BRITISH STANDARD

BS EN
81-80:2003

Safety rules for the construction and installation of lifts — Existing lifts —

Part 80: Rules for the improvement of safety of existing passenger and goods passenger lifts

The European Standard EN 81-80:2003 has the status of a British Standard

ICS 91.140.90

National foreword

This British Standard is the official English language version of EN 81-80:2003.

The UK participation in its preparation was entrusted to Technical Committee MHE/4, Lifts, hoists and escalators, which has the responsibility to:

— aid enquirers to understand the text;

— present to the responsible international/European committee any enquiries on the interpretation, or proposals for change, and keep the UK interests informed;

— monitor related international and European developments and promulgate them in the UK.

A list of organizations represented on this committee can be obtained on request to its secretary.

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Safety rules for the construction and installation of lifts - Existing lifts - Part 80: Rules for the improvement of safety of existing passenger and goods passenger lifts

Règles de sécurité pour la construction et l'installation des élévateurs - Ascenseurs existants - Partie 80: Règles pour l'amélioration de la sécurité des ascenseurs et des ascenseurs de charge existants

Sicherheitsregeln für die Konstruktion und den Einbau von Aufzügen - Bestehende Aufzüge - Teil 80: Regeln für die Erhöhung der Sicherheit bestehender Personen- und Lastenaufzüge

This European Standard was approved by CEN on 3 November 2003.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Management Centre or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the Management Centre has the same status as the official versions.

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Contents

page

Foreword

This document (EN 81-80:2003) has been prepared by Technical Committee CEN/TC 10 “Lifts, escalators and moving walks”, the secretariat of which is held by AFNOR.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by June 2004, and conflicting national standards shall be withdrawn at the latest by June 2004.

Regulations concerning the safety upgrading of existing lifts vary from member state to member state and have not, to date, been harmonised at either international or European level.

CEN/CENELEC have embarked on a programme of work to produce a series of related machinery and lift safety standards as part of the process of European harmonisation. This standard both makes use of and refers to EN 292 parts 1 and 2 and most of the EN 81 series of standards (see clause 2).

This standard is part of the EN 81 series of standards: *“Safety rules for the construction and installation of lifts”.* This is the first edition of the standard.

Annexes A and B are informative.

This document includes a Bibliography.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Slovakia, Spain, Sweden, Switzerland and the United Kingdom.

Introduction

Background of this standard

More than 3 million lifts are in use today in EU and EFTA and almost 50 % were installed more than 20 years ago. Existing lifts were installed to the safety level appropriate at that time. This level is less than today's state of the art for safety.

New technologies and social expectations have led to today's state of the art for safety. This has led to the situation today of different levels of safety across Europe causing accidents. However, users and authorised persons expect a common acceptable level of safety.

In addition, there is a growing trend for people to live longer and for disabled people to expect access and design for all. Therefore it is especially important to provide a safe means of vertical transport for disabled and elderly persons without supervision.

Lift attendants and in many cases building caretakers are not so common anymore, so it is important that relevant safety features for the rescue of trapped persons should be provided.

Furthermore the life cycle of a lift is longer than most other transportation systems and building equipment, which therefore means that lift design, performance and safety can fall behind modern technologies. If existing lifts are not upgraded to today's state of the art of safety the number of injuries will increase (especially in buildings which can be accessed by the general public).

With the freedom of movement of people within the EU for both users and authorised persons, familiarisation with the different installations is becoming more and more difficult.

Approach of this standard

This standard

— categorises various hazards and hazardous situations, each of which has been analysed by a risk assessment;

— is intended to provide corrective actions to progressively and selectively improve, step by step, the safety of all existing passenger and goods passenger lifts towards today's state of the art for safety;

— enables each lift to be audited and safety measures to be identified and implemented in a step by step and selective fashion according to the frequency and severity of any single risk;

— lists the high, medium and low risks and corrective actions which can be applied in separate steps in order to eliminate the risks.

Other designs to previous national regulations or standards, providing they have an equivalent safety level, may be acceptable.

