to move with boarding point doors open unless all of the following conditions are met.

a) All movement of the carrier outside the unlocking zone is prevented by at least one switching device mounted in the bridge or shunt of the door and lock electric safety devices.

b) This switching device is either:

   1) an electrical safety contact conforming to **7.9.2**; or

   2) connected in such a way as to meet the requirements for safety circuits specified in **7.9**.

c) If the operation of the switches is dependent upon a device which is indirectly mechanically linked to the carrier, e.g. by rope, belt or chain, the breaking of or slackening in the connecting link causes the machine to stop through the action of an electric safety device conforming to **7.9**.

7 Electrical equipment

7.1 Power supply

Except for battery operated homelifts, the power supply shall be dedicated and protected by an RCD conforming to BS 7671.

7.2 Conductors of different circuits

Conductors shall conform to BS EN 60204-1:2006+A1, **13.1.3**.

7.3 Insulation resistance of the electrical installation

The insulation resistance, when measured between each live conductor and earth, shall be not less than the value given in Table 1 for the appropriate nominal circuit voltage.

Table 1 **Insulation resistance**

Nominal circuit voltage	Test voltage (d.c.)	Insulation resistance
V	V	MΩ
SELV	250	≥0.25
≤500	500	≥0.5
>500	1 000	≥1.0

When the circuit includes electronic devices, phase and neutral conductors shall be connected together during measurement.

7.4 Drive contactors

Main contactors (as required in **7.5**) shall meet the requirements for one of the following categories as specified in BS EN 60947-4-1:2010:

- utilization category AC-3 for contactors for a.c. motors; and
- utilization category DC-3 for contactors for d.c. motors.

If relays are used to operate the main contactors, those relays shall meet the requirements for one of the following categories as specified in BS EN 60947-5-1:2004+A1:

- AC-15 for relays controlling a.c. contactors;
- DC-13 for relays controlling d.c. contactors.

Each contactor shall operate such that:

a) if one of the "break" contacts (i.e. normally closed) is closed, then all the "make" contacts are open; and

b) if one of the "make" contacts (i.e. normally open) is closed, all the "break" contacts are open.

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

7.5 Motor and brake supply

Where motors and/or any brakes are controlled and supplied by solid-state elements, one of the following control methods shall be used:

a) a system whereby the supply to the motor and any brake is interrupted by two independent contactors, the contacts of which are in series in the motor and any brake supply circuits. If, whilst the carrier is stationary, one of the contactors has not opened the main contacts, further movement of the carrier shall be prevented at the latest at the next change in the direction of motion; or

b) a system consisting of:

   1) a contactor interrupting the current at all poles;

   2) an independent control device blocking the flow of energy in the static elements;

   3) a monitoring device to verify the blocking of the flow of energy each time the carrier is stationary.

If, during a normal stopping period, the blocking of the flow of energy in the static elements fails, the monitoring device shall cause the contactor to release, and any further movement of the carrier shall be prevented at the latest at the next call registration for a change in the direction of motion.

The electrical supply to the drive motor and brake shall be interrupted following the termination of a direction control signal, or following the failure of the electrical supply, or upon the operation of any electric safety device.

7.6 Enclosure requirements and electrical creepage and clearance distances

The live parts of controllers and electrical safety contacts shall be located within a protective enclosure providing ingress protection of at least IP2X as specified in BS EN 60529:1992.

Covers shall be retained by clamping devices requiring the use of a tool for their removal.

Where an enclosure containing control equipment is fixed to a building surface, the requirements of BS EN 60204-1:2006+A1, **6.2.2** shall be met.

Electrical creepage and clearance distances for the following circuits and components shall conform to BS EN 60947-1:2007, Table 15, in accordance with the working voltage and BS EN 60947-1:2007, **3.2**:

a) power circuits;

b) safety circuits;

c) any components connected after safety circuits or electrical safety contacts, the failure of which would cause an unsafe condition.

The minimum pollution degree shall be taken as 2 and the printed wiring material column in the table shall not be used.

7.7 Electromagnetic compatibility

The electromagnetic compatibility shall conform to BS EN 12015 and BS EN 12016.

7.8 Protection against electrical faults

If any fault, or combination of faults, occurs that can lead to a dangerous situation, the carrier shall be stopped, at the latest, at the next operating sequence.

When tested by means of simulation, any single applicable fault listed below, occurring in the electrical equipment of the homelift, shall not, on its own, cause any loss of function of the homelift such as to cause a dangerous situation:

a) absence of voltage;

b) voltage drop;

c) phase reversal on multi-phase supplies;

d) insulation fault between an electrical circuit and metalwork or earth;

e) short circuit or open circuit, change of value or function in an electrical component such as, for example, resistor, capacitor, transistor or lamp;

f) non-attraction, or incomplete attraction, of the moving armature of a contactor or relay;

g) non-separation of the moving armature of a contactor or relay;

h) non-opening or non-closing of a contact;

i) loss of continuity of a conductor.

NOTE The non-opening of an electrical safety contact need not be considered.

The earthing of an energized circuit, in which there is an electric safety device, shall cause the immediate halt and prevent restarting of the homelift.

7.9 Electric safety devices

7.9.1 General provisions

When tested in accordance with BS EN 81-1:1998+A3, Annex H, electric safety devices that contain electronic components shall meet the pass criteria specified therein.

During operation of an electric safety device, movement of the carrier shall be prevented or it shall be caused to stop immediately.

NOTE A list of appropriate electrical safety devices includes those given in Table 2.

Table 2 **Electrical safety devices**

Devices	Relevant clauses
Safety gear device	**4.12.1.5**
Over-speed governor	**4.12.2.1**
Slack rope and chain safety device	**6.5.2**
Screw/nut drive failure device	**6.6.3**
Electrical anti-creep device	**6.7.13**
Final limit switch	**7.9.5**
Boarding point stopping switch	**7.9.5**
Travelling infill safety devices	**8.3**
Door locking safety device for closed position	**9.4**
Devices operated by sensitive edges or sensitive surfaces	**9.11.3**

The electric safety devices shall consist of either:

a) one or more electrical safety contacts conforming to **7.9.2**, directly cutting the supply to the contactors referred to in **7.5** or their relay-contactors; or

b) safety circuits consisting of one or more electrical safety contacts conforming to **7.9.2** not directly cutting the supply to the contactors referred to in **7.5** or their relay-contactors.

The door locking safety device shall meet the requirements specified in BS EN 81-1:1998+A3, **F.1**.

Except where explicitly permitted (see **6.7.13**, **8.3**, **9.11.1**), no electric equipment shall be connected in parallel with an electric safety device.

Connections to different points of the electric safety chain shall be permitted only for gathering information. The monitoring devices used for that purpose shall fulfil the requirements for safety devices.

The effects of internal or external induction or capacity shall not cause failure of electric safety devices.

An output signal emanating from an electric safety device shall not be altered by an extraneous signal emanating from another electric device placed further down the same circuit.

Devices which record or delay signals shall not, even in the event of a fault, prevent the stopping of the machine through the functioning of an electric safety device.

The construction and arrangement of the internal power supply units shall not alter the output signals of the electric safety devices due to the effects of switching.

7.9.2 Electrical safety contacts

The operation of an electrical safety contact shall be by positive separation of the circuit-breaking devices. This separation shall occur even if the contacts have welded together.

NOTE The opening of the electrical safety contact is achieved when all the contact-breaking elements are brought to their open position.

During at least the last 50% of the opening travel, there shall be no resilient members (e.g. springs) between the moving contacts and the part of the actuator to which the actuating force is applied.

The electrical safety contacts shall be provided for a rated insulation voltage of 250 V if the enclosure provides a degree of ingress protection of at least IP4X as specified in BS EN 60529:1992, or 500 V if the degree of protection of the enclosure is less than IP4X.

The electrical safety contacts shall meet the requirements for one of the following categories as defined in BS EN 60947-5-1:2004+A1:

a) AC-15 for safety contacts in a.c. circuits;

b) DC-13 for safety contacts in d.c. circuits.

If the degree of protection is equal to or less than IP4X, the clearances shall be at least 3 mm, the creepage distances at least 4 mm and the distances for breaking contacts at least 4 mm after separation. If the protection is better than IP4X, the creepage distance may be reduced to 3 mm.

In the case of multiple breaks, the distance after separation between the contacts shall be at least 2 mm.

7.9.3 Operation of electric safety devices

When operating to ensure safety, an electric safety device shall prevent the setting in motion of the machine or immediately initiate its stopping.

