BRITISH STANDARD

BS 5655-11: 2005

Lifts and service lifts —

Part 11: Code of practice for the undertaking of modifications to existing electric lifts

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Committees responsible for this British Standard

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Consumer Policy Committee of BSI
Department of Trade and Industry — Standards Policy Unit
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Health and Safety Executive
Institution of Electrical Engineers
Institution of Incorporated Engineers
Institution of Mechanical Engineers
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Contents

Foreword

This British Standard has been prepared by Technical Committee MHE/4. It supersedes BS 5655-11:1989, which is withdrawn.

This edition is a full revision of the standard. It introduces editorial and technical changes to bring the standard up-to-date, and takes into account the publication of BS EN 81-1:1998 and other publications in the BS EN 81 series up to October 2005.

This part of BS 5655 makes reference to the requirements specified in other relevant standards.

Attention is drawn to BS EN 81-80. This provides guidance on the progressive improvement to the safety of existing lifts. BS EN 81-80 is the recognized European standard, which represents the considered thinking of a number of European experts, and it has been approved by all the standards institutions (including BSI). It also contains a checklist to enable verification of the current safety level of the installation being considered.

Where a like-for-like replacement of a safety component (see **3.2**) is not possible, attention is drawn to the legal requirement for any replacement component to have CE marking applied to it. A safety component is defined by the Lifts Regulations 1997 [1].

Attention is also drawn to BS 5655-6. Its scope is limited to the installation of new lifts, but its recommendations may be used as guidance when making modifications to existing lift installations.

Attention is drawn to the legal requirement to ensure that when alterations are made to a lift installed after 1 July 1999, the lift continues to conform to the level of safety defined by the Essential Health and Safety Requirements (EHSRs) of the Lift Regulations 1997.

It is important to note any revisions and amendments to BS EN 81-1:1998, for example the Corrigenda dated March 2000 and any published interpretations in DD CEN/TS 81-29.

Attention is drawn to BS 7255, which indicates the environment for safe working on lifts. BS 7255:2001, Annex B offers suggested improvements for consideration by an owner to improve safe working.

Notes and commentaries are provided throughout the text of this standard. Notes give references and additional information that are important but do not form part of the recommendations. Commentaries give background information.

Attention is drawn to the regulations listed in Annex A. This part of BS 5655 is recommended for use alongside these regulations.

Users of this British Standard are reminded that as a code of practice it recommends actions to be taken by all persons involved with lifts: it does not specify requirements for the lifts themselves.

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

It has been assumed in the drafting of this British Standard that the execution of its provisions will be entrusted to appropriately qualified and competent people.

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 does not of itself confer immunity from legal obligations.

Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, pages 1 to 31 and a back cover.

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Introduction

In the UK there are over 200 000 passenger and passenger/goods lifts in service — about 50 % of which were installed before 1979 — and the probability is that these often fail to meet modern safety requirements and standards (see Figure 1).

The most important reason for modifications is to enable owners to continue to fulfil their duty to provide for the safe operation of their lift installation(s). Additional reasons for modifications of a lift can be to:

— change the use of a lift, which might result from a change in use of the building;

— improve reliability;

— update technologically;

— improve traffic handling;

— improve ride quality;

— reduce energy consumption;

— improve the aesthetics.

These types of modification are often termed "modernization".

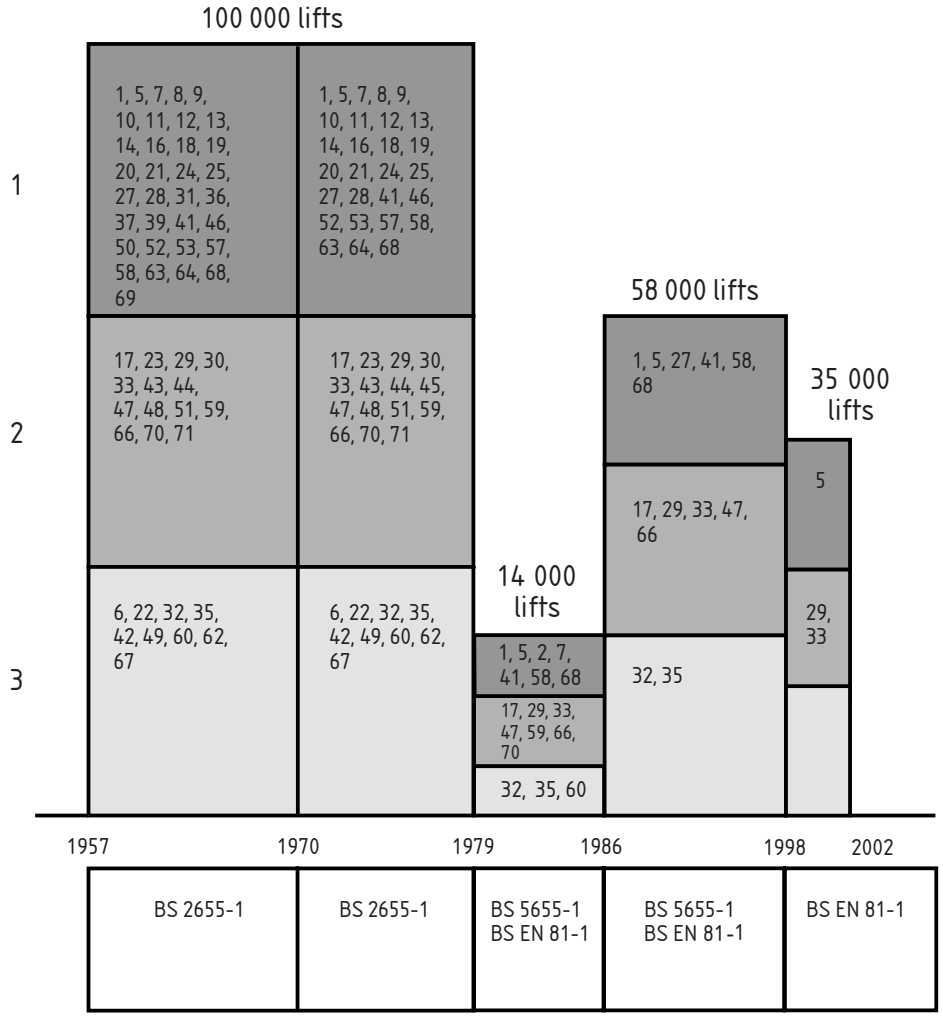
A lift is often refurbished to restore it to, at least, "as good as new condition". Where worn-out equipment and components are simply replaced on a like-for-like basis, this is not considered to be a modification. Some replacements can occur during routine maintenance operations, e.g. the replacement of a burnt-out motor. The status quo of the installation is unchanged and the same level of safety is maintained.

The formulation of a lift upgrading scheme should be undertaken by a person competent to do so in conjunction with the client in order to ensure the client's needs are fully met.

The consequences of a change can depend on a number of factors and each project should be subject to individual risk assessment to identify any issues that should be addressed.

The competent person has a duty to carry out a site-specific risk assessment of the works to be undertaken, in accordance with the Management of Health and Safety at Work Regulations (MHSWA) [2] (see **A.2**). An owner contemplating the modification of a lift is advised to take professional advice.

A lift installed before 1 July 1999, when the Lifts Regulations 1997 came into force, is expected to have been installed in accordance with the safety rules for the construction and installation current at the time it was put into service. The standards could have been to the earlier BS 2655 or BS 5655 series, etc. Some lifts might have been altered from, for example, a BS 2655 standard, to a BS 5655 standard over a period of time. There is no compulsion on an owner to bring a lift up to the latest standard; this is voluntary. However, in the event of an incident it is likely that the owner's attention will be drawn to the best practice contained in the latest safety standards. This situation can be avoided by carrying out a safety audit from time to time and upgrading all lifts to the latest safety standard.



Key

1 High risk

2 Medium risk

3 Low risk

NOTE The numbers indicated refer to the significant hazards identified in BS EN 81-80:2003 and give guidance to those hazards likely to require consideration.

Figure 1 — Number of UK lift installations (approximate)

1 Scope

This part of BS 5655 gives recommendations for the modernization, or modification, and improvement of electric passenger and goods passenger lifts, with traction drive or positive drive, serving defined landing levels, having a car designed for the transportation of persons or persons and goods, suspended by ropes or chains and moving between guide rails inclined not more than 15° to the vertical.

This part of BS 5655 does not cover any of the following types of lift:

a) new lifts (see Note 2);

b) lifting appliances, such as paternosters, mine lifts, theatrical lifts, appliances with automatic caging, skips, lifts and hoists for building and public works sites, ship's hoists, platforms for exploration or drilling at sea, construction and maintenance appliances;

c) installations where the inclination of the guide rails to the vertical exceeds 15°;

d) lifts with drives other than traction drives or positive drives;

e) like-for-like replacement of lift components (see **3.2**);

f) goods only lifts.

NOTE 1 The recommendations in this part of BS 5655 may, however, be used as a basis for modernization or modification of such lifts.

NOTE 2 Where a lift falls into one of the following categories, it is deemed to be a new lift as defined in the Lifts Regulations 1997 [1] and this part of BS 5655 is not applicable:

— dismantled from an existing site and installed at a new site;

— installed where no lift previously existed;

— completely replaced;

— only retains the guide rails.

NOTE 3 In some situations (e.g. potentially explosive atmosphere, extreme climate conditions, vandalism, transporting dangerous goods, etc.), additional measures might need to be taken to those recommended in this part of BS 5655.

2 Normative references

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

BS 7255:2001*, Code of practice for safe working on lifts.*

BS EN 81-1:1998*, Safety rules for the construction and installation of lifts and service lifts — Part 1: Electric lifts.*

BS EN 81-80:2003*, Safety rules for the construction and installation of lifts and service lifts — Part 80: Rules for the improvement of safety of existing passenger and goods passenger lifts.*

BS EN 12015*, Electromagnetic compatibility — Product family standard for lifts, escalators and passenger conveyors — Emission.*

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

3 Terms and definitions

For the purposes of this British Standard, the terms and definitions given in BS EN 81-1 and the following apply.