Use of this standard

This standard can be used as a guideline for:

a) national authorities to determine its own programme of implementation in a step by step process via a filtering process (see annex A) in a reasonable and practicable[1)] way based on the level of risk (e.g. extreme, high, medium, low) and social and economic considerations;

b) owners to follow their responsibilities according to existing regulations (e.g. Use of Work Equipment Directive);

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1) "Reasonable and practicable" is defined as follows: "In deciding what is reasonably practicable the seriousness of a risk to injury should be weighted against the difficulty and cost of removing or reducing that risk. Where the difficulty and costs are high, and a careful assessment of the risk shows it to be comparatively unimportant, action may not need to be taken. On the other hand where the risk is high, action should be taken at whatever cost."

c) maintenance companies and/or inspection bodies to inform the owners on the safety level of their installations;

d) owners to upgrade the existing lifts on a voluntary basis in accordance with c) if no regulations exist.

In making an audit of an existing lift installation annex B can be used to identify the hazards and corrective actions in this standard. However, where a hazardous situation is identified which is not covered in this standard a separate risk assessment should be made. This risk assessment should be based on ISO/TS 14798 (see bibliography).

1 Scope

1.1 This European Standard gives rules for improving the safety of existing lifts with the aim of reaching an equivalent level of safety to that of a newly installed lift by the application of today's state of the art for safety.

NOTE Due to situations such as the building design etc. it may not be possible in all cases to reach today's state of the art for safety.

1.2 This standard applies for permanently installed

— electric lifts, with traction or positive drive;

— hydraulic lifts

serving defined landing levels, having a car designed for the transportation of persons or persons and goods and moving between guide rails inclined not more than 15° to the vertical.

1.3 This standard includes the improvement of safety of existing passenger and goods passenger lifts for:

a) users;

b) maintenance and inspection personnel;

c) persons outside the well, machine room and the pulley room (but in their immediate vicinity);

d) any authorised persons.

1.4 This standard is not applicable to:

a) lifts with drive systems others than those defined in EN 81-1 or EN 81-2;

b) lifting appliances such as paternosters, mine lifts, theatre lifts, appliances with automatic caging, skips, lifts and hoists for building and public works sites, ships' 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) safety during transport, installation, repairs and dismantling of lifts;

e) fire fighting operation.

However, this standard can usefully be taken as a reference basis.

2 Normative references

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text, and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies (including amendments).

NOTE All the parts of EN 81 are normative for terms and definitions purposes.

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

EN 81-2:1998, *Safety rules for the construction and installation of lifts - Part 2: Hydraulic lifts.*

prEN 81-21, *Safety rules for the construction and installation of lifts - Lifts for the transport of persons and goods - Part 21: New passenger and goods lifts in existing buildings*.

EN 81-28, *Safety rules for the construction and installation of lifts - Lifts for the transport of persons and goods - Part 28: Remote alarm on passenger and goods passenger lifts*.

EN 81-70:2003, *Safety rules for the construction and installations of lifts - Particular applications for passenger and good passenger lifts - Part 70: Accessibility to lifts for persons including persons with disability.*

prEN 81-71, *Safety rules for the construction and installation of lifts - Particular applications to passenger lifts and goods passenger lifts - Part 71: Vandal resistant lifts.*

prEN 81-73, *Safety rules for the construction and installation of lifts - Particular applications for passenger and goods passenger lifts - Part 73: Behaviour of lifts in the event of fire.*

EN 294:1992, *Safety of machinery - Safety distance to prevent danger zones being reached by the upper limbs.*

EN 1070:1998, *Safety of machinery – Terminology.*

3 Terms and definitions

For the purposes of this European Standard, the terms and definitions given in EN 1070:1998 and the EN 81 series of standards apply.

Terms and definitions specifically needed for this European Standard are added below:

3.1
authorised person
person with a permission from the owner of the installation to perform defined activities

3.2
existing lift
lift which is in service at the disposal of its owner

3.3
levelling accuracy
maximum vertical distance between car sill and landing sill during loading or unloading of the lift

3.4
stopping accuracy
maximum vertical distance between car sill and landing sill at the moment when a car is stopped by the control system at its destination floor and the doors reach their fully open position

3.5
owner of the installation
natural or legal person who has the power of disposal of the installation and takes the responsibility for its operation and use

4 List of significant hazards

This clause contains all the significant hazards, hazardous situations and events, as far as they are dealt with in this standard, identified by risk assessments as significant for existing lifts and which require action to eliminate or reduce the risk.