The electric safety devices shall act directly on the equipment controlling the supply to the machine in accordance with **7.5**.

If relays are used to control the main contactors that are used to control the machine, these shall be the relays directly controlling the supply to the machine for starting and stopping.

7.9.4 Actuation of electric safety devices

If the devices for actuating electric safety devices are through the nature of their installation accessible to persons, they shall be so built that these electric safety devices cannot be rendered inoperative by a single bridge piece.

7.9.5 Boarding point stopping devices, final limit electric safety devices and mechanical stops

Boarding point stopping devices and final limit safety switches shall be provided (but see Note).

A boarding point stopping device shall be provided to stop the carrier at the boarding point under normal operation.

In the event of over-travel, the opening of the final limit safety device in accordance with **7.9.1** shall prevent further movement under power of the carrier in both directions of travel. It shall operate at the latest before the end of the unlocking zone. The return to service of the homelift shall not occur automatically.

Where a mechanical stop is not provided, the boarding point stopping device shall be a safety device in accordance with **7.9.1**.

NOTE The lower final limit electric safety device may be omitted:

a) in the case of hydraulic drives or those drives incorporating slack rope or slack chain electric safety devices;

b) when the design of the drive system is such that over-travel beyond the normal limits of travel is not possible, even without the use of mechanical end stops;

c) if the lower boarding point stopping device is an electric safety device and if bottom over-travel results in operation of the underside electric safety devices of the carrier.

Mechanical stops (where provided) shall be designed to withstand an impact at rated speed whilst carrying a load of 1.1 times the rated load.

7.10 Protection of the driving motor

Driving motors shall be protected against overloading and potentially damaging excess currents by means of a device that automatically disconnects the supply.

NOTE The device may automatically reset after an appropriate interval.

Where protection is provided by means of a temperature-monitoring device, it is permissible for the carrier to continue in operation to a normal stop at a boarding point to allow the user to leave the carrier. An automatic return to normal operation of the homelift shall occur only after the equipment has cooled to be within the manufacturer's specified temperature range.

7.11 Electrical wiring

The cross-sectional area of conductors shall conform to BS EN 60204-1:2006+A1, **12.4**.

Insulation shall conform to BS EN 60204-1:2006+A1, **13.1.3**. All exposed metalwork, other than conductors, shall be earth bonded.

Trailing electrical power and control cables shall be securely clamped at each end to ensure that no mechanical load is transmitted to cable terminations. Flat cables shall be constructed in accordance with BS EN 50214.

Connectors and devices of the plug-in type shall be protected by position or design against accidental misconnection.

Terminals, connectors and electrical components shall be marked with a means of identification conforming to BS EN 60204-1:2006+A1.

7.12 Additional requirements for battery powered supply

For battery powered homelifts, the control circuit voltage shall not exceed 60 V.

A fuse shall be fitted in line with the battery supply near the negative pole of the battery, which shall be accessible only by the use of a tool(s). This fuse shall isolate the battery supply within 0.5 s of the supply being short-circuited and within 5 s of twice-average peak current being drawn.

The charging arrangement for the batteries shall be as shown in Figure 2a) for a.c. charging and Figure 2b) for d.c. charging. The maximum voltage potential when measured with respect to earth shall be in accordance with BS EN 60204-1:2006+A1, **6.2**.

Battery terminals and charge contacts shall be physically protected against short-circuiting.

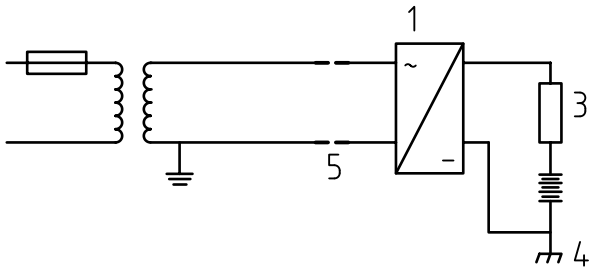
A secure location or fixing for the batteries shall be provided.

A means shall be provided to isolate the battery, which shall isolate the control and drive motor circuits.

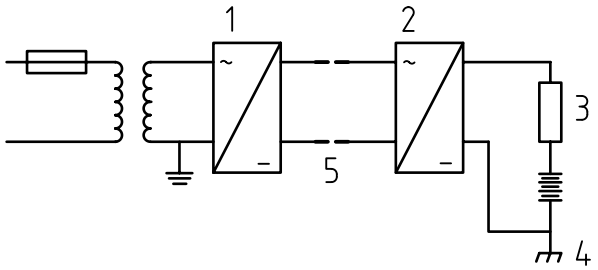
The carrier shall be earthed as shown in Figure 2.

Batteries shall be provided in leak-proof enclosures and shall not emit fumes during normal operation, including charging.

Figure 2 **Charging supply for battery – powered homelifts**



a) a.c. charge contacts



b) d.c. charge contacts

Key

1 a.c. – d.c. converter

2 d.c. – d.c. converter

3 Control circuit 60 V max.

4 The ⎓ symbol denotes that the negative side of the battery supply is connected to the chassis of the lifting platform

5 Charge contacts

NOTE Earthing is not required on SELV-protected charging circuits.

7.13 Control devices

NOTE Recommendations for the provisions and use of specially adapted control devices, switches and sensors are given in Annex C.

7.13.1 Push button control devices

Where push button control devices are used, they shall meet the requirements given in Table 3.

7.13.2 Joystick control devices

Where joystick control devices are used, they shall meet the requirements given in Table 4.

7.13.3 Rocker switch control devices

Where rocker switch control devices are used, they shall meet the requirements given in Table 5.

Table 3 **Push button control devices**

Element	Requirement
Minimum area of the active part of the button	Inscribed circle with a diameter of 20 mm
Identification of active part of button	Identifiable visually and/or by touch from faceplate or surrounds
Identification of faceplate	Colour to contrast with its surrounds
Operating force	1.0 N to 5.0 N (or shielded touch controls)
Position of symbol	On the active part (or 10 mm to 15 mm left of it)
Minimum size of symbol and/or text	Upper case 10 mm; lower case (x-height) 7 mm
Minimum separation between active parts of buttons	10 mm
Height of any control button from the floor level (see Annex B)	300 mm to 900 mm
Minimum lateral distance between the centre line of any boarding point button to any corner of any adjacent walls	200 mm

Table 4 **Joystick control devices**

Element	Requirement
Identification of faceplate/position of joystick	Colour to contrast with its surrounds
Operating force	2.5 N to 5.0 N
Position of symbol	Within 50 mm of the joystick
Minimum size of symbol and/or text	Upper case 10 mm; lower case (x-height) 7 mm
Minimum separation between joystick and any other button or control device	40 mm
Height of joystick from the floor level (see Annex B)	300 mm to 900 mm
Minimum lateral distance between the centre line of any boarding point joystick to any corner of any adjacent walls	200 mm

Table 5 **Rocker switch control devices**

Element	Recommendations
Identification of faceplate/position of rocker switch	Colour to contrast with its surrounds
Operating force	2.5 N to 5.0 N
Position of symbol	Preferably on active part (or 10 mm to 15 mm left of it)
Minimum size of symbol and/or text	Upper case 10 mm; lower case (x-height) 7 mm
Minimum distance between rocker switch and any other button or control device	10 mm
Height of rocker switch from the floor level (see Annex B)	300 mm to 900 mm
Minimum lateral distance between the centre line of any boarding point rocker switch to any corner of any adjacent walls	200 mm

7.13.4 Cable-less controls

A cable-less control system shall control only a single homelift. The control system shall not respond to signals from another homelift or other similar cable-less control system.

NOTE This can be achieved, for example, by the use of an appropriate frequency spectrum, coded signals and range.

The cable-less communication link shall be designed so as to be fail-safe in the event of signal failure.

7.14 Electrical socket outlet

An electrical socket outlet shall be provided adjacent to the homelift for local lighting during inspection and servicing. The socket outlet shall conform to BS 7671.

8 Liftways

8.1 General

The liftway shall be able to support the loading imposed by the homelift.

*NOTE See **B.1.3**.*

8.2 Inspection doors and traps

If any inspection doors and/or traps are provided, they shall not obstruct the travel of the carrier when in the open position. They shall be capable of being opened only with the aid of a key or a tool.

8.3 Liftway protection

While the carrier is at the lower level (see left-hand side of Figure 1), the upper-floor aperture shall be closed off by means of an infill capable of supporting a load of at least the rated load of the homelift or 205 kg, whichever is the greater, spread evenly over its area. This infill shall create a level surface. The infill, when raised, shall be capable of supporting a load of at least 75 kg along the edge from which maximum leverage could be generated without any permanent deformation.