3.1
drive system
system that controls the movement of a lift in a well

NOTE For electric lifts the drive system comprises the hoist motor, any gear, brake, sheave, pulley, ropes, bearing, bedplate, drive controller and signal interface, etc.

3.2
like-for-like replacement of safety component
replacement of a safety component that is identical to the original component

3.3
machinery space
space(s) inside or outside a well where machinery as a whole or part is placed

3.4
modification
change, alteration, upgrading, modernization of a lift or part of a lift

NOTE See also BS EN 81-1:1998, **E.2**.

3.5
owner
legal entity having right of possession of a lift and responsibility for its safe working

NOTE The natural or legal entity can be the owner, lessee, tenant, operator of the equipment, etc.

3.6
traffic controller
system that allocates landing calls to specific lift(s) and causes the lift(s) to stop in response to car calls

4 General

4.1 Upgrading the safety of existing lifts

When undertaking modifications to an existing lift the first consideration should be the retention of at least the existing level of safety. Under no circumstances should the lift installation be less safe after the modifications have been made.

BS EN 81-80 gives recommendations for improvements to the safety of existing lifts. It is strongly recommended that an audit be carried out in accordance with BS EN 81-80:2003, Annex B before altering any lift installation in order to assess the existing level of safety and determine what changes are necessary to bring the level to today's state of the art. BS EN 81-80:2003, Table 1 provides a numbered list of 74 significant hazards and BS EN 81-80:2003, Table B.2 gives recommendations for risk reduction measures. Annex B in the present part of BS 5655 summarizes the 74 significant hazards.

The results of this audit are expected to give the owner a clear indication of which items are of most concern and the priority in which they should be addressed. The items identified and the means used to address them might be in addition to those given in **5.1**, **5.2**, **5.3**, **5.4**, **5.5**, **5.6**, **5.7**, **5.8**, **5.9**, **5.10**, **5.11**, **5.12**, **5.13**, **5.14**, **5.15** and **5.16**. The relevant hazard reference numbers from BS EN 81-80 are indicated in each subclause of the present standard.

4.2 Risk assessment

Whilst levels of risk can be identified using the audit given in BS EN 81-80:2003, Annex B, this document cannot address all of the potential hazards and hazardous situations that might be encountered on existing lift installations. It is therefore important that each project is subject to an individual site-specific risk assessment to identify any issues that need to be addressed.

NOTE A suitable risk assessment method is given in ISO/TS 14798.

4.3 Upgrading of existing CE marked lifts

When undertaking modifications to an existing CE marked lift it is recommended that the following procedure be adopted.

a) If a lift is modified, a risk assessment should be made of the proposed modifications to ensure that safety is not reduced.

b) A file should be compiled and retained of the modifications made.

c) Prior to putting the lift back into service the replacement components, and all other parts that have been affected, should be tested (see **4.4**).

d) Records of tests before placing into service should be retained.

e) The original CE marking in the lift car should be retained.

f) A permanent notice should be fixed on or in the car stating the date of change and company name.

g) Updated information should be provided to the owner where the change will effect the user or maintenance procedures described in the original owner's manual.

h) A record of the change should be provided for inclusion in the original log book previously issued to the owner when the lift was new.

NOTE Attention is drawn to the Lifts Regulations 1997 [1], Clause **2.2**, in respect of lifts installed after 1 July 1999.

4.4 Tests and records of important modifications

The following are regarded as important modifications:

a) change of:

1) rated speed;

2) rated load;

3) travel (increase);

4) mass;

b) change or replacement of:

1) travel (decrease);

2) control system;

3) type of door (or the addition of one or more landing or car doors);

4) safety component, including:

— overspeed governor;

— ascending car overspeed protection means;

— buffers;

— safety gear;

— type of locking devices (the replacement of a locking device by a device of the same type is not regarded as an important modification);

— electronic safety devices;

5) electric safety devices;

6) machine, brake or traction sheave;

7) car enclosure;

8) door operator;

9) guide rails or the type of guide rails.

Where any changes listed in a) are made, a full test of the complete lift installation should be carried out. Where any of the changes or replacements listed in b) are made, there might be consequential changes. It is essential that tests be conducted to ensure that the main changes and any consequential changes result in a safe installation.

NOTE The tests given in BS 5655-10.1.1 and PAS 32-1 are deemed to be suitable.

A record can be made using either BS 5655-10.1.1 or PAS 32-1, or a combination of the appropriate parts of these documents, depending on when the lift installation was first put into service.

5 Modification to existing lifts

5.1 Change of rated speed

COMMENTARY ON **5.1**. *A change in rated speed is any increase of speed greater than 5 %, or decrease in speed greater than 8 %. This range is given in BS EN 81-1:1998,* ***12.6*** *as the tolerance permitted under various operating conditions. An increase in rated speed can occur where it is desired to improve performance. A decrease in rated speed can occur for a number of reasons, e.g. change of use from passenger to goods service. The change of rated speed is regarded as an important modification, and tests and records are necessary (see* ***4.4****). Hazards and/or hazardous situations indicated in BS EN 81-80 that are relevant to this subclause are identified in Annex A, Table B.1, numbers 3, 6 to 18, 19 to 24, 40, 47 to 53, 60, 62 to 64, 66 to 72, and 74.*

The following non-exhaustive list of recommendations should be met when changing the rated speed, as this change has an effect on many of the items concerning the safety of the lift installation.

a) The dimensions at the well ceiling and pit should be checked (BS EN 81-1:1998, Clause **5**), in order to ensure that adequate dimensions and safety spaces are provided. Where this is not possible existing safety spaces should not be reduced and an alternative means should be provided to give refuge spaces.

NOTE 1 Where neither of the above can be achieved the rated speed should not be changed.

NOTE 2 Attention is drawn to the Lifts Regulations 1997 [1], Clause **2.2**, in respect of lifts installed after 1 July 1999.

b) The overspeed governor and any ascending car overspeed protection device (BS EN 81-1:1998, **9.10**) should be checked to ensure that it suits the change of rated speed.

c) The suspension (BS EN 81-1:1998, **9.1**), and traction (BS EN 81-1:1998, **9.3**), safety gear (BS EN 81-1:1998, **9.8**), tripping means for safety gears (BS EN 81-1:1998, **9.9**), buffers (BS EN 81-1:1998, **10.3** and **10.4**), guidance system (BS EN 81-1:1998, **10.2**), etc. should be checked to ensure that they are operating within their safe working limits.

d) The limits of the unlocking zone (BS EN 81-1:1998, **7.7.1**), power supply and switchgear (BS EN 81-1:1998, Clause **13**), inspection speed (BS EN 81-1:1998, **14.2.1.3**) and security of the counterweight/balancing weights (BS EN 81-1:1998, **8.18**) should be checked and appropriate measures taken where necessary.

e) The safe working spaces and equipment clearances (BS EN 81-1:1998, Clause **6**) should be maintained, when new equipment is installed into the machine room.

A change of rated speed might necessitate a change of all or part of the drive system (BS EN 81-1:1998, Clause **12**) (see **5.12**).

NOTE 3 For electric lifts the drive system comprises the hoist motor, any gear, brake, sheave, pulley, ropes, bearing, bedplate, drive controller and signal interface, etc.

5.2 Change of rated load

COMMENTARY ON **5.2**. *A change in rated load is a change greater than 5 %, or 75 kg (whichever is the greater). See* ***5.4*** *for a change of suspended mass. A change in rated load can occur as the result of a need to transport heavier loads or can result from changes to the available size of the platform area of the car (see* ***5.13****). The change of rated load is regarded as an important modification, and tests and records are necessary (see* ***4.4****). Hazards or hazardous situations indicated in BS EN 81-80 that are relevant to this subclause are identified in Annex B, Table B.1, numbers 38 to 46, 50 to 53, 55 to 57, 60, 66, 70, 73 and 74.*

The following non-exhaustive list of recommendations should be met when changing the rated load, as this change has an effect on many of the items concerning the safety of the lift installation.

a) Verification should be carried out to ensure that the well structure (BS EN 81-1:1998, Clause **5**) is capable of supporting any increase in load, resulting from the forces transmitted through the lift equipment to the building structure.

b) The suitability of the drive supports, guide rail fixings, buffer supports, etc. (BS EN 81-1:1998, Clause **10**) should be checked.

c) The suspension (BS EN 81-1:1998, **9.1**) and traction (BS EN 81-1:1998, **9.3**), safety gear (BS EN 81-1:1998, **9.8**) and governor (BS EN 81-1:1998, **9.9**), buffers (BS EN 81-1:1998, **10.3** and **10.4**), guidance system (BS EN 81-1:1998, **10.2**), drive system (BS EN 81-1:1998, Clause **12**), etc. should be checked, in order to ensure that they are operating within their safe working limits.

d) The available car area and the new rated load should conform to BS EN 81-1:1998, Clause **8** and Table 1. The load plate (BS EN 81-1:1998, Clause **15**) should be changed to reflect the new rated load.

e) The safe working spaces and equipment clearances (BS EN 81-1:1998, Clause **6**) should be maintained, when new equipment is installed into the machine room.

A change of rated load might necessitate a change of all or part of the drive system (BS EN 81-1:1998, Clause **12**) (see **5.12**).

NOTE For electric lifts the drive system comprises the hoist motor, any gear, brake, sheave, pulley, ropes, bearing, bedplate, drive controller and signal interface, etc.