4.1 Significant hazards dealt with by this standard

Table 1 — List of significant hazards

Nr.	Hazard/Hazardous situation	Relevant clauses in this standard
1	Presence of harmful materials	5.1.4
2	No or limited accessibility for disabled persons	5.2.1
3	Drive system with bad stopping/levelling accuracy	5.2.2
4	No or inadequate vandal resistance	5.3
5	No or inadequate control functions in case of fire	5.4
6	Well enclosures with perforate walls	5.5.1.1
7	Partially enclosed well with too low enclosure	5.5.1.2
8	Inadequate locking devices on access doors to well and pit	5.5.2
9	Inadequate vertical surface below landing door sills	5.5.3

Nr.	Hazard/Hazardous situation	Relevant clauses in this standard
10	Counterweight/balancing weight without safety gear in case of accessible spaces below well	5.5.4
11	No or inadequate partition of counterweight/ balancing weight travel path	5.5.5
12	No or inadequate pit screen for several lifts in the same well	5.5.6.1
13	No or inadequate partition for several lifts in the same well	5.5.6.2
14	Insufficient safety spaces in headroom and pit	5.5.7
15	Unsafe pit access	5.5.8
16	No or inadequate stopping devices in the pit or in the pulley room	5.5.9
17	No or inadequate lighting of the well	5.5.10
18	No alarm system in pit and on car roof	5.5.11
19	No or unsafe means of access to machine and pulley room	5.6.1
20	Slippery floor in machine or pulley room	5.6.2
21	Insufficient clearances in machine room	5.6.3
22	No or inadequate protection on different levels in machine pulley room	5.6.4
23	Inadequate lighting in machine or pulley room	5.6.5
24	Inadequate means of handling equipment	5.6.6
25	Perforate landing doors and car doors	5.7.1
26	Inadequate design of landing door fixings	5.7.2
27	Inadequate glass in doors	5.7.3
28	No or inadequate protection against dragging of fingers on sliding car or landing doors with glass	5.7.4
29	No or inadequate lighting on landing doors	5.7.5
30	No or inadequate protective devices on power operated doors	5.7.6
31	Unsafe locking device of landing door	5.7.7
32	Unlocking of landing door without a special tool	5.7.8.1
33	Well enclosure with perforate walls near door locks	5.7.8.2
34	No automatic closing device on sliding doors	5.7.9
35	Inadequate link between panels of landing doors	5.7.10
36	Inadequate fire resistance of landing doors	5.7.11
37	Car door moving with open landing door	5.7.12
38	Large car area in relation to rated load	5.8.1
39	Inadequate length of car apron	5.8.2
40	Car without doors	5.8.3
41	Unsafe locking of car roof trap door	5.8.4
42	Insufficient strength of car roof	5.8.5
43	No or inadequate balustrade on car	5.8.6
44	Insufficient ventilation in car	5.8.7
45	Inadequate lighting in car	5.8.8.1

Nr.	Hazard/Hazardous situation	Relevant clauses in this standard
46	No or inadequate emergency lighting in car	5.8.8.2
47	No or inadequate protection means on sheaves, pulleys and sprockets against injury	5.9.1
48	No or inadequate protection against rope/chains leaving the sheaves, pulleys or sprockets	5.9.1
49	No or inadequate protection means on sheaves, pulleys or sprockets against introduction of objects	5.9.1
50	No or inadequate safety gear and/or overspeed governor on electric lifts	5.9.2
51	No or inadequate slack rope switch for governor rope	5.9.3
52	No protection means against ascending car overspeed on traction drive lifts with counterweight	5.9.4
53	Inadequate design of lift machine for electric lifts	5.9.4, 5.12.1
54	No or inadequate protection against free fall, overspeed and creeping on hydraulic lifts	5.9.5
55	Counterweight or balancing weight guided by 2 wire ropes	5.10.1
56	No or inadequate buffers	5.10.2
57	No or inadequate final limit switches	5.10.3
58	Large gap between car and wall facing the car entrance	5.11.1
59	Excessive distance between car door and landing door	5.11.2
60	No or inadequate emergency operation system	5.12.2
61	No shut-off valve	5.12.3
62	No independent starting contactors	5.12.4
63	No or inadequate slack rope/chain device	5.12.5
64	No run-time limiter	5.12.6
65	No or inadequate low pressure device	5.12.7
66	Insufficient protection against electric shock and/or marking of electrical equipment; missing notices	5.13.1
67	No or inadequate protection on lift machine motor	5.13.2
68	No lockable main switch	5.13.3
69	No protection against phase reversal	5.14.1
70	No or inadequate inspection control station and stopping device on car roof	5.14.2
71	No or inadequate alarm device	5.14.3
72	No or inadequate communication system between machine room and car (travel height > 30 m)	5.14.4
73	No or inadequate load control on car	5.14.5
74	Missing notices, markings and operating instructions	5.15