A device that will sense an obstruction on the upper side of the infill shall be provided. It shall function in the manner specified in **9.11.3**, but shall stop the carrier in the upward direction only.

If a travelling infill is used, a trap door separation device shall be fitted which stops the carrier if the infill becomes detached from it at any point above the upper-floor aperture. This device shall operate in the manner specified in **7.9** to stop the carrier when it is travelling downwards.

The opening between the top side of the upper floor and the underside of the infill shall be fully protected by a safety device(s) to prevent trapping. It shall function in the manner specified in **9.11.3**, but shall stop the carrier in the downward direction only.

It shall be possible for the safety devices to be overridden by a switching device, when the closing edge of the infill is within 20 mm of the surface of the upper floor. The switching devices shall be either:

a) an electrical safety contact conforming to **7.9.2**; or

b) connected in such a way as to meet the requirements for safety circuits specified in **7.9.1**.

9 Carrier construction

9.1 Protection of access sides

An imperforate carrier door shall be provided to the access sides of the carrier. The door shall be not less than 1 220 mm high for seated persons and not less than 1 875 mm high for standing persons.

The door shall be able to withstand the application of a force of 300 N, acting at right angles at any point and any direction over an area of 500 mm^2 (of round or square section) without any permanent deformation.

During and after this test, the safety function of the door shall remain operational.

Carrier doors shall require a force less than 40 N to open and shall be provided with a vision panel.

During any loss of the normal power supply, it shall be possible to manually close any power operated doors.

Any glazing materials used in doors shall conform to **9.10**.

Sliding or folding doors shall be guided at the top and bottom to prevent twisting. The guide blocks or rollers shall be easily renewable.

If a switch is used to control the unlocking zone, it shall be an electrical safety contact conforming to **7.9.2**.

9.2 Protection during door operation

The effort needed to resist movement of a power-operated door shall not exceed 150 N, as measured at its leading edge.

The kinetic energy of any power operated door and of the mechanical elements which are rigidly connected to it, calculated or measured at the average closing speed, shall not exceed 10 J.

A power-operated door shall incorporate a sensitive protective device which automatically causes the door to stop or reopen if it the door comes into contact with an object or a person who is crossing the entrance.

The control system shall allow the door dwell time to be adjustable between 20 s and 300 s. The means of the adjustments shall not be accessible to users.

9.3 Door unlocking zone

It shall not be possible in normal operation to open the door when the carrier is more than 50 mm from the boarding point level of that door.

It shall not be possible to make the homelift start with the door unlocked when the carrier is more than 50 mm from the boarding point of that door.

9.4 Door locking devices

It shall not be possible to make the carrier start or continue in motion with a carrier door open. The closed position shall be detected by an electric safety device conforming to **7.9**.

An electric safety device conforming to **7.9** shall be provided to detect whether the locking elements are engaged.

The connection between one of the contact elements which opens the circuit and the device which mechanically locks the door shall be positive and fail-safe, but adjustable if necessary.

The locking action shall be effected and maintained by the action of gravity or springs or other equivalent method. Any springs shall act by compression, be guided and be of such dimensions that, at the moment of unlocking, the coils are not compressed solid. The failure of a spring shall not render a lock unsafe.

Carrier door locking devices shall have a mechanical strength such that in the locked position and when a force of 3 000 N is applied horizontally at right angles to either side of the closing edge of the door, it shall be able to resist that force:

a) without any reduction of the effectiveness of the lock and its fixings;

b) without elastic deformation greater than 15 mm;

c) without permanent deformation.

The door shall remain operational after the force is removed.

Locks on carrier doors shall be located at, or close to, the closing edge of the door and shall continue to lock effectively in the event of the door sagging. The locking action shall be maintained with 300 N applied to the worst position on any side of the car.

The locking devices shall be designed and situated to be inaccessible from both the outside and the inside when in normal use.

9.5 Door emergency unlocking

It shall be possible to unlock each door with the aid of a key or a tool specified by the manufacturer.

9.6 Protection of non-access sides

The carrier enclosure shall be imperforate and shall be able to withstand a force of 300 N, applied perpendicular to the surface and evenly distributed over any square or circular area of 500 mm^2, without permanent deformation.

With the exception of sensitive surfaces meeting the requirements specified in **9.11.3**, the external surface of the carrier enclosure shall have no recess or projection exceeding 5 mm.

The height of each side of the carrier enclosure, excluding entrances, shall not be less than 1 220 mm high for seated persons, and not less than 1 875 mm for standing persons.

9.7 Tip-up seat

Where a tip-up seat is provided, the seat shall have the following characteristics:

a) adjustable seat height from the floor (nominal height 500 mm);

b) depth: 300 mm to 400 mm;

c) width: 400 mm to 500 mm;

d) supported mass: 115 kg.

NOTE For supported masses greater than 115 kg, a fixed seat would normally be used.

9.8 Floor covering

The floor covering of the carrier shall be slip-resistant.

NOTE See Annex B for further guidance.

9.9 Lowest level carrier access ramp

Ramps shall be fitted on all carrier access edges incorporating a step greater than 15 mm high, and shall have an inclination no greater than 1:8.

NOTE A step of up to 15 mm high is permissible at the leading edge of any ramp.

The entrance to the carrier shall be provided with a sill or ramp, which shall withstand the passage of rated loads on to the carrier.

Where carriers are designed for seated or standing users only, a step of 40 mm is permissible.

9.10 Glass

When glass is used, it shall either conform to Table 6 or it shall be tested in accordance with BS EN 81-1:1998+A3, Annex J.

Glass panels shall be fixed in such a way that the forces specified in **9.1** and **9.2** are transferred without permanent deformation of the fixing(s) of the glass.

Table 6 **Glass panels**

Dimensions in millimetres

Type of glass	**Minimum thickness**	
	1 000 mm max. diameter of inscribed circle	**2 000 mm max. diameter of inscribed circle**
Laminated and toughened	08 (4 + 4 + 0.76)	10 (5 + 5 + 0.76)
Laminated	10 (5 + 5 + 0.76)	12 (6 + 6 + 0.76)

9.11 Edge and surface protection

9.11.1 Under-surface protection

All potential trapping hazards, arising from any part of the carrier under-surface, shall be eliminated by providing a sensitive surface over the entire area of the under-surface of the carrier.

It shall be possible for the sensitive surface to be overridden by a switching device, when the closing edge of the sensitive surface is within 10 mm of the surface of the lower boarding point. The switching device shall be either:

a) an electrical safety contact conforming to **7.9.2**; or

b) connected in such a way as to meet the requirements for safety circuits specified in **7.9.1**.

9.11.2 Top of carrier protection

The upper edges of the carrier shall be fitted with sensitive edges, to prevent trapping between the top of the carrier and the underside of the ceiling of the lower level at the opening of the liftway.

9.11.3 Sensitive surfaces and sensitive edges

Means shall be provided to avoid the hazards of trapping caused by the movement of sensitive surfaces and sensitive edges.

The operation of any sensitive surface or sensitive edge shall initiate a break in the electrical supply to the motor and brake in the direction in which the carrier is operating. This shall be achieved by the use of a safety device (see **7.9**).

The operation of these safety devices shall stop the carrier before any rigid parts come into forceful contact. It shall be possible to drive the carrier away in the opposite direction to clear the obstruction, by the user operating the directional control buttons.

For a sensitive surface, the mean forces, measured in two diagonally opposite corners and at the centre point of the sensitive surface, that are required to actuate this safety device shall not exceed:

a) 50 N for surfaces with an area equal to, or less than, 0.15 m^2;

b) 100 N for surfaces with an area greater than 0.15 m^2.

If the sensitive surface projects more than 5 mm on any side of the carrier, it shall be actuated in both compression and tension.

For a sensitive edge, the mean force required to actuate these devices shall not exceed 30 N when measured at each end and at the mid-point.

9.12 Fire protection

The upper level shall have its fire protection preserved, whether the homelift is parked at either the upper level or the lower level.

When tested in accordance with Annex E, the seal between the underside of the homelift carrier (when parked in the upper position) and the trapdoor (when parked in the lower position) shall meet the following requirements:

a) when tested in accordance with BS 476-20: load-bearing capacity not less than 30 min, integrity not less than 15 min, insulation not less than 15 min; or

b) when tested in accordance with BS EN 1363-1: load-bearing capacity not less than 30 min (R 30), integrity and insulation not less than 15 min (REI 15).