5.3 Change of travel

COMMENTARY ON **5.3**. *A change of travel is any increase or decrease of the travel distance between the highest and lowest finished floor levels. See **5.9** for the provision of additional entrances. No tolerance can be permitted as even a small change in travel can cause refuge spaces and over-travel distances to be insufficient. A change in travel can occur where a lowest, or highest, finished floor level is raised, e.g. to accommodate a suspended floor, or lowered, e.g. to accommodate access for persons with disabilities. A change in travel can also occur where higher or lower floors are no longer served, e.g. service to a basement level is no longer required or higher floors are removed from a traffic zone. The change of travel is regarded as an important modification, and tests and records are necessary (see **4.4**). Hazards or hazardous situations indicated in BS EN 81-80 that are relevant to this subclause are identified in Annex B, Table B.1, numbers 6 to 37, 40 and 66.*

5.3.1 *General*

The following non-exhaustive list of recommendations should be met when changing the travel, as this change has an effect on many of the items concerning the safety of the lift installation.

a) The dimensions at the well ceiling and pit should be checked (BS EN 81-1:1998, Clause **5**), in order to ensure that adequate dimensions and safety spaces are provided. Where this is not possible existing safety spaces should not be reduced and an alternative means should be provided to give refuge spaces.

NOTE 1 Where neither of the above can be achieved the travel should not be changed.

NOTE 2 Attention is drawn to the Lifts Regulations 1997 [1], Clause **2.2**, in respect of lifts installed after 1 July 1999.

b) The system of guiding (BS EN 81-1:1998, **10.2**) (which might need extension/reduction) and the suspension system and traction (BS EN 81-1:1998, **9.1** to **9.6**) should be checked and appropriate measures taken where necessary.

c) The final limit switches should be repositioned (BS EN 81-1:1998, **10.5**).

d) Any changes to the wiring (BS EN 81-1:1998, Clause **13**) should be checked.

e) Arrangements for access (BS EN 81-1:1998, **5.2.2** and **5.7.3.2**) and rescue (BS EN 81-1:1998, **5.10**) should be made.

f) The machine room and any pulley room might need to be re-located and all changes should conform to the requirements of BS EN 81-1:1998, Clause **6**.

g) The structural and fire integrity of the well should be maintained (BS EN 81-1:1998, **5.3**).

5.3.2 *Reducing travel*

In addition to the recommendations given in **5.3.1**, where the lowest floor, or floors, are no longer to be served then the following non-exhaustive list of recommendations should also be met.

a) Where a pit depth greater than 2.5 m is created, a work platform should be provided as a means of safe access to the underside of the car.

b) The means of buffering should be repositioned above the work platform maintaining the structural integrity of the buffer support and the maintenance of adequate clearances.

c) If pit equipment is to be retained in its original position, safe means of access and rescue to it should be provided.

NOTE 1 This access may be by means of the original landing entrance(s), if available, or the provision of an access trap/door.

d) Any accessible areas under any new pit floor should be protected (BS EN 81-1:1998, **5.5**).

e) Stopping devices and lighting switches should be added or relocated where necessary.

In addition to the recommendations given in **5.3.1**, where the highest floor or floors are no longer to be served and where equipment is retained at the well ceiling then attention should be given to arrangements for access for maintenance (BS EN 81-1:1998, **5.7.3.2**) and rescue (BS EN 81-1:1998, **5.10**) in order to permit work activities to be safely carried out.

NOTE 2 This may be by means of the original landing entrance(s), if available, or the provision of an access trap/door.

5.3.3 *Increasing travel*

In addition to the recommendations given in **5.3.1**, where the highest floor level is raised or the lowest floor level is lowered then a check should be made that the buffering characteristics are maintained (BS EN 81-1:1998, **10.4**).

5.4 Change of mass of empty car or suspended mass

COMMENTARY ON **5.4**. *A change of mass of empty car or suspended mass is any increase, or decrease, greater than 5 %. A change in suspended or driven mass can occur as the result of a larger or smaller car being installed, changes to the linings (car refurbishment), changes to the car doors/operators (manual to power doors, adding car doors, change of operator type), addition or changes of other equipment, and attachments carried on the car (car top balustrades, guarding, canopies, traps, etc.). Changes to the mass of the empty car or suspended mass have similar effects to changing the rated load (see **5.2**). The change of the mass of empty car or suspended mass is regarded as an important modification, and tests and records are necessary (see **4.4**). Hazards or hazardous situations indicated in BS EN 81-80 that are relevant to this subclause are identified in Annex B, Table B.1, numbers 38 to 46, 50 to 53, 55 to 57, 60, 66, 70, 73 and 74.*

The following non-exhaustive list of recommendations should be met when changing the mass, as this change has an effect on many of the items concerning the safety of the lift installation.

a) Verification should be made that the well structure (BS EN 81-1:1998, Clause **5**) is capable of supporting any increase in load, resulting from the forces transmitted through the lift equipment to the building structure.

b) The suitability of the guidance system (BS EN 81-1:1998, **10.2**), drive supports, guide rail fixings (BS EN 81-1:1998, **10.1**), buffers and buffer supports (BS EN 81-1:1998, **10.3** and **10.4**), car frame (BS EN 81-1: 1998, **8.3**), etc. should be checked.

c) The suspension (BS EN 81-1:1998, **9.1**) and traction (BS EN 81-1:1998, **9.3**), counter-weighting (BS EN 81-1:1998, **8.18**) and car balancing should be checked, in order to ensure that they are operating within their safe working limits.

d) The safety gear (BS EN 81-1:1998, **9.8**) and governor (BS EN 81-1:1998, **9.9**) and any ascending car overspeed protection (BS EN 81-1:1998, **9.10**) should be checked, to ensure that they are suitable for the change of mass.

e) The drive system (BS EN 81-1:1998, Clause **12**) should be checked to ensure that it is sized to meet the change in mass.

5.5 Change of complete controller including door operations

COMMENTARY ON **5.5**. *A complete controller can comprise the drive controller, the traffic controller and the door operator.*

When changing the complete controller, the recommendations given in the following subclauses should be taken into account:

a) drive controller (see **5.6**);

b) traffic controller (see **5.7**);

c) door operator (see **5.14**).

5.6 Change of drive controller

COMMENTARY ON **5.6**. *The drive controller (sometimes called motion control) is the system controlling and monitoring the running of the lift machine (but not door operations, see **5.14**) (see BS 5655-6:2002, **9.2**). A change in the drive controller might be required to improve the ride comfort to passengers, improve passenger handling, improve the accuracy of floor levelling, reduce the number of breakdowns, reduce energy consumption, or provide a greater level of safety to the operation of the lift. A new motor might be required to match the drive technology employed (see BS 5655-6:2002, **9.2**). For a change of the lift machine only, see **5.12**. The change of the drive controller is regarded as an important modification, and tests and records are necessary (see **4.4**). Hazards or hazardous situations indicated in BS EN 81-80 that are relevant to this subclause are identified in Annex B, Table B.1, numbers 53, 60, 62 to 64, 66 to 69, and 74.*

The following non-exhaustive list of recommendations should be met when changing the drive controller, as this change has an effect on many of the items concerning the safety of the lift installation.

a) Where the new control equipment is placed within a new cabinet or an existing cabinet it should be properly earthed to the existing equipment (BS EN 81-1:1998, Clause **13**) and the integrity of the earthing system verified.

b) The wiring and earthing of retained components should be verified to ensure continued suitability.

c) Sufficient working space should be provided in front and (if necessary) at the rear of the cabinet and the new cabinet should not reduce the dimensions to adjacent machinery to an unsafe level (BS EN 81-1:1998, **6.3.2**).

d) The rated voltage and current of the new equipment should match the existing equipment supply (BS EN 81-1:1998, Clause **12**) and the output voltages and currents from the new equipment should interface with the existing motor, brake and other devices.

e) Electromagnetic compatibility precautions should be carried out in accordance with BS EN 12015 and BS EN 12016.

f) Measures should be taken to prevent inadvertent contact with live conductors. Appropriate hazard and warning signs should be prominently displayed. Particular attention should be paid to parts of the common control equipment that might remain live after the isolation of individual lifts.

g) The power supply should be able to handle any new power demand created by an increase in acceleration value or other characteristics. Verification should be made that the supply can meet the demands of the lift in respect of full load current, starting current, voltage drop, diversity factor, phasing, current overload discrimination, prospective short circuit current, etc.

h) The floor approach speed of the lift should match the door zone settings of the control system (see **5.1**).

i) The lift should be tested with a load to ensure that it operates at the correct speed, slows and stops in a safe manner and has all its safety circuits fully working (BS EN 81-1:1998, **D.2**).

j) To ensure safe operation, any new inspection control should conform to BS EN 81-1:1998, **14.2.1.3** and take account of the recommendations given in BS 7255.

NOTE Where no or inadequate inspection control exists, it is advisable to provide one.

k) The ventilation of the area containing the equipment should be checked to ensure that it is suitable for the heat output of the new equipment (BS EN 81-1:1998, **6.3.5**).

l) Checks should be made that any auxiliary supplies (BS EN 81-1:1998, **13.4.1**), e.g. fans, shaft lighting, etc. are identified and that adequate protection to inadvertent contact is provided.