4.2 Significant hazards not dealt with by this standard

— Fire in well, machine room and pulley room;

— environmental conditions including e.g. earthquake and flooding;

— electromagnetic compatibility;

— shearing due to sharp edges.

5 Safety requirements and/or protective measures

5.1 General

5.1.1 The following requirements and/or protective measures shall not be considered as the only possible solution. Alternatives are permitted, provided they lead to an equivalent safety level.

5.1.2 A risk assessment shall be made on a case by case basis for safety items not covered in this standard.

5.1.3 Where the requirements of this standard cannot be met and a residual risk remains, or cannot be avoided, then appropriate procedures such as signs, instructions and training shall be given.

5.1.4 Harmful materials such as asbestos in brake linings, contactor shields, cladding of the well, landing doors, cladding of the machine room, etc. shall be replaced by materials which ensure the same performance level (see also EN 81-1:1998, 0.3.1 and EN 81-2:1998, 0.3.1).

NOTE These should be considered in relation to national requirements.

5.1.5 For specific requirements such as accessibility, requirements against vandalism and behaviour of lifts in the event of fire, the conditions in the building shall be checked to see what is practical to be applied for lifts.

5.1.6 If a lift has been upgraded by one of the measures described in this standard, the consequences to other parts of the lift have to be considered.

5.2 Accessibility requirements

5.2.1 General

Where existing lifts are intended to be used also by persons with disabilities the requirements of EN 81-70 shall be considered. The items considered are subject to a risk assessment on a case by case basis.

5.2.2 Levelling and stopping accuracy

Of particular importance the stopping and levelling accuracy shall comply with EN 81-70:2003, 5.3.3 which means:

— the stopping accuracy of the lift shall be ± 10 mm;

— the levelling accuracy of ± 20 mm shall be maintained.

NOTE It is recommended to apply the above to all lifts.

5.3 Requirements against vandalism

Where the lift is installed in an environment where it is subjected to vandalism, the requirements of prEN 81-71 shall be considered. The items to be considered are subject to a risk assessment on a case by case basis.

5.4 Behaviour of lifts in the event of fire

When the fire security strategies ask for a recall control, then the requirements of prEN 81-73 shall be considered. The items to be considered are subject to a risk assessment on a case by case basis.

5.5 Well

5.5.1 Well enclosures

5.5.1.1 Existing well enclosures which deviate from EN 81-1:1998, 5.2 or EN 81-2:1998, 5.2 may be perforate providing EN 294:1992, 4.5.2 is fulfilled.

5.5.1.2 The dimensions of the partial enclosure shall be in accordance with EN 81-1:1998, 5.2.1.2 or EN 81-2:1998, 5.2.1.2.

5.5.2 Inspection and emergency doors to well and access to the pit

Locking devices and their electrical safety devices of any such doors shall conform with EN 81-1:1998, 5.2.2.2 or EN 81-2:1998, 5.2.2.2.

5.5.3 Wall of the well

Below each landing door sill the wall of the well shall be according to EN 81-1:1998, 5.4.3 or EN 81-2:1998, 5.4.3.

5.5.4 Protection of any accessible spaces located below the car, the counterweight or the balancing weight

If accessible spaces do exist below the car, the counterweight or the balancing weight, there shall be, in accordance with EN 81-1:1998, 5.5 or EN 81-2:1998, 5.5, either:

a) a solid pier extending down to solid ground, or

b) a counterweight or a balancing weight equipped with a safety gear.