NOTE The results from the BS 476-20 test do not automatically equate with those from the BS EN 1363-1 test. See also Approved Document B, Volume 1 [4], Table A.1, 3a.

At the end of the 30 min test period, the trapdoor shall continue to support the load equivalent to 150 kg/m^2.

9.13 Behaviour of homelift in the event of fire

The homelift shall be connected to a smoke/fire system which will give a signal to the homelift initiated by smoke/heat detectors at each landing. When the fire alarm signal is activated, the homelift shall be taken out of service immediately if it is parked. If a journey is being made when the signal is received, the homelift shall be taken out of service as soon as the journey is completed. No other automatic operation of the lift shall be allowed.

Normal door operation shall be possible at all times.

9.14 Carrier illumination

The carrier floor area shall be illuminated. The carrier illumination shall operate from an electrical supply independent of the homelift power supply, unless the lighting circuit is provided with a battery back-up unit of at least 1 h capacity which is automatically recharged from the mains supply.

10 Information

10.1 General

Operating instructions shall be provided that include advice that safety-related components should only be adjusted and reset by a competent person.

NOTE BS EN ISO 12100 specifies general requirements for information, location and nature of the information for use, signals and warning devices, markings, signs (pictograms), written warnings, and accompanying documents (in particular the instruction handbook). Requirements for drafting maintenance instructions for lifts and escalators, which might be of use to manufacturers and suppliers of homelifts, are given in BS EN 13015.

10.2 Signals and warning devices

10.2.1 General

All labels, notices, markings and operating instructions shall be indelible, legible and readily understandable (if necessary aided by signs or symbols). They shall be untearable, of durable material and placed in a visible position.

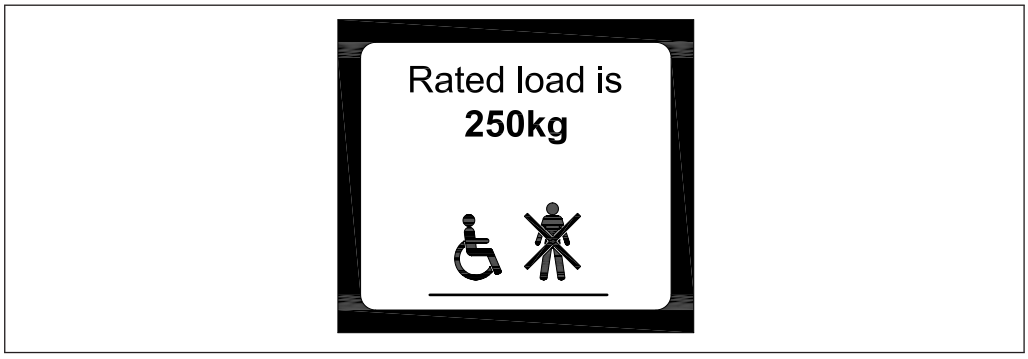
10.2.2 Rated load

The rated load shall be clearly displayed on the homelift and visible from the boarding point.

The height of the text or symbols that indicate the rated load shall be at least 10 mm for upper case and at least 7 mm for the x-height of lower case (i.e. the height of the lower case "x").

NOTE A typical load plate is shown in Figure 3.

Figure 3 **Typical load plate**



10.2.3 Identification of control devices

The function of all devices controlling the operation of the homelift shall be identified (see **7.13**).

10.2.4 Emergency manual operation

Detailed step-by-step emergency operating instructions in accordance with **6.4** and **6.7.12** shall be included in the operating instructions handbook.

Where it is possible for the device to be operated to move the carrier in both the up and the down direction, a direction label indicating the direction of movement of the carrier when the device is operated shall be fitted in a prominent position.

10.2.5 Safety instructions

The homelift shall be provided with safety instructions in the operating instructions handbook for the use of maintenance and other trained and authorized personnel, and giving the safety precautions to be followed when working on the equipment (see **5.1** and **5.2**).

10.2.6 Main isolation switch

The switch for the main electrical supply to the homelift shall be identified.

For hydraulically powered homelifts, the switch identification shall also bear the following legend:

"Switch off only when the carrier is at the lowest level."

10.3 Documents

10.3.1 General

The following information shall be supplied in documentation:

a) the intended use;

b) specific warnings against any reasonably foreseeable misuse;

c) recommended intervals for routine inspection and servicing (see Annex F), including the details of spare parts where the use of incorrect parts would affect the safety of the homelift;

d) warning of residual risks;

e) a repeat of the information with which the machinery is marked;

f) instructions for use of the controls;

g) emergency operations, including the method to be followed in the event of an accident or breakdown;

h) a statement that when a safety gear has tripped, only a competent person should attempt to release it, and that after its release it should be checked to ensure that it remains functional for further use;

i) the operating method to be followed in the event of accident or breakdown; if a blockage is likely to occur, the operating method to be followed so as to enable the equipment to be safely unblocked;

j) a statement that the emission sound pressure level at the operator's position is expected not to exceed 70 dB(A);

k) an electrical circuit wiring diagram showing the electrical connections and components, together with all necessary identification markings;

l) assembly instructions, including:

   1) forces imposed upon the building structure;

   2) anchorage requirements;

   3) electrical connection requirements;

m) instructions to be carried out when power is lost, e.g. send the carrier to the lowest level;

n) acceptance certificate from the end user;

   NOTE Annex G gives an example of a typical certificate.

o) declaration of conformity to the Supply of Machinery (Safety) Regulations 2008 [2].

10.3.2 Marking

Each homelift shall be marked legibly and indelibly with at least the following particulars:

a) the business name and full address of the manufacturer and, where applicable, their authorized representative;

b) year of construction;

c) designation of series or type, if any;

d) serial or identification number;

e) rated load.

NOTE Attention is drawn to the Supply of Machinery (Safety) Regulations 2008 [2] in respect of the requirement for CE marking.

10.4 Verification tests on each machine before first use

Immediately upon completion of installation and prior to being put into service, the homelift shall be subjected to an examination and test by a competent person to determine that:

a) all control devices function correctly;

b) the door locking device operates correctly;

c) the stopping distance of the carrier is within specified limits;

d) all electrical safety devices function correctly;

e) the suspension elements and their attachments are in order;

f) the correct clearance dimensions from the surrounding structure are maintained throughout the full travel of the carrier;

g) the homelift does not fail any electrical tests including insulation and earth continuity;

h) the polarity of the mains supply connection is correct;

i) a certificate has been provided showing the correct tripping speed of the over-speed governor (or on hydraulic systems, the rupture valve) to enable the correct function (free fall, **6.6.1**) of the safety gear at rated load and speed;

j) the mechanism for emergency/manual operation operates correctly;

k) any communication device when activated operates correctly;

l) the mechanical blocking device is provided and effective;

m) all notices, etc. are correctly displayed;

n) the homelift operates satisfactorily in both directions at rated speed;

o) the homelift operates satisfactorily in both directions whilst transporting the user and their accompanying equipment.

p) where applicable, the distance between main nut and safety nut is within the manufacturer's limits;

q) where applicable, the positioning of the safety nut electric safety device is within the manufacturer's limits.

The competent person shall confirm that all factory test certificates are available on site.

A test and examination document shall be completed by the competent person, which declares at least all the information and the results of all checks on-site listed above. This shall be held by the installer, together with any type examinations and other declarations.

NOTE An example test document is shown in Annex H.

10.5 Dismantling

The instructions shall include a statement that if the homelift has to be dismantled, this should be done by a competent person who has been fully trained in its installation and is qualified to provide safe disconnection to the mains terminal.

Annex A (informative)

List of significant hazards

The lists of hazards, hazardous situations and events given in this annex are not exhaustive, nor are they prioritized according to BS EN ISO 12100. Whilst it is recognized that BS EN 1050 was replaced by BS EN ISO 14121-1, which in turn was replaced by BS EN ISO 12100, the former standard contained a list of hazards found to be more suitable to lifting applications and these have been included in this annex where indicated.

Table A.1 lists all the hazards, hazardous situations and events that have been identified by risk assessment as significant for this type of machinery and which require action to eliminate or reduce the risk. Table A.1 also gives subclause references for the relevant safety recommendations and protective measures given in this British Standard.

Before supplying any homelift, it is important to review the risks in Table A.1 to check that all site-specific hazards have been identified.

NOTE 1 Hazards resulting from allergic reactions to persons are not addressed in this standard, but advice on such materials is given in BS EN 81-70:2003, Annex D.

