

Specification for

Powered stairlifts

ICS 91.140.90

Committees responsible for this British Standard

The preparation of this British Standard was entrusted to Technical Committee MHE/4, Lifts, hoists and escalators, upon which the following bodies were represented:

- Associated Offices Technical Committee
- Association of District Councils
- British Broadcasting Corporation
- British Lift Association
- British Retail Consortium
- Chartered Institute of Environmental Health
- Chartered Institution of Building Services Engineers
- Department of the Environment (Building Research Establishment)
- Department of Trade and Industry (Standards Policy Unit)
- Electrical, Electronic, Telecommunications and Plumbing Union
- Engineer Surveyors Section of the MSF
- Health and Safety Executive
- Institution of Electrical Engineers
- Institution of Incorporated Executive Engineers
- Institution of Mechanical Engineers
- Institution of Plant Engineers
- Lloyds Register of Shipping
- London Underground Ltd.
- National Association of Lift Makers
- Post Office
- Royal Association for Disability and Rehabilitation
- Safety Assessment Federation Ltd.

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

- Association of Loading and Elevating Equipment Manufacturers
- Association of Metropolitan Authorities
- British Federation of Care-Home Properties
- British Surgical Trades Association
- Consumer Policy Committee of BSI
- Institute of Trading Standards Administration
- London Fire and Civil Defence Authority
- Trades Union Congress

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Foreword

This British Standard has been prepared by Technical Committee MHE/4. It is a revision of BS 5776:1979 which is superseded and withdrawn.

NOTE This revision has been offered as the basis for a new International/European Standard for stairlifts. When this proposed European Standard is published it will be implemented as a British Standard and BS 5776:1996 will be superseded and withdrawn.

Equipment manufactured to the requirements of this standard is for use on a stairway within, or an internal stairway giving access to, a private dwelling. The equipment is increasingly being used by disabled persons in commercial and public premises and this standard provides guidelines for such installations in Annex A. The equipment is required to operate in a normal domestic environment (as regards temperature and humidity); additional features will be necessary in more rigorous conditions, or if fitted in an external situation.

It is assumed that a stairlift conforming to this standard will be used only by a person who is either capable of using it safely and unaided after having been fully instructed in its use or, if not so capable, who only uses it when attended by an able-bodied person fully instructed in the safe and proper use of the equipment.

This revision includes amendments to the 1979 edition of this standard. The opportunity has also been taken to revise 6.7, electrical equipment, in accordance with BS 3456-101:1987 and BS 3456-201:1990. Overspeed governors are also specified. In addition, this revision covers requirements for hinged bridging platforms and battery powered operation, the use of which has increased considerably in recent years. Annex B is included to identify various important aspects that should be investigated when considering the installation of a stairlift for a specific user. Annex C gives guidance on the provision of operating instructions for the user, the services that should be provided and the considerations arising from changes of user or use.

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

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

BS 5900, *Specification for powered domestic lifts.*

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

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

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Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, pages 1 to 37 and a back cover.

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1 Scope

This British Standard specifies requirements for the design, construction and installation of powered stairlifts, with particular regard for safety, for use by persons with impaired mobility travelling between fixed floors in private dwellings.

NOTE The standard also gives guidelines in Annex A that should be satisfied when stairlifts are installed in buildings other than private dwellings.

2 References

2.1 Normative references

This British Standard incorporates, by dated or undated reference, provisions from other publications. These normative references are made at the appropriate places in the text and the cited publications are listed on page 37. For dated references, only the edition cited applies; any subsequent amendments to, or revisions of the cited publication apply to this British Standard only when incorporated in the reference by amendment or revision. For undated references, the latest edition of the cited publication applies, together with any amendments.

2.2 Informative references

This British Standard refers to other publications that provide information or guidance. Editions of these publications current at the time of issue of this standard are listed on page 37, but reference should be made to the latest editions.