5.7 Change of traffic controller

COMMENTARY ON **5.7**. *The traffic controller supervises and distributes landing and car calls to specific lift car(s) in order to handle the calls in an efficient manner (see BS 5655-6:2002, Clause* ***7****). A change of traffic controller might be required to reduce passenger waiting and journey times, increase the number of passengers served, provide special features to increase accessibility for disabled persons, reduce lift group failures by the replacement of relays with solid state technology, improve the behaviour of the lift in the event of fire, reduce any risks owing to the poor condition of wiring, etc. The change of this control system is regarded as an important modification, and tests and records are necessary (see* ***4.4****). Hazards or hazardous situations indicated in BS EN 81-80 that are relevant to this subclause are identified in Annex B, Table B.1, numbers 23, 66, 68 and 74.*

The following non-exhaustive list of recommendations should be met when changing the traffic controller, as this change has an effect on many of the items concerning the safety of the lift installation.

a) Where the new control equipment is placed within a new or existing cabinet it should be properly earthed to the existing equipment (BS EN 81-1:1998, Clause **13**) and the integrity of the earthing system verified.

b) The wiring and earthing of retained components should be verified to ensure continued suitability.

c) Sufficient working space should be provided in front and (if necessary) at the rear of the cabinet, and any new cabinet(s) should not reduce the dimensions to adjacent machinery to an unsafe level (BS EN 81-1:1998, **6.3.2**).

d) The rated voltage and current of the new equipment should match the existing equipment supply (BS EN 81-1:1998, Clause **12**) and the output voltages and currents from the new equipment should interface with existing fixtures and control equipment.

e) Electromagnetic compatibility precautions should be carried out in accordance with BS EN 12015 and BS EN 12016.

f) Measures should be taken to prevent inadvertent contact with live conductors. Appropriate hazard and warning signs should be prominently displayed. Particular attention should be paid to parts of the common control equipment that might remain live after the isolation of individual lifts.

g) The ventilation of the area containing the equipment should be checked to ensure that it is suitable for the heat output of the new equipment (BS EN 81-1:1998, **6.3.5**).

h) Checks should be made that any auxiliary supplies (BS EN 81-1:1998, **13.4.1**), e.g. fans, shaft lighting, etc., are identified and adequate protection to inadvertent contact provided.

5.8 Change from manual to power-operated doors

COMMENTARY ON **5.8**. *This change involves the addition of powered devices to drive (operate) the car and/or the landing doors (BS EN 81-1:1998, Clause* ***7*** *and Clause* ***8****). A change from manual to power-operated doors might be required to improve the service to the passengers (traffic handling) or to reduce the burden on passengers to open and close the doors by hand, e.g. to assist persons with disabilities. The change of the door type is regarded as an important modification, and tests and records are necessary (see* ***4.4****). Hazards or hazardous situations indicated in BS EN 81-80 that are relevant to this subclause are identified in Annex B, Table B.1, numbers 4, 6 to 18, 25 to 44, 58, 59, 66, 68 and 70.*

The following non-exhaustive list of recommendations should be met when changing from manual to power-operated doors, as this change has an effect on many of the items concerning the safety of the lift installation.

a) The well structure (BS EN 81-1:1998, Clause **5**) should be checked to allow adequate clearances (BS EN 81-1:1998, Clause **11**) to be maintained and to ensure that the addition of a powered device does not create a hazard on the car roof (BS EN 81-1:1998, **5.7.1.1**) or in the pit (BS EN 81-1:1998, **5.7.3.3**).

b) The fitting of power operation to the doors can change the mass of the car (see **5.4**) (BS EN 81-1:1998, Clause **8**), and the capability of the drive system (BS EN 81-1:1998, Clause **12**) and the traction (BS EN 81-1:1998, Clause **9**) should be checked.

c) Where power-operated doors with glass panels are fitted, means should be provided to avoid the dragging of children's hands (BS EN 81-1:1998, **7.2.3.6**).

d) Where powered operation is fitted to a car door with a swing manual landing door, which is not coupled, the landing door should not be unlocked until the car door is fully open and the car door should not close until the landing door is fully closed.

e) Adequate protection should be provided to protect against electric shock (BS EN 81-1:1998, **13.5.3.2** and **13.5.3.5**).

f) To ensure safe operation any new horizontal sliding power-operated doors should meet the dynamic requirements of BS EN 81-1:1998, **8.7.2.1.1** and a device should be fitted to automatically initiate reopening in the event of a person being struck. To assist persons with disabilities this device should be a non-contact device.

g) Powered door operators should not normally be fitted to open existing manual lattice gates or shutter gates.

NOTE Powered door operation of lattice gates can be dangerous, unless the door operator is especially designed for this purpose.

h) The required fire integrity of the landing entrance (BS EN 81-1:1998, **7.2.2**) should be maintained.

i) The operation of vertical sliding doors should conform to BS EN 81-1:1998, **8.7.2.2**.

The change of manual to power operation of the doors requires the provision of suitable wiring and control (see **5.14**).

5.9 Change of address

5.9.1 *Alteration to existing landing entrances*

COMMENTARY ON **5.9.1**. *Alterations to the landing entrances occur when they are refurbished by the addition of new panel skins or when they are completely replaced by different components not of the same specification as the original, e.g. heavier. The type of operation, manual or powered, is not changed (see **5.8**). Hazards or hazardous situations indicated in BS EN 81-80 that are relevant to this subclause are identified in Annex B, Table B.1, numbers 6 to 18, 25 to 37, 58, 59, 66 and 74.*

NOTE 1 Consideration should be given to upgrading the locking system in accordance with BS EN 81-1.

The following non-exhaustive list of recommendations should be met when altering existing landing entrances, as this change has an effect on many of the items concerning the safety of the lift installation.

a) All changes should conform to the requirements of BS EN 81-1:1998, Clause **7**.

b) When landing door panels are altered, replaced or refurbished a check should be made that the fire integrity (BS EN 81-1:1998, **7.2.2**) is maintained.

NOTE 2 This might necessitate referral to the appropriate fire test authority to ensure that the fire certification remains valid.

c) Any new rollers, shoes, etc. that are provided should be checked to ensure that they are of adequate strength for the environment and anticipated usage.

5.9.2 *Change in the number of landing entrances*

COMMENTARY ON **5.9.2**. *This change involves the provision of additional entrances or the reduction in the number of entrances (see **5.3** for change of travel). Additional landing entrances might be required where an existing lift does not serve all floors throughout its existing travel, e.g. skip/stop arrangements, or where a mezzanine floor is introduced. There might also be occasions when entrances are to removed, e.g. at the extremes of travel. The change of the number of landing entrances is regarded as an important modification, and tests and records are necessary (see **4.4**). Hazards or hazardous situations indicated in BS EN 81-80 that are relevant to this subclause are identified in Annex B, Table B.1, numbers 6 to 18, 25 to 37, 50 to 53, 58, 59, 66, 73 and 74.*

The following non-exhaustive list of recommendations should be met when changing the number of entrances, as this change has an effect on many of the items concerning the safety of the lift installation.

a) A check should be made that the structural integrity (BS EN 81-1:1998, **5.3**) and fire integrity (BS EN 81-1:1998, **7.2.2**) of the well are maintained.

b) A check should be made that the necessary clearances between the car doors, landing doors and well structure (BS EN 81-1:1998, Clause **11**) are maintained.

c) The landing and car controls should be installed or removed as appropriate.

d) A check should be made that the safe working spaces on the car roof (BS EN 81-1:1998, **5.7.1.1**) and in the pit (BS EN 81-1:1998, **5.7.3.3**) are maintained.

e) All new landing doors (BS EN 81-1:1998, Clause **7**) that are added should be compatible with the existing car door operation.

NOTE 1 Attention is drawn to the Lifts Regulations 1997 [1] in respect of the requirement for new locks for doors to be of a CE-type-tested design.

NOTE 2 The introduction of a new entrance can result in an incompatibility with the existing car door coupling mechanism (see **5.10.1**). This might necessitate the replacement of the locks at all the other entrances. It is not acceptable to supply a new lock of a non-type-tested design at the new entrance.

f) Where an entrance is removed at the terminal floors this becomes a change of travel and the recommendations given in **5.3** should be met.

5.9.3 *Addition of car entrances*

COMMENTARY on **5.9.3**. *An additional car entrance may be added to service landings at the rear or side of the well. Hazards or hazardous situations indicated in BS EN 81-80 that are relevant to this subclause are identified in Annex B, Table B.1, numbers 25, 27, 28, 30, 33, 37, 58 and 59.*

The following non-exhaustive list of recommendations should be met when adding car entrances, as this change has an effect on many of the items concerning the safety of the lift installation.

a) If there is a change in the suspended mass, the recommendations given in **5.4** should be met.

b) If the floor area/rated load ratio changes, the recommendations given in **5.2** should be met.

c) If there are hazards present on the car top, additional stopping devices should be provided as necessary [BS EN 81-1:1998, **8.15**b)].

d) The structural integrity and strength of the car (BS EN 81-1:1998, **8.3**) should be maintained.

e) All refuge spaces and clear working areas should be maintained (BS EN 81-1:1998, **5.7.1**, **5.7.2** and **8.13.2**).

5.10 Change of a safety component

NOTE Attention is drawn to the Lifts Regulations 1997 [1] in respect of CE marking and type certification of safety components. Requirements for safety components, e.g. landing door locking devices, safety gear, overspeed governors, buffers, electronic safety circuit components and ascending car overspeed protection, are given in BS EN 81-1:1998, Annex F.

5.10.1 *Landing door locking devices*

COMMENTARY ON **5.10.1**. *Landing door locking devices can be changed or replaced by a more modern device, as the result of the unavailability of an identical equipment. New landing door locking devices might be fitted as the result of a change in the number of entrances (see **5.9**). The changing, replacing or adding of landing door locking devices is regarded as an important modification, and tests and records are necessary (see **4.4**). Hazards or hazardous situations indicated in BS EN 81-80 that are relevant to this subclause are identified in Annex B, Table B.1, numbers 1, 4, 29 to 37, 40, 58 and 59.*

NOTE 1 A landing door locking device includes all components that take part in the mechanical locking and the proof of the locking of the landing doors.

The following non-exhaustive list of recommendations should be met when changing the landing door locking device, as this change has an effect on many of the items concerning the safety of the lift installation.

a) Landing door locking devices should conform to BS EN 81-1:1998, **7.7**.

NOTE 2 The replacement of landing door locking device by a device of the same type is not regarded as an important modification [see BS EN 81-1:1998, **E.2**b), first indent].

b) The fire integrity of the landing door (BS EN 81-1:1998, **7.2.2**) and associated equipments should be maintained.

c) When landing door locking devices are altered, replaced or refurbished a check should be made that the fire integrity is maintained.