NOTE 2 Annex D indicates the means of verification of the requirements specified in BS 5900.

Table A.1 **Significant hazards relating to the general design and construction of homelifts** *(1 of 4)*

Item	Hazards	Relevant clauses in BS 5900:2012
General hazards, hazardous situations and hazardous events		
1	**Mechanical hazards**	
1.0a)	Shape	**9.6**
1.0b)	Relative location	**5.1**, **5.2**, **5.3**, **8.2**, **8.3**, **9.1**, **9.2**, **9.6**, **9.11**
1.0c)	Mass and stability (potential energy of elements might move under the effect of gravity)	**4.4**, **4.5**, **4.6**, **4.8**, **4.9**, **4.11** **4.12**, **6.1**, **6.7.1** to **6.7.4**
1.0d)	Mass and velocity (kinetic energy of elements in controlled motion)	**4.12**, **5.1**, **5.2**, **5.3**, **6.3**, **6.4.1**
1.0e)	Inadequacy of energy inside the machinery	Not relevant to this product
1.0f)	Accumulation of energy inside elastic elements (springs)	**6.7**, **9.2**
1.0g)	Accumulation of energy inside liquids and gases under pressure	**6.7**
1.0h)	The effect of vacuum	Not relevant to this product
1.1	Crushing hazard	**4.3**, **4.8**, **4.9**, **4.11**, **4.12.1.4**, **5.1**, **5.2**, **5.3**, **6.1**, **6.4**, **6.5**, **6.6**, **6.7**, **8.2**, **9.1**, **9.2**, **9.6**, **9.11**
1.2	Shearing hazard	**4.3**, **5.1**, **5.3**, **6.1**, **6.5.4**, **6.7.4**, **8.2**, **8.3**, **9.6**, **9.11**
1.3	Cutting or severing hazard	**4.3**, **5.1**, **5.2**, **5.3**, **6.1**, **6.5.4**, **6.7.4**, **8.2**, **8.3**, **9.1**, **9.2**, **9.6**, **9.10**, **9.11**
1.4	Entanglement hazard	**4.3**, **5.1**, **5.3**, **6.5.4**, **6.6.4**, **6.7.4**, **8.2**, **8.3**, **9.1**, **9.6**, **9.11**
1.5	Drawing-in or trapping hazard	**4.3**, **5.1**, **5.3**, **6.6.4**, **6.7.4**, **8.2**, **8.3**, **9.1**, **9.6**, **9.11**
1.6	Impact hazard	**4.3**, **5.1**, **5.2**, **5.3**, **8.2**, **8.3**, **9.1**, **9.2**, **9.6**, **9.11**
1.7	Stabbing or puncture hazard	**4.3**, **5.1**, **5.2**, **5.3**, **8.2**, **8.3**, **9.1**, **9.2**, **9.6**, **9.11**
1.8	Friction or abrasion hazard	**4.3**, **9.1**, **9.6**

Table A.1 **Significant hazards relating to the general design and construction of homelifts** *(2 of 4)*

Item	Hazards	Relevant clauses in BS 5900:2012
1.9	High pressure fluid ejection hazard	**6.7**
1.10	Falling hazard	**9.1**, **9.2**, **9.3**, **9.4**
2	**Electrical hazards**	
2.1	Electrical contact of persons with live parts	**7.1**, **7.3**, **7.6**, **7.9.2**, **7.11**, **7.12**, **7.14**
2.2	Electrical contact of persons with parts which have become live under faulty conditions	**7.8**
2.3	Approach to live part under high voltage	Not relevant to this product
2.4	Electrostatic phenomena	Not relevant to this product
2.5	Thermal phenomena	Not relevant to this product
3	**Thermal hazards**	
3.1	Burns and scalds	**5.3**, **7.2**, **7.12**
3.2	Hot or cold environment	**4.10**
4	**Noise**	Not relevant to this product
5	**Vibration hazards**	Not relevant to this product
6	**Hazards generated by radiation**	
6.1	Low frequency, radio frequency and micro waves	Not relevant to this product
6.2	Infrared, visible and ultraviolet light	Not relevant to this product
6.3	X and gamma rays	Not relevant to this product
6.4	Alpha, beta rays etc.	Not relevant to this product
6.5	Lasers	Not relevant to this product
7	**Materials**	
7.1	Liquids and gases	**6.7**, **7.12**
7.2	Contact with or inhalation of harmful fluids, gases, mists, fumes and dusts	**6.7**, **7.12**
7.3	Fire or explosion hazards	**6.7**, **7.12**
7.4	Biological hazards	**6.7**, **7.12**
8	**Ergonomic hazards**	
8.1	Unhealthy postures	**7.13**
8.2	Anatomic inadequacy	**7.13**
8.3	Not using personal protection equipment	Not relevant to this product
8.4	Lighting	Annex B
8.5	Stress	Not relevant to this product
8.6	Human error	Clause **10**
8.7	Inadequate controls	Clause **10**
8.8	Inadequate visual display	Clause **10**
9	**Hazard combinations**	**7.8**
10	**Unexpected start-up, over-run or over-speed**	
10.1	Failure of the control system	**7.8**
10.2	Restoration of supply	**7.8**
10.3	External influences on electrical equipment	Not relevant to this product
10.4	Wind, gravity	Not relevant as travel will be limited
10.5	Errors in software	Not relevant to this product
10.6	Operator error	Clause **10**
11	**Failure to stop/stopping the machine in the best possible conditions**	
11.1	Unsafe position	**6.4**, **6.7.12**
12	**Variation in speed**	
12.1	Over-speeding	**4.12**

Table A.1 **Significant hazards relating to the general design and construction of homelifts** *(3 of 4)*

Item	Hazards	Relevant clauses in BS 5900:2012
13	**Failure of the power supply**	
13.1	Over-speeding	**4.4, 4.12.2**
13.2	Unexpected start	**7.8**
13.3	Change of direction	**7.8**
13.4	Loss of memory	**7.8**
13.5	Unsafe position	**6.4, 6.7.12**
13.6	Entrapment	**6.4, 6.7.12, 10.2.4**
14	**Failure of the control circuit/failure of controls**	
14.1	Failure/disorder of the control system	**7.8**
14.2	Failure to stop	**7.8**
14.3	Unexpected stop	**7.8**
14.4	Unexpected start	**7.8**
14.5	External influences	**7.8**
14.6	Failure to start	**7.8**
14.7	Maintenance Operation	**7.8**
14.8	Unexpected Activation	**7.8**
14.9	Brake remains lifted	**7.8**
14.10	Prevent stopping	**7.8**
14.11	Ineffective protection	**7.8**
14.12	Isolation	**7.1**
14.13	Restoration of the energy after an interruption	**7.1, 7.8**
14.14	External influences on the electrical equipment	**7.7**
15	**Errors in fitting**	Clause **10**
16	**Break-up during operation**	
16.1	Stress failure (and fatigue)	**4.9**
16.2	Falling	**4.8, 4.11, 4.12**
17	**Falling or ejected objects or fluids**	
17.1	Falling objects	**4.8, 4.11, 4.12**
18	**Loss of stability**	
18.1	Overturning	**4.8, 4.11, 4.12**
18.2	Falling	**4.8, 4.11, 4.12**
19	**Slip, trip and fall**	
19.1	Slipping	**9.8**
19.2	Tripping	**9.9**
19.3	Falling	**8.3, 9.1, 9.4, 9.6**
19.4	Falling from the landing	**8.3**
Additional hazards, hazardous situations and hazardous events due to mobility *Hazards 20 to 26 relate to mobile equipment (BS EN 1050) and are therefore not relevant to this product*		
Additional hazards, hazardous situations and hazardous events due to lifting		
27	**Mechanical hazards and hazardous events**	
27.1	Load fall and collision etc. caused by:	
27.1.1	Lack of stability	**4.8, 4.9, 4.11, 4.12**
27.1.2	Overloading	**4.6, 4.12**
27.1.3	Amplitude	**4.2, 4.4, 4.9**
27.1.4	Unexpected movement of load	**4.12**
27.1.5	Holding devices	**4.12.1**

Table A.1 **Significant hazards relating to the general design and construction of homelifts** *(4 of 4)*