3 Definitions

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

3.1

back-up nut

an internally threaded annular component, used in conjunction with a screw and nut drive, so arranged that it does not normally carry the load but is capable of doing so in the event of failure of the threads in the main driving nut

3.2

brake

an electromechanical mechanism employed to bring the stairlift to rest smoothly and hold it in position

3.3

carriage

that whole moving part of the stairlift designed to carry a passenger or a passenger in a wheelchair

3.4

chain

a simplex or duplex transmission chain that, if used as part of a drive system, either transmits rotary motion from one shaft to another or transmits motion directly to the carriage

3.5

chainwheel

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

3.6

contactor (or relay)

an electromagnetically operated device for switching an electrical circuit

3.7

control limit switch

a directional electrical switch positively and mechanically operated by movement of the carriage

3.8

controller

an assembly of electrical contactors, relays and/or other components mounted within a cabinet and constituting the electrical control equipment for the stairlift

3.9

disabled person

a person with impaired mobility

3.10

drive

a generic term covering the various electromechanical drive unit arrangements that cause the carriage to move under electrical power input

3.11

drive unit

the complete assembly comprising an electric motor, brake and gearing, which supplies the tractive and braking effort controlling the movement of the carriage

3.12

driving nut

an internally threaded annular component that acts in conjunction with a driving screw to produce linear motion of the carriage, i.e. a rotating screw engaging with a fixed nut, or vice versa

3.13

driving screw

an externally threaded driving component that acts in conjunction with a driving nut

3.14

duty cycle

the number of journeys the stairlift is required to perform in a given period of time

3.15

final limit safety switch

a terminal electrical safety switch positively and mechanically operated by movement of the carriage

3.16

follow-through

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

3.17

footrest

NOTE Footrests are sometimes referred to as foot-supporting platforms.

a platform or bracket designed so that the passenger is able to stand or to rest his/her feet upon it in complete safety either during movement of the stairlift or when it comes to rest

3.18

guard

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

3.19

hinged bridging platform

a platform attached to the building structure that, when lowered into position, forms a bridge between the upper landing level and the stairlift to facilitate mounting and dismounting by passengers where the stairs turn immediately prior to the top landing

3.20

journey

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

3.21

landing

a defined level to be served by the stairlift having space to permit the manoeuvring, boarding and alighting of passengers with a wheelchair where appropriate

3.22**overspeed governor**

a device which, when the lift attains a predetermined speed, causes the lift to stop by application of the safety gear

3.23**passenger**

the person(s) for whom the stairlift is installed or designed

3.24**pinion**

a wheel, having machine-cut teeth specially designed to engage with those of other similar toothed wheels or racks, used to transmit relative motion

3.25**platform**

a horizontal structure that is part of the carriage and supports a person standing, sitting or in a wheelchair

3.26**powered stairlift**

an appliance that uses an external source of power for transporting a person or person with a wheelchair between two or more levels by means of a guided carriage/platform moving substantially in the direction of a flight of stairs and travelling in the same path in both upward and downward directions

3.27**private dwelling**

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

3.28**rack**

a metal or plastic strip in which have been cut or moulded specially shaped teeth with which a pinion may engage and form a positive driving means converting rotary motion into linear motion

3.29**rail**

metal formed into a section, or arranged to retain and guide the carriage during its motion in the course of its travel over the stairway

3.30**ramp**

a structure or structural member providing an inclined surface connecting one level with another

3.31**rated load**

the load for which the equipment has been built and for which normal operation is guaranteed by the manufacturer or the manufacturer's agent

3.32**rated speed**

the speed of the carriage for which the stairlift has been built and for which normal operation is guaranteed by the manufacturer or the manufacturer's agent

3.33**residential home**

either:

- a) accommodation provided in accordance with Section 21 of the National Assistance Act 1948 [1] or Section 21 and Schedule 8 of the National Health Act 1977 [2], by a local authority with social services responsibilities for, respectively, persons who by reason of age, infirmity or any other circumstances are in need of care and attention not otherwise available to them or the mentally disordered; or
- b) accommodation provided under the Residential Homes Act 1980 [3]