NOTE 3 This might require referral to the appropriate fire test authority to ensure that the fire certification remains valid.

5.10.2 ***Safety gear***

COMMENTARY ON **5.10.2**. *Safety gear can be of an instantaneous or progressive type. It should be fitted to all cars and may be fitted to counterweight or balancing weights. The selection of the appropriate type is dependent on the suspended mass, rated load and speed of the lift. A change of safety gear can require a change of the overspeed governor (see **5.10.3**). The changing, replacing or adding of safety gear is regarded as an important modification, and tests and records are necessary (see **4.4**). Hazards or hazardous situations indicated in BS EN 81-80 that are relevant to this subclause are identified in Annex B, Table B.1, numbers 1, 10, and 50a or 50b.*

The following non-exhaustive list of recommendations should be met when changing the safety gear, as this change has an effect on many of the items concerning the safety of the lift installation.

a) The safety gear should conform to BS EN 81-1:1998, **9.8**.

b) Particular care should be taken to ensure that the replacement safety gear is sized to absorb the energy presented at the moment of engagement (BS EN 81-1:1998, **F.3.2.4.1**).

c) A change of safety gear should retain compatibility with its associated safety system (governor, governor rope, release mechanism, methods of tripping, tension weight etc.) (see **5.10.3**).

d) Checks should be made to verify the soundness of the safety gear mountings.

e) Checks should be made to verify that the complete assembly, comprising the car, car/counterweight frame, safety gear, guide rails, their surface finishes and their fixings, matches the replacement safety gear.

5.10.3 ***Overspeed governors***

COMMENTARY ON **5.10.3**. *The changing, replacing or adding of an overspeed governor is regarded as an important modification, and tests and records are necessary (see **4.4**). Hazards or hazardous situations indicated in BS EN 81-80 that are relevant to this subclause are identified in Annex B, Table B.1, numbers 1, and 50a or 50b.*

The following non-exhaustive list of recommendations should be met when changing the overspeed governor, as this change has an effect on many of the items concerning the safety of the lift installation.

a) The overspeed governor should conform to BS EN 81-1:1998, **9.9**.

b) Particular care should be taken to ensure that the replacement overspeed governor is calibrated for the rated speed of the lift.

c) Checks should be made to ensure that an appropriate location is selected for the overspeed governor, particularly when this location is changed, for example, from the well to a machine space.

d) A change of overspeed governor should retain compatibility with its associated safety system (governor, governor rope, release mechanism, methods of tripping, tension weight, etc.) (see **5.10.2**).

e) In the event of re-location sufficient working space should be maintained to any adjacent machinery (BS EN 81-1:1998, **6.3.2**).

5.10.4 ***Buffers***

COMMENTARY TO **5.10.4**. *Buffers can be of energy accumulation or energy dissipation types and their selection is dependent on the rated speed of the lift. The changing, replacing or adding of buffers is regarded as an important modification, and tests and records are necessary (see **4.4**). Hazards or hazardous situations indicated in BS EN 81-80 that are relevant to this subclause are identified in Annex B, Table B.1, numbers 14 to 18, 56 and 57.*

NOTE Attention is drawn to the fact that polymer buffers have a limited life.

The following non-exhaustive list of recommendations should be met when changing the buffers, as this change has an effect on many of the items concerning the safety of the lift installation.

a) The buffers should conform to BS EN 81-1:1998, **10.3** and **10.4**.

b) Particular care should be taken to ensure the replacement buffers are sized to meet the maximum impact speed and can accommodate the minimum and maximum masses likely to be applied (BS EN 81-1:1998, **5.3.2**).

c) Where buffers are moved or placed on a pedestal in a deep pit, the supporting structure should be adequate to bear the loads to be applied (BS EN 81-1:1998, **5.3.2**).

d) Adequate clearances between existing equipment and all refuge spaces (BS EN 81-1:1998, **5.7.3**) should be maintained.

5.10.5 ***Electronic safety devices in the form of safety circuits containing electronic components***

COMMENTARY ON **5.10.5**. *Electronic safety devices, replacing the functions of devices listed in BS EN 81-1:1998, Annex A, are required to bear CE marking and to be type tested in accordance with the Lift Regulations 1997 [1] or BS EN 81-1:1998. They are likely to be part of another change (see **5.5**, **5.6** and **5.12**).*

Electronic safety devices in the form of safety circuits containing electronic components should conform to the requirements of BS EN 81-1:1998, Clause **14**, **F.6** and Annex H.

5.10.6 ***Ascending car overspeed protection***

COMMENTARY ON **5.10.6**. *Ascending car overspeed protection comprises speed monitoring and speed reducing elements and was first required by the Lift Regulations 1997 [1]. The changing, replacing or adding of ascending car overspeed protection is regarded as an important modification, and tests and records are necessary (see **4.4**). Hazards or hazardous situations indicated in BS EN81-80 that are relevant to this subclause are identified in Annex B, Table B.1, numbers 10, 50a or 50b, and 52.*

The following non-exhaustive list of recommendations should be met when changing or adding ascending car overspeed protection, as this change has an effect on many of the items concerning the safety of the lift installation.

a) Ascending car overspeed protection equipment should conform to BS EN 81-1:1998, **9.10**.

b) Where ascending car overspeed protection equipment is fitted to existing lifts, particular care should be taken to ensure that such equipment can be properly integrated.

c) Checks should be made to ensure that the car/counterweight frame, building structure and guidance system can sustain any upward or downward reaction on the application of the ascending car overspeed protection.

5.11 Change of electric safety devices

NOTE Electric safety devices are one of the 43 electric safety devices listed in BS EN 81-1:1998, Annex A.

5.11.1 ***Electric safety devices — manually operated***

COMMENTARY ON **5.11.1**. *The changing or adding of manually operated electric safety devices is regarded as an important modification, and tests and records are necessary (see **4.4**). Hazards or hazardous situations indicated in BS EN 81-80 that are relevant to this subclause are identified in Annex B, Table B.1, numbers 16, 70a and 70b.*

The following non-exhaustive list of recommendations should be met when changing manually operated electric safety devices, as this change has an effect on many of the items concerning the safety of the lift installation.

a) Manually operated electric safety devices should conform to BS EN 81-1:1998, **14.1.2** and **14.2.2**.

b) The location and specific properties of manually operated electric safety devices should conform to the relevant clauses listed in BS EN 81-1:1998, Annex A.

c) All stopping devices should be bi-stable and protected to prevent involuntary release (BS EN 81-1:1998, **14.2.2.2**).

NOTE Guidance on the physical arrangements for a "stop" button is given in BS 7255:2001, **C.4.8**a) to **C.4.8**f).

5.11.2 *Electric safety devices — non-manually operated*

COMMENTARY ON **5.11.2**. *The changing, replacing or adding of non-manually operated electric safety devices is regarded as an important modification, and tests and records are necessary (see **4.4**). Hazards or hazardous situations indicated in BS EN 81-80 that are relevant to this subclause are identified in Annex B, Table B.1, numbers 8, 31, 41, 51, 57 and 63.*

The following non-exhaustive list of recommendations should be met when changing monitoring electric safety devices, as this change has an effect on many of the items concerning the safety of the lift installation.

a) Non-manually operated electric safety devices should conform to BS EN 81-1:1998, **14.1.2**.

b) The specific properties of non-manually operated electric safety devices should conform to the relevant clauses listed in BS EN 81-1:1998, Annex A.

5.12 Change of the drive components

COMMENTARY ON **5.12**. *This occurs where all or part(s) of the drive system, which comprises the hoist motor, gear (if installed), brake, sheave, pulley, bearing and bedplate are changed.*

5.12.1 *Lift machine*

COMMENTARY ON **5.12.1**. *This change can occur for many reasons, including where excessive wear has taken place, fatigue of the main components is suspected, change of speed, change of levelling accuracy, etc. The changing of the lift machine is regarded as an important modification, and tests and records are necessary (see **4.4**). A traction sheave might be changed as the result of wear or other damage. Hazards or hazardous situations indicated in BS EN 81-80 that are relevant to this subclause are identified in Annex B, Table B.1, numbers 21 to 24, 47 to 49, 53, 60, 62 to 64, 66 to 68, 69 and 74.*

The following non-exhaustive list of recommendations should be met when changing the lift machine, as this change has an effect on many of the items concerning the safety of the lift installation.

a) Any replacement machine, and its sheave shaft load rating, should be suitable to support the suspended mass under all operational conditions.

b) The operating voltage, power capability and fault protection of the existing control equipment should interface with the new motor, brake and other devices and the associated wiring should be checked (BS EN 81-1:1998, Clause **13**).

c) Electromagnetic compatibility precautions should be carried out in accordance with BS EN 12015 and BS EN 12016.

d) All dangerous parts should be guarded (BS EN 81-1:1998, **9.7**).

e) The lift should be tested with a load to ensure that it operates at the correct speed, slows and stops in a safe manner and has all its safety circuits fully working (BS EN 81-1:1998, **D.2**).

f) The ventilation of the area containing the equipment should be checked to ensure that it is suitable for the heat output of the new equipment (BS EN 81-1:1998, **6.3.5**).

g) Where the sheave is changed, the traction should be checked (BS EN 81-1:1998, **9.3**).

h) Checks should be made of the suitability and soundness of the mountings and the complete assembly to attach to the existing drive machine.

i) A check should be made that sufficient working space can be maintained (BS EN 81-1:1998, **6.3.2**).