Item	Hazards	Relevant clauses in BS 5900:2012
27.1.6	Collision of more than one machine	Not relevant to this product
27.2	From access of persons to load support	**5.1, 5.2, 5.3**
27.3	From derailment	**4.11**
27.4	Mechanical failure	**4.8, 4.9, 4.11, 4.12**
27.5	Failure of pulleys	**6.5.4**
27.6	Failure of ropes and chains	**6.5.2, 6.5.3**
27.7	Friction brakes	**6.2, 7.5**
27.8	Abnormal assembly, testing and use	Clause **10**, Annex A
27.9	Impact on persons of load or counterweight	Not relevant to this product
28	**Electrical hazard**	
28.1	Lightning	Not relevant to this product
29	**Ergonomic hazard**	
29.1	Insufficient visibility	Not relevant to this product
Additional hazards, hazardous situations and hazardous events due to underground work *Hazards 30 to 33 are not relevant to this product (BS EN 1050)*		
Additional hazards, hazardous situations and hazardous events due to the lifting or moving of persons		
34	**Mechanical hazards and hazardous events**	
34.1	Inadequate mechanical strength/working coefficients	**4.5, 4.6, 4.8, 4.9, 4.11, 4.12, 6.1, 6.2, 6.6, 6.7, 8.3, 9.1, 9.2, 9.4, 9.6, 9.7**
34.2	Failing of loading control	**4.6**
34.3	Failure of carrier controls	**7.9**
34.4	Over speed of carrier	**4.4, 4.12**
34.5	Loss of integrity of fixings	**4.9, 4.11, 4.12**
35	**Falling of persons from carrier**	**4.8, 4.9, 4.11, 4.12**
36	**Falling/overturning of carrier**	
36.1	Preventing of falling or overturning	**4.5, 4.8, 4.9, 4.11, 4.12, 9.3, 9.4, 9.5, 9.6**
36.2	Acceleration and braking	**4.4, 4.12.1, 7.5**
37	**Human error/behaviour**	**4.6, 5, 9.11**

Annex B (informative) Guidance for the exchange of information between manufacturer/supplier and specifier

NOTE This annex provides guidance to enable manufacturers/suppliers to select and specify an appropriate powered homelift for installation in a private dwelling, and to remind purchasers and owners of new and existing homelifts of other factors for their attention.

B.1 Selection of homelift

B.1.1 Suitability of homelift

The following issues need to be addressed when determining the general suitability of the homelift.

a) Consider the current abilities of the user(s) (where known) when selecting a homelift, including whether the needs of the user(s) are likely to change in the future.

b) Ensure that a suitable homelift is selected with a rated load and size that is capable of carrying the maximum foreseeable load and size of user and wheelchair as applicable.

c) Ensure that the user(s) can be safely transported on the homelift, whether sitting, standing, or seated in a wheelchair.

d) Consider, where either manual or automatic operation is optionally available for devices such as doors, which is more appropriate for the user(s).

e) Ensure that the location of the homelift does not restrict the means of emergency access or egress.

f) Ensure that the anticipated maximum number of journeys per hour determined by the purchaser is communicated to the supplier.

g) Determine any limits to the ability of the user with respect to the entrance, e.g. the position of the carrier floor with respect to landing floors, and with respect to the manoeuvring space on the landings, e.g. 1 200 mm clear space in front of the homelift.

B.1.2 Controls

The following issues need to be addressed when determining the suitability of the controls.

a) Identify any potential difficulties in operating the controls, e.g. if an intended user has the use of only one hand.

b) Consider the need to have a suitable located attendant control if the user cannot operate the machine independently.

c) Specify a means (e.g. key locking, remote fobs, etc.), if required, to restrict the use of the homelift and prevent children from playing with it.

B.1.3 Suitability of the building

Expert advice may be sought on the positioning of the homelift with respect to the construction of the building, including:

a) that the construction is adequate for the fixing of the homelift;

NOTE 1 Attention is drawn to the need to obtain local authority building control approval. This often involves double joisting, which might necessitate the clearance of the upstairs room and the moving of services, e.g. electrical and plumbing. These works usually involve additional charges being made.

b) whether there are potential trapping areas;

c) that sufficient space is available in passageways for wheelchairs or any other special devices;

d) the provision of adequate lighting at all entrances and at all times to ensure an illumination level of at least 50 lx;

e) that the transmission of noise and vibration to any surrounding walls and other supporting structures is taken into account;

f) that appropriate safety measures are taken if the homelift is to be installed in an adverse environment;

NOTE 2 Adverse environments are those that could affect safe operation. Examples include:

- *the effects of humidity, atmospheric pollution, solar radiation, swimming pool environs, rain/ice/high wind, etc.;*
- *the actions of flora and fauna.*

g) that heating or cooling means are used to ensure that any electronic components contained in the enclosure operate in the ambient temperature range specified by the manufacturer.

B.2 Electrical supply

It is preferred that the electrical supply is not provided through a pre-payment meter. If this cannot be avoided, then a battery back-up, or similar means, should be provided that allows the completion of any journey in progress.

B.3 Other considerations

If the homelift is for a user living alone for long periods, the following additional issues should be considered.

a) An alarm system to a suitable responsible person could be desirable. Recommendations for alarm systems are given in DD CEN/TS 50134-7.

b) Alarm systems and emergency lighting should not operate from the mains power supply. These facilities should be available to the user(s) at all times.

B.4 Change of use

If a change of use of the homelift is desired, this should be discussed with the manufacturer as certain alterations could be required.

Examples of changes of use are:

a) change of type, size and/or weight of wheelchair;

b) change of user disability;

c) change of user;

d) removal of the homelift and reinstallation at another site;

e) change of duty cycle.

All changes of use should entail a review of the installation.

Annex C (informative) Recommendations for the provisions and use of specially adapted control devices, switches and sensors

C.1 Control devices

It is recommended that the operation of the homelift is by means of conventional pushbuttons, joysticks or similar devices, except where these are unsuitable due to the disability of the user.

In such cases, the control device placement, whether on a wall, wheelchair, pendant, etc., should be such that accidental operation by the user is minimized.

If the disability of a dedicated user is such that an adapted switch or a remote control device cannot be operated to control the homelift, other technical solutions may be sought that could enable the user to operate the homelift.

C.2 Assistance

If the disability of the user is such that they can operate neither an adapted switch nor a remote control device independently, then assistance from others should be sought.

C.3 Specially adapted switches

Where specially adapted switches such as touch switches, low force switches, blowpipe operated switches or pull-cords are used, the design should be such that their immunity to electrical and mechanical interference will prevent accidental operation of the homelift.

Additional stopping devices, which are either specially adapted switches or remotely controlled switches, can also be fitted.

In order to minimize the effects of electrical interference on touch switches, and the accidental operation of mechanically sensitive switches, a device should be fitted which ensures that the switch has been operated for longer than 0.5 s before the (electrical) command is accepted by the homelift controller, except where such a touch switch or mechanically sensitive switch is used for stopping the homelift.

Specially adapted switches:

a) should only switch extra low voltages (less than 30 V);

b) should only be powered, where appropriate, by extra low voltages;

c) may be used to stop the homelift, in addition to the stopping devices;

d) should be positioned at the most convenient location for the user.

C.4 Sensors

Infra-red sensors, ultrasonic sensors, microwave movement detectors and pressure mats should not be used to control the homelift.

Annex D (normative) Verification of safety requirements and/or protective measures

D.1 Verification of design

The safety requirements and measures specified in this British Standard shall be verified by means of the tests and inspections shown in Table D.1.

NOTE It is recommended that all verification records are kept by the manufacturer.