3.34

safety factor

unless defined otherwise in the text, the ratio for a particular member under static conditions of the yield load to the load that can be imposed upon a member by the maximum working load

3.35

safety gear

a mechanical device attached to the carriage to stop and sustain the carriage on the rails in the event of suspension failure

3.36

safety switch

an electrical switch whose contacts open by positive mechanical action and, if need be, by wrenching of the breaking contacts

3.37

sensitive edge

a safety device attached to any edge of the carriage

3.38

sensitive surface

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

3.39

slack rope/chains switch

a switch or combination of switches, arranged to switch off the power supply to the motor and apply the brake if any suspension rope or chain slackens by a predetermined amount

3.40

stairway

any part of a building that provides a route of travel and is formed either by a single flight of stairs or by a combination of two or more flights of stairs and one or more intervening landings

3.41

suspension rope/chain

a rope/chain used to haul the carriage along its rail

3.42

toothed belt

a flexible continuous belt having teeth formed in one or other of its surfaces and designed to engage with specially cut or moulded teeth in wheels attached to separate shafts to provide a drive between the two

4 Information to be agreed and to be documented

4.1 All information in this clause shall be ascertained by the manufacturer, or the manufacturer's agent, from the purchaser (see Annex B).

4.2 The following information shall be fully documented and retained by the manufacturer. Both the definitive requirements specified throughout the standard and the following documented items shall be satisfied before a claim of compliance with the standard can be made and verified.

- a) *Location of stairlift.* Full details of the stairway, each of the landing areas and the expected use of those areas, and nearby doorways or other possible obstructions. In addition, if necessary, details of adjoining rooms or areas and the space above and below the stairs (see **B.3**);
- b) *Building construction.* Details of the building and stairway construction to ensure that adequate fixings can be provided (see **B.3**);
- c) *Passenger.* Details of the nature of the disability, the relevant residual function of the passenger, and the need for personal assistance. In addition, where appropriate, whether a walking aid, wheelchair or other physical assistance is normally necessary to be transported with the passenger;
- d) *Pattern of use* (See **5.1** and **B.2**);
- e) *Electrical power supply.*

NOTE The electrical power supply should be as follows:

- 1) single phase with effective earth connection conforming to BS 7671:1992 or, if necessary, three phase with neutral supply;
- 2) dedicated solely to the stairlift, originating at the household consumer unit and terminating at a double pole (conforming to BS 7671:1992) fused spur in a position recommended by the manufacturer; or
- 3) dedicated from a switched spur unit on a ring main circuit, if the stairlift is battery operated and charged from the mains supply.

5 Design

5.1 Pattern of use

The design of the stairlift shall take account of the use to which it will be subjected, as determined by the manufacturer [see 4.2d)]. Motor and gearbox thermal time ratings shall be not less than 25 %. In addition, the gearbox wear rating shall ensure a minimum life of 100 000 starts and 2 500 h at full load.

NOTE Applications other than private dwellings, may require an increase in the duty cycle and the corresponding need for an improved gearbox wear rating.

5.2 Protection against hazards

Protection shall be incorporated in the stairlift to minimize all of the following hazards:

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

5.3 Design features

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

NOTE Components should be of sound mechanical and electrical construction using materials that are free from obvious defect. The dimensions specified in this standard should be maintained despite wear. The transmission of noise and vibration to any surrounding walls and other supporting structures should be minimized.

5.3.2 Plastics components shall be of flame retardant, self-extinguishing grade material.

NOTE The lift should not be made of materials likely to become dangerous through flammability or through the nature and quantity of gas and fumes they may generate if ignited.

5.4 Maintenance, repair and inspection

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

5.5 Documentation

5.5.1 The manufacturer or the manufacturer's agent shall provide appropriate documentary guidance as outlined in Annex B.