5.12.2 ***Change of brake***

COMMENTARY ON **5.12.2**. *Where the brake is changed and the replacement is not of an identical type it is regarded as an important modification, and tests and records are necessary (see **4.4**). Hazards or hazardous situations indicated in BS EN 81-80 that are relevant to this subclause are identified in Annex B, Table B.1, numbers 1, 21, 47, 60, 66 and 74.*

The following non-exhaustive list of recommendations should be met when changing the type of brake, as this change has an effect on many of the items concerning the safety of the lift installation.

a) The new brake should be double acting and should have sufficient capacity to meet the requirements of BS EN 81-1:1998, **12.4.2.1**.

b) The operating voltage, power capability and fault protection of the existing control equipment should interface with the new brake and the associated wiring should be checked (BS EN 81-1:1998, Clause **13**).

c) Electromagnetic compatibility precautions should be carried out in accordance with BS EN 12015 and BS EN 12016.

d) All dangerous parts should be guarded (BS EN 81-1:1998, **9.7**).

e) The new brake should be tested to ensure that it operates correctly under the loading conditions given in BS EN 81-1:1998, **12.4.2.1**.

f) Checks should be made of the suitability and soundness of the mountings and the complete assembly to attach to the existing drive machine.

g) A check should be made that sufficient working space can be maintained (BS EN 81-1:1998, **6.3.2**).

5.13 Change of a car enclosure and/or interior finishes

COMMENTARY ON **5.13**. *From time to time the car interiors begin to look tired and dated and require a new fit out. Sometimes the car enclosure requires change to accommodate a change in landing doors or change of rated load. At this time consideration should be given to increasing the platform area to include the floor area of any extensions or recesses (BS EN 81-1:1998, **8.2.1**), e.g. stretcher extensions, or they should be removed. [A car with a stretcher extension (see BS 5655-6:2002, **9.1.4**) is one where the extension is available for the transport of stretchers under controlled conditions.] The changing of the car enclosure is regarded as an important modification, and tests and records are necessary (see **4.4**). Hazards or hazardous situations indicated in BS EN 81-80 that are relevant to this subclause are identified in Annex B, Table B.1, numbers 38 to 40, 44 to 46, 58, 59, and 73.*

The following non-exhaustive list of recommendations should be met when changing the car enclosure and/or interior finishes, as this change has an effect on many of the items concerning the safety of the lift installation.

a) Changes to the finishes to the car should be checked to ensure that they do not affect the usability for the transportation of disabled people (see BS EN 81-70).

b) Where the car platform area increases, e.g. due to the incorporation of recess and extensions, the rated load should be increased accordingly (see **5.2**) and the load plate (BS EN 81-1:1998, Clause **15**) should be changed.

c) Where significant changes occur, i.e. a load change of greater than 5 %, in the car finishes/enclosure, then the recommendations given in **5.4** should be met.

5.14 Change of door operator

COMMENTARY ON **5.14**. *This is where the door operator is changed to one with a different specification. A change in positional performance might be desired from open loop to closed loop control, or the dynamic performance might require improvement. The changing of the door operator is regarded as an important modification, and tests and records are necessary (see **4.4**). Hazards or hazardous situations indicated in BS EN 81-80 that are relevant to this subclause are identified in Annex B, Table B.1, numbers 34, 35, 39, 66 and 74.*

The following non-exhaustive list of recommendations should be met when changing the door operator, as this change has an effect on many of the items concerning the safety of the lift installation.

a) A check should be made to ensure that the well clearances are maintained (BS EN 81-1:1998, **5.7**, BS EN 81-1:1998, Clause **11**).

b) A check should be made of the structural rigidity of the car/car frame to receive the door operator.

c) Where there is a change in the mass of the car this should be treated as a change in suspended mass (see **5.4**).

d) The speed and energy characteristics of the door operator should be matched to the mass of the car and landing doors to ensure safe operation (BS EN 81-1:1998, **8.7.2.1.1**). A device should be fitted to horizontal slide doors to automatically initiate re-opening in the event of a person being struck. To assist persons with disabilities this device should be a non-contact device.

e) The door operator should be checked to ensure compatibility with the door locking devices.

f) The limits of the unlocking zone (BS EN 81-1:1998, **7.7.1**) should be checked.

g) A check should be made that an apron of a suitable length (BS EN 81-1:1998, **8.4**) has been provided.

h) Particular care should be taken of any change in operating voltages. Where such voltages are increased the door operator should be clearly marked to warn of the change in risk of harm to persons, and protection should be provided against electric shock (BS EN 81-1:1998, **13.5.3**).

5.15 Change from gates to doors

COMMENTARY ON **5.15**. *Gates are used to protect the access to a lift car and are perforate. BS EN 81-1:1998, **7.1** and **8.6.1** require access to the lift car to be protected by imperforate landing and car doors. (Vertical car doors fitted to goods/passenger lifts may be of mesh.) In order to improve safety the gates can be replaced by doors. The change might retain manual operation or the opportunity might be taken to fit power-operated doors. The change from gates to doors is regarded as an important modification, and tests and records are necessary (see **4.4**). Hazards or hazardous situations indicated in BS EN 81-80 that are relevant to this subclause are identified in Annex B, Table B.1, numbers 25 to 37, 40, 58, 59, 66 and 74.*

The following non-exhaustive list of recommendations should be met when changing from gates to doors, as this change has an effect on many of the items concerning the safety of the lift installation.

a) Any powered device fitted to operate the doors should conform to BS EN 81-1:1998, Clause **7** and Clause **8**.

b) The well structure should be checked to ensure that it can accommodate the change from gates to doors (BS EN 81-1:1998, Clause **5**).

c) The clearances between the car and the landing doors and the car door and the well should be in accordance with BS EN 81-1:1998, Clause **11**.

d) The traction should be checked (BS EN 81-1:1998, **9.3**) where the mass of the car changes (BS EN 81-1:1998, Clause **8**).

e) Where the mass of the car changes then the recommendations given in **5.4** should be met.

5.16 Change of guide rails or type of guide rails

COMMENTARY ON **5.16**. *A change of guide rails or type of guide rails can occur when an installation is upgraded or modified. This change is regarded as an important modification, and tests and records are necessary (see **4.4**). Hazards or hazardous situations indicated in BS EN 81-80 that are relevant to this subclause are identified in Annex B, Table B.1, numbers 11 to 13, 50 and 55.*

The following non-exhaustive list of recommendations should be met when changing the guide rails or the type of guide rails, as this change has an effect on many of the items concerning the safety of the lift installation.

a) The system of guiding (BS EN 81-1:1998, Clause **10**) should be checked and in accordance with BS EN 81-1:1998, Annex G.

b) Verification should be made that the well structure is capable of supporting the change in load distribution and the forces transmitted through the lift equipment to the building structure and that clearances are maintained (BS EN 81-1:1998, **5.7**).

c) The suitability of the guide supports, guide rail fixings, buffer supports, etc. should be checked.

d) The safety gear (BS EN 81-1:1998, **9.8**) and governor (BS EN 81-1:1998, **9.9**) should be checked to ensure that they are suitable to operate with the changed guidance system.

e) The well structure should be checked to ensure that adequate clearances between the car and the facing wall and any balancing weight are maintained (BS EN 81-1:1998, Clause **11**).

Annex A (informative)
Relevant statutory regulations

A.1 Summary of the Health and Safety at Work etc. Act 1974

Persons concerned with lifts have duties under the Health and Safety at Work etc. Act 1974 [3], which include the following.

a) Employers have a duty to ensure, so far as is reasonably practicable, the health and safety of their employees while at work. This includes:

— the provision of plant and systems of work that are safe and without risk to health;

— the means to safely use and handle articles and substances;

— all necessary information, instruction, training and supervision;

— a safe means of access and egress;

— a safe working environment.

b) Employers, the self-employed and employees have a duty to conduct their undertakings in such a way as to ensure, so far as is reasonably practicable, that all persons who might be affected by the work activity are not exposed to risks to their health and safety.

c) Manufacturers, suppliers etc. of articles for use at work have a duty to ensure, so far as is reasonably practicable, that the articles are so designed and constructed that they will be safe and without risk to health when they are being set, used, cleaned or maintained.

d) Erectors and installers of articles for use at work have a duty to ensure, so far as is reasonably practicable, that nothing about the way articles are erected or installed is unsafe or a risk to health.

e) Persons concerned with premises have a duty to persons other than employees who use non-domestic premises made available to them as a place of work. It is the duty of the person who controls the premises to take such measures as it is reasonable for them to take to ensure, so far as is reasonably practicable, that the premises, the means of access and egress to and from the premises, and any plant of substance in the premises, are safe and without risk to health.

A.2 Summary of the Management of Health and Safety at Work Regulations 1999

The Management of Health and Safety at Work Regulations 1999 [2] implement the requirements of Framework Directive 89/391/EEC [4].

They include a requirement (Regulation 3) for every employer and self-employed person to make a suitable and sufficient assessment of the risks to health and safety of themselves and others arising out of, or in connection with, the conduct of the undertaking. The Regulations require the significant findings of the assessment to be recorded. The purpose of the assessment is to identify and quantify the risk. Employers are required to implement preventative and protective measures to eliminate risk, and to put in place effective control measures to address residual risks and hazards.

The Regulations also include requirements for training, health and safety assistance, information for employees, and a requirement to put in place such arrangements as are appropriate for the effective planning, organization, control, monitoring and review of the preventative and protective measures necessary.

A.3 Summary of the Disability Discrimination Act 1995

The Disability Discrimination Act 1995 [5] gives disabled people rights in such areas as access to goods, facilities and services. It requires goods and services to be accessible to disabled people; this can include the removal of physical barriers, but does not impose specific requirements.

Businesses and service providers have a duty to make "reasonable adjustments" to the physical features of their premises in order to overcome barriers to access.

Service providers have a duty to consider the use of premises by people with mobility, visual, hearing, speech and dexterity impairments as well as those with learning difficulties and mental health disabilities.

"Reasonable adjustments" take account of:

— practicality;

— financial and other costs;

— disruption;

— resources available;

— availability of financial assistance.