Table D.1 **Means of verification of the safety requirements and/or measures** *(1 of 3)*

Sub-clause	Safety requirements (clause/subclause title)	Visual inspection [A)]	Performance check/test [B)]	Measure-ment [C)]	Drawing/ calculation [D)]	User info [E)]
4	**General requirements for homelifts**					
4.1	General					
4.2	Pattern of use	✓	✓	✓	✓	✓
4.3	Guarding	✓	✓	✓		
4.4	Rated speed		✓	✓	✓	
4.5	Rated load		✓		✓	✓
4.6	Load control		✓	✓		
4.7	Carrier floor			✓		
4.8	Mechanical strength of the homelift		✓		✓	
4.9	Resistance to operating forces		✓		✓	
4.10	Protection of equipment against harmful external influences	✓	✓		✓	✓
4.11	Carrier support/guide system	✓	✓	✓	✓	
4.12	Safety gear and over-speed governor [F)]	✓	✓	✓	✓	
5	**Access for maintenance, repair and inspection**					
5.1	Working areas on the carrier	✓		✓		✓
5.2	Working areas under the carrier	✓		✓		✓
5.3	Access to equipment and machinery	✓		✓		✓
6	**Driving units and drive systems**					
6.1	General requirements	✓	✓	✓	✓	
6.2	Braking system	✓	✓	✓	✓	
6.3	Stopping/levelling accuracy		✓	✓		✓
6.4	Emergency/ manual operation	✓	✓	✓		✓
6.5	Additional requirements for rope and chain suspension drive	✓	✓	✓	✓	
6.6	Additional requirements for screw and nut drive	✓	✓	✓	✓	
6.7	Additional requirements for hydraulic drive	✓	✓	✓	✓	

Table D.1 **Means of verification of the safety requirements and/or measures** *(2 of 3)*

Sub-clause	Safety requirements (clause/subclause title)	Visual inspection [A)]	Performance check/test [B)]	Measure-ment [C)]	Drawing/ calculation [D)]	User info [E)]
7	**Electrical equipment**					
7.1	Power supply	✓		✓	✓	✓
7.2	Conductors of different circuits	✓			✓	
7.3	Insulation resistance of the electrical installation	✓		✓	✓	✓
7.4	Drive contactors	✓			✓	
7.5	Motor and brake supply	✓	✓	✓	✓	
7.6	Enclosure requirements and electrical creepage and clearance distances	✓	✓	✓	✓	
7.7	Electromagnetic compatibility		✓	✓	✓	✓
7.8	Protection against electrical faults	✓	✓		✓	
7.9	Electric safety devices					
7.9.1	General provisions	✓	✓	✓	✓	
7.9.2	Electrical safety contacts	✓	✓	✓	✓	
7.9.3	Operation of electric safety devices	✓	✓	✓	✓	
7.9.4	Actuation of electric safety devices		✓			
7.9.5	Boarding point stopping devices, final limit electric safety devices and mechanical stops	✓	✓	✓	✓	
7.10	Protection of the driving motor		✓	✓	✓	
7.11	Electrical wiring	✓			✓	
7.12	Additional requirements for battery powered supply	✓	✓	✓	✓	✓
7.13	Control devices					
7.13.1	Push button control devices	✓	✓	✓	✓	✓
7.13.2	Joystick control devices	✓	✓	✓		✓
7.13.3	Rocker switch control devices	✓	✓	✓		✓
7.13.4	Cable less controls	✓	✓	✓		✓
7.14	Electrical socket outlet					✓
8	**Liftways**					
8.1	Liftway floor				✓	✓
8.2	Inspection doors and traps	✓	✓			✓
8.3	Liftway protection	✓	✓	✓		
9	**Carrier construction**					
9.1	Protection of access sides	✓	✓	✓	✓	

Table D.1 **Means of verification of the safety requirements and/or measures** *(3 of 3)*

Sub-clause	Safety requirements (clause/subclause title)	Visual inspection [A)]	Performance check/test [B)]	Measure-ment [C)]	Drawing/ calculation [D)]	User info [E)]
9.2	Protection during door operation	✓	✓	✓	✓	
9.3	Door unlocking zone	✓	✓	✓		
9.4	Door locking devices		✓	✓		
9.5	Door emergency unlocking	✓	✓			✓
9.6	Protection of non access sides	✓	✓	✓	✓	
9.7	Tip up seat		✓	✓		
9.8	Floor covering	✓	✓			
9.9	Lowest level carrier access ramp			✓	✓	
9.10	Glass	✓		✓	✓	
9.11	Edge and surface protection					
9.11.2	Top of carrier protection	✓	✓	✓	✓	
9.11.3	Sensitive surfaces and sensitive edges	✓	✓	✓	✓	✓
9.12	Fire resistance	✓	✓			✓
9.13	Behaviour of homelift in the event of fire		✓			
9.14	Carrier illumination		✓			

[A)] Visual inspection will be used to verify the features necessary for the requirement by visual examination of the components supplied.

[B)] A performance check/test will verify whether the features provided perform their function in such a way that the requirement is met.

[C)] Measurement will verify by the use of instruments whether requirements are met, to the specified limits.

[D)] Drawings/calculations will verify whether the design characteristics of the components provided meet the requirements.

[E)] Verify that the relevant point is dealt with in the instruction handbook or by marking.

[F)] See verification tests for safety gear and over-speed governor from BS EN 81-41.

Annex E (normative) Determination of fire resistance

E.1 Principle

The objective of this test is to specifically determine the minimum period of fire resistance of the seal between the underside of a homelift carrier when the homelift is up, the trapdoor when the homelift is down and the penetrated building floor. The test assumes that the fire is at the lower level and that it is the upper level which is being protected.

The minimum period of fire resistance is determined by the behaviour of the test specimens when subjected to defined heating and pressure. The test method provides a means of quantifying the ability of the specimen to withstand exposure to high temperatures, from which the fire containment ability (integrity) and the thermal transmittance (insulation) can be determined.

The standardized temperature/time conditions used in this evaluation are representative of only one possible fire exposure condition, which is at the stage of a fully developed fire.

NOTE Due to restrictions of size and the absence of surrounding construction, the laboratory test cannot reproduce the actual behaviour pattern in a fire. However, test data can provide a basis for making engineering evaluations.

E.2 Test specimen

The test specimen and any associated construction forming a test construction shall be identical to, or representative of, the element of building construction that is to be evaluated. If necessary, the size of the test specimen may be reduced to suit the 1 m × 1 m furnace. The test specimen shall otherwise, as far as possible, consist of full-sized elements.

The floor shall consist of tongued and grooved softwood or chipboard floor fixed to joists over clad with 3 mm hardboard. The ceiling shall be constructed of skimmed plasterboard 12 mm thick, fixed to the joists. The open ends of the floor shall be boxed in.

The test of the underside of the carrier shall comprise the panel, the lift floor and a representative construction needed to support the lift floor and the underside of the carrier. Measurements and observations shall be made of the lift floor and its immediate surrounding area, and recorded.

The test of the trapdoor shall consist of the trapdoor bearing a load equivalent to 150 kg/m^2, and its supporting framework. Measurements and observations shall be made of the trapdoor upper surface and its immediate surrounding area, and recorded.

E.3 Test method

The test conditions, apparatus, procedures, evaluation and report shall be in accordance with either BS 476-20 or BS EN 1363-1.

Annex F (informative) In-use periodic examinations, servicing and tests

NOTE The recommendations given below are intended to be supplied by the manufacturer as part of the accompanying documentation.

F.1 Periodic examinations

Homelifts installed in domestic premises should be thoroughly examined at intervals not exceeding 12 months, or at an interval advised according to a written scheme of examination.

Particular attention should be given in any report to the effectiveness of the following features:

a) interlocking devices;

b) electrical safety devices;

c) earthing continuity;

d) supporting and suspension means for lifting;

e) driving unit and brakes;

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

g) alarm system;

h) safety edges;

i) internal surfaces (distances, surfaces and sharp edges);

j) guides and guide shoes or rollers;

k) lighting and any emergency lighting;

l) moving parts (check for wear).

F.2 Maintenance

Regular servicing should be carried out at the periodicity recommended by the manufacturer and as specified in the instruction handbook provided by the manufacturer. It is important that the person carrying out the servicing is provided with the necessary tools and instructions and has received appropriate training and possesses sufficient experience of the equipment to be serviced.

A log book/record card should be provided to document visits and actions.

Annex G (informative)

Certificate of acceptance from purchaser/user after initial tests and examination

It is necessary to obtain a certificate of acceptance from the end user after initial tests and examination have been carried out [see **10.3.1**n)].

A typical certificate is shown in Figure G.1.

NOTE Attention is drawn to the legal requirement in the Supply of Machinery (Safety) Regulations 2008 [2] for the purchaser to be provided at handover with a signed declaration of conformity.

Figure G.1 **Typical certificate of acceptance**

I/we [the purchaser/user of this homelift (serial no.... . . . .)] have received and understood verbal and written instructions (including recommendations for periodic inspection and servicing) and a demonstration on the correct and safe use of the homelift and emergency operation,
from . . . . . .

Signature(s) . . . . . .

Date . . . . . .

Address . . . . . .

. . . . . .

. . . . . .

Annex H (informative) Certificate for test and examination after installation of homelift

An example of a certificate for test and examination after installation of a homelift is shown in Figure H.1.

Figure H.1 **Example of a certificate for test and examination after installation of homelift** *(1 of 3)*

1. Description

Location . . . . . .

Manufacturer . . . . . .

Homelift serial no . . . . . .