5.5.2 The manufacturer or manufacturer's agent shall provide comprehensive technical literature which shall include the following information as a minimum (see also Annex C):

- a) the name and address of the manufacturer;
- b) full operating instructions;
- c) testing, inspection and servicing recommendations (see clause 7 and C.2);
- d) an electrical wiring diagram showing the electrical connections and components together with all necessary identification markings;
- e) the name and address of persons to contact in the event of an emergency or a breakdown.

6 Technical specification

6.1 General safety factor

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

6.2 Rails

6.2.1 Rails shall be used to retain and guide the carriage, which supports the chair, platform or other purpose-made adaptation for the passenger throughout its travel, whether the travel is horizontal or inclined, straight or curved. Any deflection of the rails or their fixings shall be limited so that no discomfort or danger to the passenger results.

6.2.2 The rails, their attachments and joints shall withstand, without permanent deformation, the maximum forces likely to be imposed during normal usage (see 5.1) of the stairlift and also the additional forces imposed by operation of the safety gear.

6.2.3 The rails shall be fitted with end stops.

6.2.4 The supporting rails shall be securely fixed to the stairs or stairway wall and the fixings shall withstand any of the forces specified in 6.2.2.

6.2.5 Folding rail sections shall not obstruct the stairway or landing when folded.

6.2.6 Manually operated folding rail sections shall be counter-balanced.

6.2.7 A safety switch shall be fitted which, when operated, shall ensure that the stairlift stops at a distance from the folding guide rail section which prevents trapping or crushing, except when the folding section is correctly positioned for the operation of the stairlift.

NOTE On stairlifts with cableless control, the hinged rail position proving switch may act indirectly on the equipment controlling the supply to the driving motor and brake.

6.2.8 A warning label similar to that given in Figure 1 shall be fitted adjacent to the hinged section of rail. The height of the lettering used on the label shall be as specified in Figure 1.

6.2.9 If the folding rail is operated by a motorized drive, the control circuits shall be energized by a voltage of less than 55 V and the motor and control circuits shall be electrically protected. The control system shall operate from constant pressure pushbuttons, but motorized drives shall be capable of manual operation. The drive to the hinged mechanism shall be protected to prevent damage to the mechanism should it encounter an obstruction (e.g. protection by a slipping clutch, overload detector or motor torque limiter).

6.3 Rated speed and rated load

6.3.1 The rated speed of the stairlift shall not exceed 0.15 m/s when measured at the reference points shown in Figure 2, at any point of travel (including travel around a curved section of rail).

6.3.2 Stairlifts shall be designed either for a capacity of one person, for which the rated load shall be not less than 115 kg, or for a capacity of one person in a wheelchair for which the minimum load rating shall be not less than 150 kg.

NOTE Some motorized wheelchairs are of substantial and heavy construction. If the wheelchair weight is not known, or may be subject to change, an increase in the load rating above the minimum figure should be considered.