5.5.5 Counterweight or balancing weight screen

The travelling area of the counterweight or balancing weight shall be protected by an adequate screen in the pit. Where the screen is not adequate it shall be in accordance with EN 81-1:1998, 5.6.1 or EN 81-2:1998, 5.6.1.

5.5.6 Screens

5.5.6.1 Where there are adjacent lifts in a common well, the installation shall have a partition in the pit in accordance with EN 81-1:1998, 5.6.2.1 or EN 81-2:1998, 5.6.2.1.

5.5.6.2 Where the well contains several lifts, it shall be checked that the horizontal distance between the edge of the car roof and any moving parts of an adjacent lift is greater than 0,5 m.

Where this is found not to be the case then a partition for the full height of the well shall be fitted in accordance with EN 81-1:1998, 5.6.2.2 or EN 81-2:1998, 5.6.2.2.

5.5.7 Headroom and pit clearances

Where top and/or pit clearances are found not to be in accordance with:

a) EN 81-1:1998, 5.7.1, 5.7.2 and 5.7.3.3 (for electric lifts), or

b) EN 81-2:1998, 5.7.1 and 5.7.2 (for hydraulic lifts),

the relevant requirements of prEN 81-21 shall be applied.

5.5.8 Pit access

The pit shall have a suitable safe access and egress according to EN 81-1:1998, 5.7.3.2 or EN 81-2:1998, 5.7.2.2.

5.5.9 Pit and pulley room stopping device

The pit and pulley room shall have appropriate stopping devices in accordance with EN 81-1:998, 5.7.3.4 and 6.4.5 or EN 81-2:1998, 5.7.2.5 and 6.4.5.

5.5.10 Lighting of the well

The well shall have adequate lighting. Where the lighting is not adequate then lighting shall be fitted as defined in EN 81-1:1998, 5.9 or EN 81-2:1998, 5.9.

5.5.11 Emergency release of persons working in well

If there is a risk for persons working in the well being trapped and no means are provided to escape, alarm devices shall be installed in accordance with EN 81-1:1998, 5.10 or EN 81-2:1998, 5.10 and 5.14.3 of this standard.

5.6 Machine and pulley rooms

5.6.1 Machine and pulley room access

A site evaluation of the hazardous situations shall be carried out to bring the access to the machine and pulley room to a safety level reflected by EN 81-1:1998, 6.2 or EN 81-2:1998, 6.2.

5.6.2 Floors of machine and pulley rooms

The floors of machine rooms and pulley rooms shall be non-slip in accordance with EN 81-1:1998, 6.3.1.2 and 6.4.1.2 or EN 81-2:1998, 6.3.1.2 and 6.4.1.2.

5.6.3 Clearances of machinery

The machine room shall be checked that the horizontal clearances are in accordance with EN 81-1:1998, 6.3.2 or EN 81-2:1998, 6.3.2.

Where this is found not to be the case protection from the moving equipment shall be provided in accordance with EN 294:1992, Table 4, where practical.

5.6.4 Machine room floor levels and recesses

A site evaluation of the hazardous situations shall be carried out to ensure the levels and recesses in the machine room are to a safety level as reflected by EN 81-1:1998, 6.3.2.4 and 6.3.2.5 or EN 81-2:1998, 6.3.2.4 and 6.3.2.5.

5.6.5 Lighting in machine and pulley room

The lighting in the machine and pulley room shall be adequate. Where it is not adequate it shall be fitted in accordance with EN 81-1:1998, 6.3.6 and 6.4.7 or EN 81-2:1998, 6.3.6 and 6.4.7.

5.6.6 Handling of equipment

The existing metal supports or hooks for the handling equipment in the machine room or well shall be checked that they are safe for use, suitably positioned and marked with the safe working load.

5.7 Landing doors and car doors

5.7.1 Imperforate landing doors and car doors

Landing and car doors shall be imperforate according to EN 81-1:1998, 7.1 and 8.6.1 or EN 81-2:1998, 7.1 and 8.6.1.