Lifts are included in the examples of "physical features".

NOTE The Disability Rights Commission have published a number of codes of practice relating to duties applicable under the Disability Discrimination Act 1995. Information is available from DRC Helpline, Freepost MID02164, Stratford-upon-Avon, CV37 9BR, telephone 08457 622633, or from the Disability Rights Commission website at www.drc-gb.org.

A.4 Summary of other relevant statutory provisions

NOTE 1 This list is not intended to be exhaustive and does not attempt to indicate which regulations are applicable in any given circumstance.

NOTE 2 The regulations are listed alphabetically and not by relative importance.

A.4.1 *Construction (Design and Management) Regulations 1994*

The Construction (Design and Management) Regulations 1994 [6] place duties on clients and their agents (where appointed), designers and contractors to coordinate and manage the health and safety aspects of a construction project with the aim to control and reduce the risks involved.

A.4.2 *Control of Asbestos at Work Regulations 1987*

The Control of Asbestos at Work Regulations 1987 [7] require employers to prevent the exposure of employees to asbestos, or if this is not reasonably practicable, to control such exposure to the lowest possible level. Before any work with asbestos is carried out, the Regulations require employers to make an assessment of the likely exposure of employees to asbestos dust, which can include a description of the precautions that are taken to control dust release and to protect workers and others who might be affected by that work.

A.4.3 *Control of Substances Hazardous to Health Regulations 1994*

The Control of Substances Hazardous to Health Regulations 1994 and subsequent amendments [8] set out a framework of action for employers and self-employed persons to follow, which aims to protect the health of all people who might be exposed to hazardous substances at work.

This includes:

— carrying out a risk assessment;

— identifying and implementing control measures;

— ensuring that control measures are used;

— ensuring that employees are properly informed, trained and supervised.

Hazardous substances include chemicals, dust, gases and fumes. Asbestos is excluded from the Control of Substances Hazardous to Health Regulations as it is covered by separate regulations (see **A.4.2**).

A.4.4 *Electricity at Work Regulations 1989*

The Electricity at Work Regulations 1989 [9] set out requirements for all electrical systems used at work, including construction, integrity, maintenance and isolation. They apply to employers and self-employed persons.

A.4.5 *Electromagnetic Compatibility Regulations 1992*

NOTE Generic standards that support the Electromagnetic Compatibility Regulations 1992 are BS EN 61000-6-1 for residential, commercial and light industry and BS EN 61000-6-2 for industrial environments. Industry standards for lifts are BS EN 12015 and BS EN 12016.

The Electromagnetic Compatibility Regulations 1992 [10] deal with the two elements of electromagnetic compatibility, i.e. emission and immunity.

The emission requirements aim to ensure a level of electromagnetic emission that will cause minimal disturbance to other equipment.

The immunity requirements aim to ensure a level of electromagnetic immunity that will allow minimal disturbance to other equipment.

A.4.6 *Electrical Equipment (Safety) Regulations 1994*

The Electrical Equipment (Safety) Regulations 1994 [11] implement the requirements of composite Directive 93/68/EEC [12] and cover the supply of electrical equipment which, when properly installed, does not endanger persons, domestic animals or property and provides safe operation of the equipment by users free from electric shock. Low voltage is defined as 50 V a.c. to 100 V a.c. or 75 V d.c. to 1 500 V d.c.

A.4.7 *Lifting Operations and Lifting Equipment Regulations 1998 (LOLER)*

The Lifting Operations and Lifting Equipment Regulations 1998 [13] give effect to Directive 89/655/EEC [14] on the health and safety requirements for the use of work equipment by persons at work as amended by Directive 95/63/EC [15].

Lifting operations mean an operation concerned with the lifting or lowering of a load. Lifting equipment means work equipment for lifting or lowering loads and includes its attachments for anchoring, fixing or supporting it. An accessory for lifting means work equipment for attaching loads to machinery for lifting. Work equipment means any machinery, appliance, tool or installation for use at work. Load includes a person and the Regulations include passenger lifts.

The Regulations require that a thorough examination be carried out every six months (or as determined by risk assessment) by a competent person and a report issued. The report has to notify any defect which in the opinion of the competent person could be, or become, a danger to persons. Where there is a serious risk of personnel injury a report has to sent as soon as reasonably practicable to the relevant enforcing authority (HSE or Local Authority).

A.4.8 *Lifts Regulations 1997*

These Regulations implement Directive 95/16/EC [16] (the Lift Directive) in order to meet the Essential Health and Safety Requirements (EHSRs) defined in the Directive. The Regulations contain fifteen complex Schedules setting out the arrangements. The most important of these is Schedule 1, which sets out the EHSRs relating to the design and construction of lifts and safety components. Among the definitions included are: lift, harmonized standard, installer, safe, placing on the market, Essential Health and Safety Requirements, responsible person. "Putting into service" is not specifically defined.

The Lifts Regulations 1997 require new lift installations to conform to the EHSRs laid down in Schedule 1 of the Regulations. These requirements apply to the entire lift installation including the building fabric and supporting building services. Compliant installations carry a CE mark in the lift car, which denotes that either (a) the entire installation conforms in full to harmonized standards or to a pre-approved "model" standard, or (b) the installation meets the minimum essential health and safety requirements approved by a Notified Body. These are known as the "routes to conformity". The most common routes to conformity are the installation of "model" lifts and lift installations meeting harmonized standards.

For installations where conformity is to be obtained other than by installing in accordance with harmonized standards, it is necessary to seek the specific requirements for the lift installation's environment. This is defined in the model lift's technical documentation, or otherwise approved by a Notified Body. The harmonized standards that are deemed to satisfy the EHSRs are the BS EN 81 series of safety standards.

The Regulations do not apply to lifts installed and put into service before 1 July 1999 or to a number of specialist lifts listed in Schedule 14.

A.4.9 *Provision and Use of Work Equipment Regulations 1998*

The Provision and Use of Work Equipment Regulations 1998 [17] require risks to people's health and safety, from equipment they use at work, to be prevented or controlled by ensuring that the equipment is:

— suitable for use;

— maintained in a safe condition; and

— inspected in certain circumstances.

"Work equipment" covers all equipment used by an employee or a self-employed person at work and includes tools, static and mobile machinery, installations and lift equipment.

A.4.10 *Personal Protective Equipment Regulations 2002*

The Personal Protective Equipment Regulations 2002 [18] implement the requirements of Personal Protective Equipment Directive 89/686/EEC [19] (as amended).

Personal protective equipment means:

> "All equipment designed to be worn or held by a person at work to protect against one or more risks, and any addition or accessory designed to meet this objective."

Personal protective equipment includes:

— helmets;
— eye protection;
— ear protection;
— safety footwear;
— gloves;
— safety harness;
— protective clothing;
— high visibility clothing.

Employers are required to provide suitable personal protective equipment to each of their employees who might be exposed to risk.

Personal protective equipment is to be used as a last resort after all measures to prevent or control risks at source are exhausted.

The Regulations cover suitability, compatibility, maintenance, replacement, information, loss, defect, etc.

A.4.11 *Supply of Machinery (Safety) Regulations 1992 (as amended 1994)*

The Supply of Machinery (Safety) Regulations 1992 and subsequent amendments [20] implement the requirements of Machinery Directive 98/37/EC [21]. The Machinery Directive applies to a wide range of machines that include chain saws, power presses, tractors, etc., but it is also applicable to escalators and moving walks. Annex 1 of the Machinery Directive lists the essential health and safety requirements that apply to all machines.

A.4.12 *Workplace (Health, Safety and Welfare) Regulations 1992*

The Workplace (Health, Safety and Welfare) Regulations 1992 [22] implement the requirements of Workplace Directive 89/654/EEC [23] and aim to ensure that workplaces meet minimum standards of health, safety and welfare.

A.5 Other statutory provisions

In addition to the statutory provisions listed in **A.1**, **A.2**, **A.3** and **A.4**, the following statutory provisions are examples of those that can be applicable to the construction, installation, service and use of lifts:

— Building Regulations 2000 and subsequent amendments [24];
— Construction (Head Protection) Regulations 1989 [25];
— Construction (Health, Safety and Welfare) Regulations 1996 [26];
— Fire Precautions Act 1971 [27];
— Fire Precautions (Workplace) Regulations 1997 [28];
— Health and Safety (First Aid) Regulations 1981 [29];
— Health and Safety (Safety Signs and Signals) Regulations 1996 [30];
— Manual Handling Operations Regulations 1992 [31];
— Noise at Work Regulations 1989 [32];
— Reporting of Injuries, Diseases and Dangerous Occurrences Regulations 1995 [33]

Annex B (informative)
Summary of significant hazards

Table B.1 gives a summary of significant hazards that might be encountered while upgrading the safety of electric lifts, together with references to the relevant subclauses in BS EN 81-1.