6.4 Requirements for drive

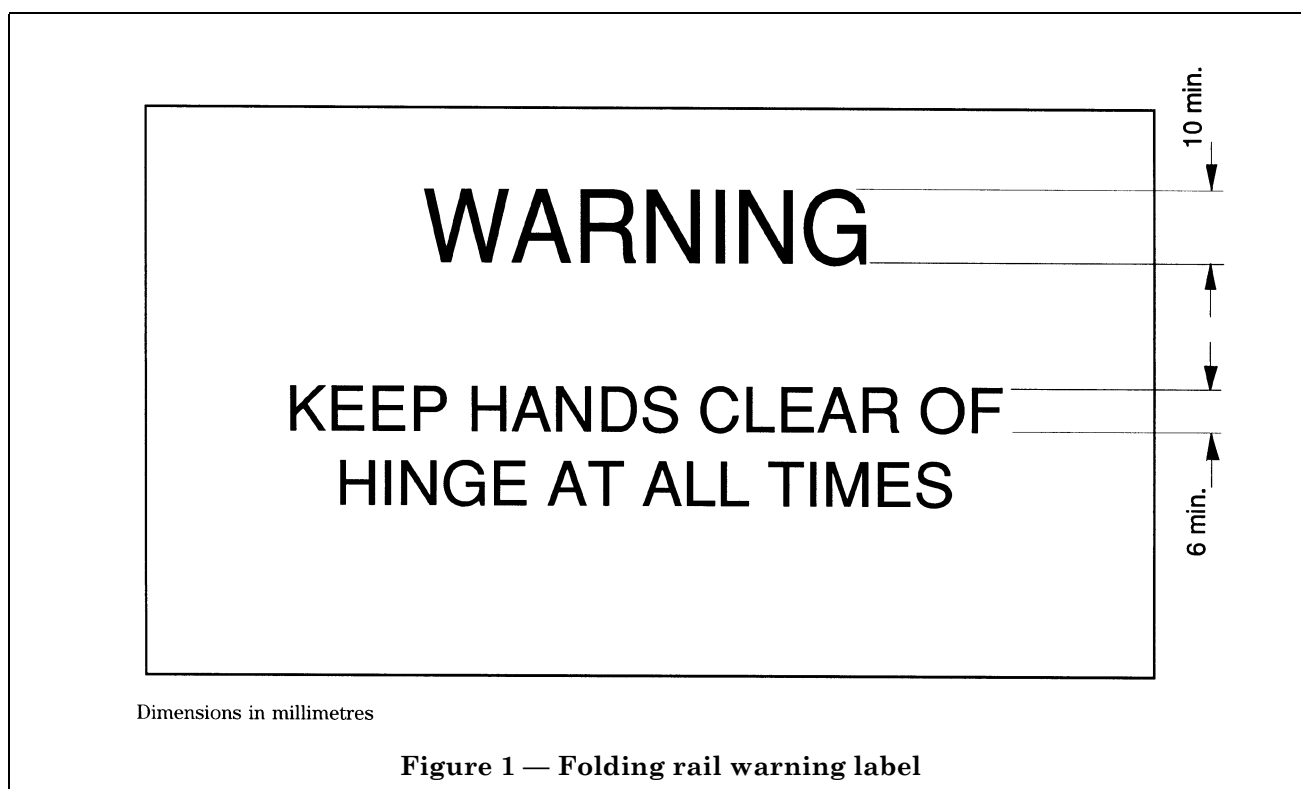
6.4.1 General

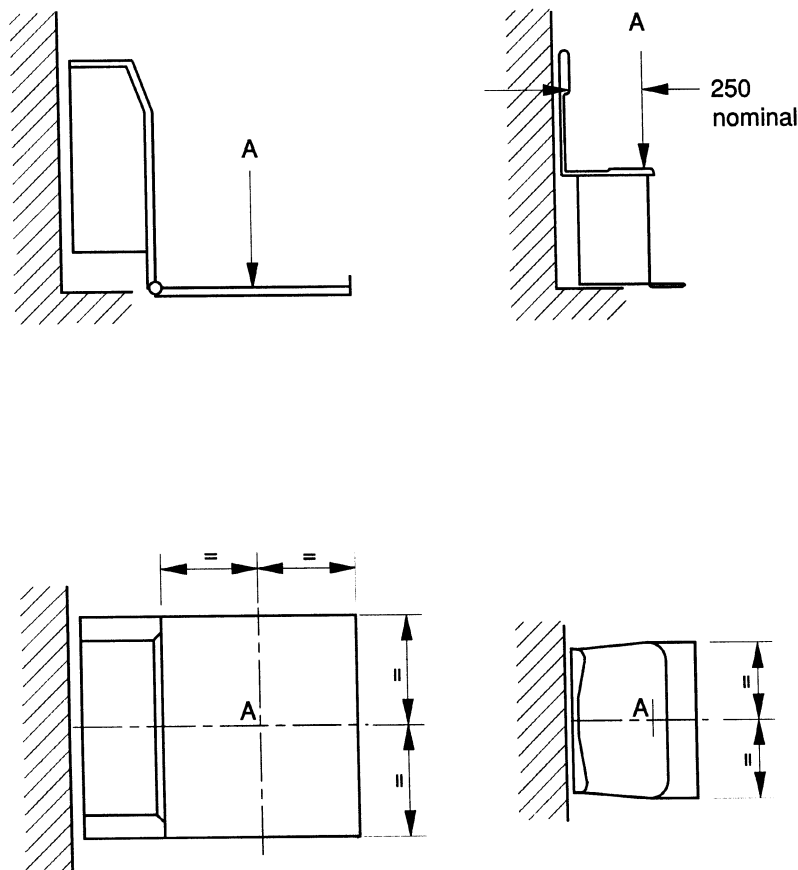
The selected drive shall be in accordance with 6.4.2, 6.4.3, 6.4.4, 6.4.5 and 6.4.6 as appropriate, or shall provide an equivalent level of safety.