5.7.2 Landing door fixings

Each landing door fixing (e.g. fixing screws, bottom door guides, top door rollers, etc.) shall resist the forces and derailment as defined in EN 81-1:1998, 7.2.3.1 and 7.4.2.1 or EN 81-2:1998, 7.2.3.1 and 7.4.2.1, to avoid the door panel falling into the well.

5.7.3 Use of glass in car doors and landing doors

Landing and car doors which contain glass shall be checked to see that the glass fitted is in accordance with EN 81-1:1998, 7.2.3.2, 7.2.3.3, 7.2.3.4, 8.6.7.2, 8.6.7.3 and 8.6.7.4 or EN 81-2:1998, 7.2.3.2, 7.2.3.3, 7.2.3.4,8.6.7.2, 8.6.7.3 and 8.6.7.4 or has an equivalent level of safety.

If not then:

a) change glass to that defined in EN 81-1:1998, annex J or EN 81-2:1998, annex J, or

b) the size of the glass panel shall be reduced to that of a vision panel in conformity with EN 81-1:1998, 7.6.2 or EN 81-2:1998, 7.6.2, or

c) the glass shall be removed and replaced by a solid panel, with the addition of a ‘car here indicator’ on each landing so that users may readily know if the lift is present.

NOTE The solution adopted should take into consideration the national regulation for fire protection in the building.

5.7.4 Horizontally sliding car doors and landing doors with glass

Horizontally sliding car and landing doors made of glass shall be in accordance with EN 81-1:1998, 7.2.3.6 and 8.6.7.5 or EN 81-2:1998, 7.2.3.6 and 8.6.7.5 to protect against the dragging of children hands.

5.7.5 Lighting of the landing

The lighting of the landings in the vicinity of the landing doors shall be in accordance with EN 81-1:1998, 7.6.1 or EN 81-2:1998, 7.6.1.

5.7.6 Protection against impact from power operated horizontally sliding car and landing doors

All lifts shall be provided with door protective devices in accordance with EN 81-1:1998, 7.5.2.1.1 and 8.7.2.1.1 or EN 81-2:1998, 7.5.2.1.1 and 8.7.2.1.1.

Where the existing lifts are intended to be used also by disabled persons the requirements of EN 81-70:2003, 5.2.3 and 5.2.4 shall be met.

NOTE EN 81-70:2003, 5.2.3 and 5.2.4 gives improved state of the art solutions.

5.7.7 Locking devices

All landing door locking devices shall have an equivalent safety level to EN 81-1 or EN 81-2. Where they have not they shall be replaced with locking devices in accordance with EN 81-1:1998, 7.7 or EN 81-2:1998, 7.7.

NOTE Existing locking devices to versions of EN 81-1 and EN 81-2 issued before 1998 with 5 mm engagement are also considered to have an equivalent safety level.

5.7.8 Unlocking of landing doors

5.7.8.1 Any emergency unlocking of a landing door shall only be possible by the use of a special device (e.g. triangular key according to EN 81-1:1998, 7.7.3.2 or EN 81-2:1998, 7.7.3.2).

Additional measures shall be applied in accordance with prEN 81-71 in buildings which may be subject to vandalism or where lift surfing may take place (see 5.3).

5.7.8.2 Landing door locking devices shall not be accessible from the outside of the well (e.g. reaching through a mesh well) by unauthorised persons to prevent deliberate misuse.

5.7.9 Automatic closing of horizontal sliding landing doors

Horizontal sliding landing doors which can be driven by the car doors shall have an automatic closing device in accordance with the last paragraph of EN 81-1:1998, 7.7.3.2 or EN 81-2:1998, 7.7.3.2.

5.7.10 Sliding doors with multiple panels

Sliding doors with multiple panels shall comply with EN 81-1:1998, 7.7.6 or EN 81-2:1998, 7.7.6.

5.7.11 Fire rated landing doors

The landing doors shall conform with the fire rating as required by national or local regulations according to the building concerned.

5.7.12 Hinged landing doors in combination with power operated horizontally sliding car doors

The car door shall only operate when the landing door has been closed.

5.8 Car, counterweight and balancing weight

5.8.1 Available car area, rated load

The car floor area shall be in accordance with EN 81-1:1998, 8.2 for electric lifts or in EN 81-2:1998, 8.2 for hydraulic lifts. Where this is not the case, appropriate measures shall be taken e.g.