Electrical supply . . . . . V . . . phase . . . Hz

Travel . . . . . m

Rated load . . . . . kg

Rated speed . . . . . m/s

2. Examinations and tests

2.1 All homelifts

(a) Earthing arrangements

Is the homelift bonded to earth by a separate protective conductor? . . . . .

Is metalwork enclosing live electrical conductors bonded to the main earthing terminal by protective conductors? . . . . .

Does the resistance of the earth protective path exceed 0.1 Ω? . . . . .

(b) Insulation resistance to earth

Power circuits . . . . . MΩ

Safety circuits . . . . . MΩ

(c) Voltages

Mains voltage at time of test V

Control circuit voltage at full load V

Is the polarity of the mains correct? . . . . . .

(d) Carrier underside protection

Is carrier under-surface protection provided (see BS 5900:2012, **9.11.1**)? . . . . .

Do safety devices operate correctly? . . . . .

(e) Levelling accuracy (see BS 5900:2012, 6.3)

Is the stopping accuracy of the carrier ±10 mm? . . . . .

Is the re-levelling accuracy of the carrier ±20 mm? . . . . .

In response to operation of an electric safety device, is the stopping distance of the carrier, except for safety surfaces and safety edges, no greater than 20 mm? . . . . .

Figure H.1 **Example of a certificate for test and examination after installation of homelift** *(2 of 3)*

(f) Door lock

Is the door fitted with an appropriate lock? . . . . .

Does the lock operate correctly? . . . . .

(g) Liftway protection (see BS5900:2012, 8.3)

Can the infill support the design load? . . . . .

Does the device sensing an obstruction function correctly? . . . . .

Where a travelling infill is used:

(i) does a device stop the carrier if the infill becomes detached? . . . . .

(ii) does the safety device to prevent trapping operate correctly? . . . . .

(h) Load plate and notices

Are a load plate and other notices fitted on the homelift, as appropriate? . . . . .

(i) Performance

For one round trip of the carrier:

What is the raising time? . . . . . s

What is the lowering time? . . . . . s

(j) Load test

Does the overload detection device operate correctly (see BS 5900:2012, **4.6**)? . . . . .

Has any failure or permanent deformation been detected after load tests have been performed? . . . . .

(k) Blocking device

Is a manually operated blocking device provided (see BS 5900:2012, **5.2**)? . . . . .

Does the device operate correctly? . . . . .

(l) Protection against free fall or excessive speed

Does the certificate for the equipment provided show either the correct tripping speed of the over-speed governor or the means to protect against hydraulic systems failure? (see BS 5900:2012, **6.7.8**)? . . . . .

Give details of certificates verifying the operation of device(s) to prevent free fall or descent with excessive speed:

Device	Certificate number
.....	.....
.....	.....
.....	.....

(m) Control devices

Do all control devices function correctly (see 5900:2012, **7.13**)? . . . . .

Figure H.1 **Example of a certificate for test and examination after installation of homelift** *(3 of 3)*

(n) Emergency operation

Does the mechanism for emergency/manual operation operate correctly? . . . . .

2.2 Mechanically driven homelifts

(a) Suspension system

Is the rope/chain test certificate available and satisfactory? . . . . .

Are the rope terminations correctly made and secured? . . . . .

(b) Safety gear and braking system

Does the mechanical safety gear operate effectively? . . . . .

Does the brake sustain the carrier with the 125% rated load? . . . . .

Does the slack rope/chain switch operate correctly? . . . . .

(c) Safety nut

Is the distance between main nut and safety nut correct? . . . . .

Is the positioning of the safety nut electric safety device correct? . . . . .

2.3 Hydraulically driven homelifts

Power circuit

Maximum working pressure . . . . . bar

Pressure relief valve setting (if applicable) . . . . . bar

3. Conformity

Does the homelift conform to BS 5900:2012? Yes ☐

No ☐

If NO, state reasons:

. . . . . .

. . . . . .

4. Declaration

I/we certify that on . . . . . the homelift at . . . . . was installed and examined to the manufacturer's instructions. This certificate gives an accurate report of the results of the examination.

Signature(s) . . . . . .

Qualification(s) . . . . . .

Address . . . . . .

. . . . . .

Date . . . . . .

Bibliography

Standards publications

For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

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

BS EN 81-40, *Safety rules for the construction and installation of lifts – Part 40: Special lifts for the transport of persons and goods – Stairlifts and inclined lifting platforms intended for persons with impaired mobility*

BS EN 81-41, *Safety rules for the construction and installation of lifts – Special lifts for the transport of persons and goods – Part 41: Vertical lifting platforms intended for use by persons with impaired mobility*

BS EN 81-70:2003, *Safety rules for the construction and installation of lifts – Part 70: Particular applications for passenger and goods passenger lifts – Accessibility to lifts for persons including persons with disability*

BS EN 1050 (withdrawn), *Safety of machinery – Principles for risk assessment*

BS EN 13015, *Maintenance for lifts and escalators – Rules for maintenance instructions*

BS EN ISO 14121-1 (withdrawn), *Safety of machinery – Risk assessment – Part 1: Principles*

DD CLC/TS 50134-7, *Alarm systems – Social alarm systems – Part 7: Application guidelines*

Other publications

[1] EUROPEAN COMMUNITIES. 2006/42/EC. Directive 2006/42/EC of the European Parliament and of the Council of 17 May 2006 on machinery, and amending Directive 95/16/EC. Luxembourg: Office for Official Publications of the European Communities, 2006.

[2] GREAT BRITAIN. Supply of Machinery (Safety) Regulations 2008. London: The Stationery Office.

[3] GREAT BRITAIN. Lifting Equipment and Lifting Operations Regulations 1998. London: The Stationery Office.

[4] STATIONERY OFFICE. *The Building Regulations 2000 – Approved Document B – Volume 1: Fire safety – Dwellinghouses*. London: The Stationery Office, 2007.

This page deliberately left blank

This page deliberately left blank

British Standards Institution (BSI)

BSI is the national body responsible for preparing British Standards and other standards-related publications, information and services.

BSI is incorporated by Royal Charter. British Standards and other standardization products are published by BSI Standards Limited.

About us

We bring together business, industry, government, consumers, innovators and others to shape their combined experience and expertise into standards -based solutions.

The knowledge embodied in our standards has been carefully assembled in a dependable format and refined through our open consultation process. Organizations of all sizes and across all sectors choose standards to help them achieve their goals.

Information on standards

We can provide you with the knowledge that your organization needs to succeed. Find out more about British Standards by visiting our website at bsigroup.com/standards or contacting our Customer Services team or Knowledge Centre.

Buying standards

You can buy and download PDF versions of BSI publications, including British and adopted European and international standards, through our website at bsigroup.com/shop, where hard copies can also be purchased.

If you need international and foreign standards from other Standards Development Organizations, hard copies can be ordered from our Customer Services team.

Subscriptions

Our range of subscription services are designed to make using standards easier for you. For further information on our subscription products go to bsigroup.com/subscriptions.

With **British Standards Online (BSOL)** you'll have instant access to over 55,000 British and adopted European and international standards from your desktop. It's available 24/7 and is refreshed daily so you'll always be up to date.

You can keep in touch with standards developments and receive substantial discounts on the purchase price of standards, both in single copy and subscription format, by becoming a **BSI Subscribing Member**.

PLUS is an updating service exclusive to BSI Subscribing Members. You will automatically receive the latest hard copy of your standards when they're revised or replaced.

To find out more about becoming a BSI Subscribing Member and the benefits of membership, please visit bsigroup.com/shop.

With a **Multi-User Network Licence (MUNL)** you are able to host standards publications on your intranet. Licences can cover as few or as many users as you wish. With updates supplied as soon as they're available, you can be sure your documentation is current. For further information, email bsmusales@bsigroup.com.

BSI Group Headquarters

389 Chiswick High Road London W4 4AL UK

Revisions

Our British Standards and other publications are updated by amendment or revision.

We continually improve the quality of our products and services to benefit your business. If you find an inaccuracy or ambiguity within a British Standard or other BSI publication please inform the Knowledge Centre.

Copyright

Useful Contacts:

Customer Services
Tel: +44 845 086 9001
Email (orders): orders@bsigroup.com
Email (enquiries): cservices@bsigroup.com

Subscriptions
Tel: +44 845 086 9001
Email: subscriptions@bsigroup.com

Knowledge Centre
Tel: +44 20 8996 7004
Email: knowledgecentre@bsigroup.com

Copyright & Licensing
Tel: +44 20 8996 7070
Email: copyright@bsigroup.com

bsi.

...making excellence a habit.™