6.4.2 Drive units

6.4.2.1 General construction details

All types of drive shall be capable of being powered in both directions.





a) Wheel chair and standing passenger

b) Seated passenger

NOTE 1. Point A is the reference point for speed calculation.

NOTE 2. For stairlifts with combined seated and standing function, use a).

Dimensions in millimetres

Figure 2 — Reference points for measuring rated speed

6.4.2.2 Gearing

The safety factor used in the design of geared drive units shall be based on the static loads imposed by the fully laden carriage on the driving mechanism and shall be not less than 6.

All shouldered shafts shall be provided with fillets.

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

- a) sunk keys;
- b) splines;
- c) any other means that provides an equivalent level of safety.

Friction gearing mechanisms (i.e. drives depending on friction between the surfaces of adjacent pulleys or friction clutches) shall not be used for connecting the main driving unit to the drum, pinion, chainwheel, nut or other final output component. All gearing shall be fully guarded by imperforate material. Gearing on curved rail stairlifts shall be guarded as far as is practicable.

If chain or toothed belt drives are employed, a device incorporating a safety switch shall be provided to break the power supply to the motor and brake control circuits if either the chain or the toothed belt breaks or slackens by a predetermined amount.

6.4.2.3 Braking

The drive unit shall be provided with a brake capable of bringing the carriage smoothly to rest within a distance of 20 mm and holding it firmly in position under maximum load conditions. This brake shall be applied mechanically and held off electrically. The brake shall operate through positive gearing to stop the final output shaft.

Brake linings shall be of asbestos-free material that do not support combustion and shall be so secured to the brake shoes that normal wear will not weaken their fastenings.

When springs are used to apply the brake shoes, such springs shall be in compression and supported.

The brake shall not be released in normal operation unless the power supply is simultaneously applied to the stairlift motor and the brake.

No earth fault or residual magnetism shall prevent the brake from being applied when the power supply to the drive motor is interrupted.

6.4.2.4 Emergency operation

One of the following means shall be provided for moving the carriage in an emergency:

- a) a smooth spokeless wheel for manual operation, any cover of which is to be removable without tools; or
- b) a standby power system for motorized operation. In this case, a safety switch shall be provided to disable the normal controls when the standby power system is engaged.

Where the resisting torque of the brake is too great to be overcome by emergency hand winding, means shall be provided of releasing the brake to ensure that the lowering is under control. Free fall conditions shall not be possible under any circumstances. A toggle, or other device, which could be left in a locked position, shall not be used to hold off the brake.

Instructions shall be prominently displayed stating the following:

- 1) that emergency operation is to be undertaken only in accordance with the correct procedure;
- 2) the correct procedure in step by step detail;
- 3) that the electrical supply is to be switched off and the carriage is to be under constant surveillance whilst in emergency operation.

A direction label, similar to that shown in Figure 3, shall be fitted in a prominent position on the drive unit. The height of the lettering used on the label shall be as specified in Figure 3.