Table B.1 — Summary of significant hazards

No.	Description of hazard	Reference clause in BS EN 81-80:2003	Remedial action (references to BS EN 81-1:1998 unless otherwise indicated)
General			
1	Presence of harmful materials	**5.1.4**	**0.31**
Accessibility			
2	No or limited accessibility for disabled persons	**5.2.1**	Measures conforming to BS EN 81-70
3	Drive system with bad stopping/levelling accuracy	**5.2.2**	BS EN 81-70:2003, **5.3.3**
Vandalism			
4	No or inadequate vandal resistance	**5.3**	Measures conforming to BS EN 81-71
Behaviour in the event of fire			
5	No or inadequate control functions in case of fire	**5.4**	Measures conforming to BS EN 81-73
Lift well			
6	Well enclosures with perforate walls	**5.5.1.1**	a) Fit imperforate well enclosure; or b) Fit perforate enclosure in accordance with BS EN 294:1992, **4.5.2**.
7	Partially enclosed well with too low enclosure	**5.5.1.2**	**5.2.1.2**
8	a) Inadequate locking devices on access doors to well and pit b) Car does not stop when access doors to well and pit are opened	**5.5.2**	**5.2.2.2** **5.2.2.2**
9	Inadequate vertical surface below landing door sills	**5.5.2**	**5.4.3**
10	Counterweight/balancing weight without safety gear in case of accessible spaces below well	**5.5.4**	a) Provide solid pier; or b) Fit safety gear to counterweight/balance weight
11	No or inadequate partition of counterweight/balancing weight travel path	**5.5.5**	**5.6.1**

Table B.1 — Summary of significant hazards (*continued*)

No.	Description of hazard	Reference clause in BS EN 81-80:2003	Remedial action (references to BS EN 81-1:1998 unless otherwise indicated)
12	No or inadequate pit screen for several lifts in the same well	**5.5.6.1**	**5.6.2.1**
13	No or inadequate partition for several lifts in the same well	**5.5.6.2**	**5.6.2.2**
14	Insufficient safety spaces in headroom and pit	**5.5.7**	**5.7.1** to **5.7.3**
15	Unsafe pit access	**5.5.8**	**5.7.3.2**
16	No or inadequate stopping devices in the pit or in the pulley room	**5.5.9**	**5.7.3.4**, **6.4.5**
17	No or inadequate lighting of the well	**5.5.10**	**5.9**
18	No alarm system in pit and on car top	**5.5.11**	**5.10** (BS EN 81-28:2003, **14.2.3**)
Machine and pulley rooms			
19	No or unsafe means of access to machine and pulley room	**5.6.1**	**6.2**
20	Slippery floor in machine or pulley room	**5.6.2**	**6.3.1.2**, **6.4.1.2**
21	Insufficient clearances in machine room	**5.6.3**	Guard conforming to BS EN 294:1992, Table 4
22	No or inadequate protection on different levels in machine pulley room	**5.6.4**	**6.3.2.4** and **6.3.2.5**
23	Inadequate lighting in machine or pulley room	**5.6.5**	**6.3.6**, **6.4.7**
24	Inadequate lifting means for handling equipment	**5.6.6**	Test and display SWL of lighting means and check suitability of position
Landing doors and car doors			
25	Perforate landing doors and car doors	**5.7.1**	**7.1**, **8.6.1**
26	Inadequate strength of landing door fixings	**5.7.2**	**7.2.3.1**, **7.4.2.1**
27	Inadequate provision of glass in doors	**5.7.3**	a) **7.2.3.2** to **7.2.3.4**, **8.6.7.2** to **8.6.7.4**; or b) Annex J; or c) **7.6.2**; or d) Remove glass and add “car here” indicdator
28	No or inadequate protection against dragging of a child’s hands on a horizontal sliding car or a landing door with glass	**5.7.4**	**7.2.3.6**, **8.6.7.5**

Table B.1 — Summary of significant hazards (*continued*)

No.	Description of hazard	Reference clause in BS EN 81-80:2003	Remedial action (references to BS EN 81-1:1998 unless otherwise indicated)
29	No or inadequate lighting on landing	**5.7.5**	**7.6.1**
30a	No or inadequate protective devices on power-operated car and landing doors (not intended for disabled use)	**5.7.6**	a) **7.5.2.1.1**, **8.7.2.1.1**; or b) Measures conforming to BS EN 81-70:2003, **5.2.3** and **5.2.4**
30b	No or inadequate protective devices on power-operated car and landing doors (intended for disabled use)	**5.7.6**	Measures conforming to BS EN 81-70:2003, **5.2.3** and **5.2.4**
31	Unsafe or inadequate locking device of landing door	**5.7.7**	**7.7**
32	Unlocking of landing door without using a special tool	**5.7.8.1**	**7.7.3.2**
33	Access to door locks through perforate well enclosure	**5.7.8.2**	a) Fit imperforate well enclosure; or b) Fit protection around door locks
34	No automatic closing device on horizontal sliding doors	**5.7.9**	**7.7.3.2**
35	Inadequate link between panels of landing doors	**5.7.10**	**7.7.6**
36	Inadequate fire resistance of landing doors	**5.7.11**	Fit doors in accordance with specified fire regulations
37	Power-generated car door moving with open hinged landing door	**5.7.12**	Ensure that the landing door is not unlocked until the car door is fully open and that the car door cannot close until the landing door is fully closed
Car, counterweight and balancing weight			
38	Large car area in relation to rated load	**5.8.1**	a) Reduce the available car floor area; or b) Restrict use of lift to instructed users only; or c) Verify the intended use
39	Inadequate length of car apron	**5.8.2**	**8.4**
40	No car doors	**5.8.3**	a) Fit power-operated car doors in accordance with **8.6** to **8.10**; or b) Fit manual car doors in accordance with **8.6**, **8.7.1**, **8.9** and **8.10**
41	Unsafe locking of car top emergency trap door	**5.8.4**	**8.12.4.2**
42	Insufficient strength of car top and emergency trap door	**5.8.5**	**8.13.1**

Table B.1 — Summary of significant hazards (*continued*)

No.	Description of hazard	Reference clause in BS EN 81-80:2003	Remedial action (references to BS EN 81-1:1998 unless otherwise indicated)
43	No or inadequate balustrade on car to protect against falling	**5.8.6**	a) Reduce free distance to less than 0.3 m; or b) Fit balustrade in accordance with **8.13.3**; or c) Fit full height partition to reduce free distance to less than than 0.3 m
44	Insufficient ventilation in car	**5.8.7**	**8.16**
45	Inadequate lighting in car	**5.8.8.1**	**8.17.1** to **8.17.3**
46	No or inadequate emergency lighting in car	**5.8.8.2**	**8.17.4** and illuminate alarm button
Suspension, compensation, overspeed			
47	No or inadequate protection against injury on sheaves, pulleys and sprockets	**5.9.1**	**9.7**
48	No or inadequate protection against rope/chains leaving the sheaves, pulleys or sprockets	**5.9.1**	**9.7**
49	No or inadequate protection against introduction of objects on sheaves, pulleys or sprockets	**5.9.1**	**9.7**
50a	No safety gear and/or overspeed governor	**5.9.2**	**9.8** and **9.9**
50b	Incorrect functioning of safety gear and/or overspeed governor	**5.9.2**	a) Adjust system; or b) **9.8** and **9.9**
51	No or inadequate slack rope switch for governor rope	**5.9.3**	**9.9.11.3**
52	No protection means against ascending car overspeed on electric lifts with counterweight	**5.9.4**	**9.10**
53	Inadequate design of lift machine to prevent uncontrolled movement with open doors	**5.9.4** **5.12.1**	a) Change to BS EN 81-1:1998 machine; or b) Install protective means in accordance with BS EN 81-80:2003, **5.9.4**, Note 2; and/or c) Fit double brake in accordance with **12.4.2**
54	Not applicable	—	—

Table B.1 — Summary of significant hazards (*continued*)

No.	Description of hazard	Reference clause in BS EN 81-80:2003	Remedial action (references to BS EN 81-1:1998 unless otherwise indicated)
Guide rails, buffers, final limit switches			
55	Counterweight or balancing weight guided by two wire-ropes	**5.10.1**	a) **10.2.1**; or b) Fit four wire-ropes
56	No or inadequate buffers	**5.10.2**	**10.3**
57	No or inadequate final limit switches	**5.10.3**	**10.5**
Distances car/landing doors			
58	Large horizontal gap between car and wall facing the car entrance	**5.11.1**	a) Reduce distance in accordance with **11.2.1**; or b) Fit car door locking device in accordance with **8.9.3**
59	Excessive horizontal distance between car door and landing door	**5.11.2**	**11.2.3** and **11.2.4**
Lift machine			
60a	No or inadequate emergency operation system	**5.12.2**	**12.5**, **16.3.1**
61	Not applicable	—	—
62	No or inadequate means of stopping the machine and checking its position	**5.12.4**	**12.7**
63	No or inadequate slack rope/chain device	**5.12.5**	**9.5.3**, **12.9**
64	No run-time limiter	**5.12.6**	**12.10**
65	Not applicable	—	—
Electric installation/appliances			
66	Insufficient protection against electric shock and/or marking of electrical equipment; missing notices	**15.13.1**	a) **13.1.2**; and b) **13.5.3.3**; and c) Fit warning notice to group controllers
67	No or inadequate protection on lift machine motor	**15.13.2**	**13.3.1** to **13.3.3**
68	No lockable main switch	**15.13.3**	**13.4.2**

Table B.1 — Summary of significant hazards (*continued*)

No.	Description of hazard	Reference clause in BS EN 81-80:2003	Remedial action (references to BS EN 81-1:1998 unless otherwise indicated)
Protection against electric faults, etc.			
69	No protection against phase reversal	**5.14.1**	**14.1.1.1**j)
70a	No or inadequate inspection control station on car top	**5.14.2**	**14.2.1.3**
70b	No or inadequate stopping device on car top	**5.14.2**	**14.2.2**
71	No or inadequate emergency alarm device	**5.14.3**	**14.2.3**, measures conforming to BS EN 81-28
72	No or inadequate communication system between machine room and car (travel height >30 m	**5.14.4**	**14.2.3.4**
73	No or inadequate load control on car	**5.14.5**	**14.2.5**
Notices, markings, operating instructions			
74	Missing notices, markings and operating instructions for safe use and maintenance	**5.15**	**15.2.1**, **15.3**, **15.4**, **15.5.1**, **15.5.3**, **15.7**, **15.11**, **15.15**

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NOTE Acts and regulations are published by The Stationery Office and enquiries concerning their availability should be directed to: The Stationery Office, Publications Centre, 51 Nine Elms Lane, London SW8 5DR. Tel: 0870 600 5522. Fax: 0870 600 5533. E-mail: esupport@theso.co.uk. Website: http://www.thestationeryoffice.co.uk.

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