— Reduce the available car floor area, or

— restrict the use to instructed users, or

— verify the intended use of the lift.

5.8.2 Avoidance of the risk of people falling into the well (car apron)

The car shall have an apron in accordance with EN 81-1:1998, 8.4 or EN 81-2:1998, 8.4. Where this is not possible it shall be in accordance with prEN 81-21 (e.g. telescopic apron).

5.8.3 Cars without doors

Where a car has no door the following additions shall be carried out. Either:

a) a power operated car door shall be fitted in accordance with EN 81-1:1998, 8.6, 8.7, 8.8, 8.9 and 8.10 or EN 81-2:1998, 8.6, 8.7, 8.8, 8.9 and 8.10, or

b) a manual car door shall be fitted in accordance with EN 81-1:1998, 8.6, 8.7.1, 8.9 and 8.10 or EN 81-2:1998, 8.6, 8.7.1, 8.9 and 8.10.

5.8.4 Locking of emergency trap doors on the car

If an emergency trap door on the car roof is fitted its locking device shall be in accordance with EN 81-1:1998, 8.12.4.2 or EN 81-2:1998, 8.12.4.2.

5.8.5 Strength of car roof and emergency trap door

The car roof and any emergency trap doors shall be in accordance with EN 81-1:1998, 8.13.1 or EN 81-2:1998, 8.13.1.

5.8.6 Protection on the car roof

The car roof shall be checked to ensure that the free distance in the horizontal plane beyond and perpendicular to its outer edge does not exceed 0,30 m. If this is not the case then one of the following provisions shall be taken:

a) the car roof shall be extended so that the free distance is less than 0,30 m;

b) a balustrade shall be fitted on the car roof in accordance with EN 81-1:1998, 8.13.3 or EN 81-2:1998, 8.13.3 or prEN 81-21;

c) a full height partition shall be installed so that the free distance is less than 0,30 m.

5.8.7 Ventilation of the car

The car ventilation shall be sufficient according to national regulations. Where no national regulations exist then EN 81-1:1998, 8.16 or EN 81-2:1998, 8.16 shall apply.

5.8.8 Lighting and emergency lighting in the car

5.8.8.1 The car shall have permanently installed electric lighting. Where inadequate it shall be in accordance with EN 81-1:1998, 8.17.1, 8.17.2, 8.17.3 or EN 81-2:1998, 8.17.1, 8.17.2, 8.17.3.

5.8.8.2 Emergency lighting in accordance with EN 81-1:1998, 8.17.4 or EN 81-2:1998, 8.17.4 shall be provided.

5.9 Suspension, compensation and overspeed protection

5.9.1 Protection for traction sheaves, pulleys and sprockets

Traction sheaves, pulleys and sprockets shall be protected in accordance with EN 81-1:1998, 9.7 or EN 81-2:1998, 9.4.

5.9.2 Safety gear and overspeed governor for electric lifts

All electric lifts shall have a safety gear actuated by an overspeed governor.

The total system including safety gear and overspeed governor shall be checked for compatibility and a test be carried out to ensure that the system functions correctly. If not, adjust the system (without interfering with the safety component), or if adjustment is not possible, fit a safety gear actuated by a compatible overspeed governor in accordance with EN 81-1:1998, 9.8 and 9.9.

5.9.3 Governor rope tensioning device

The governor rope tensioning device shall be fitted with an electric safety device in accordance with EN 81-1:1998, 9.9.11.3 or EN 81-2:1998, 9.10.2.10.3.

5.9.4 Ascending car overspeed and uncontrolled movement of the car with open doors

Electric lifts shall meet the following requirements:

a) Traction lifts with counterweight shall be provided with an ascending car overspeed protection in accordance with EN 81-1:1998, 9.10.

b) Machines shall be fitted with a double acting brake as defined in 5.12.1 of this standard.

c) Lifts with machines where the risk of a failure between the brake and the traction sheave is significant, shall have e. g. a protection means against uncontrolled car up or down movement with open doors or the machine shall be replaced with an EN 81-1 type machine.

NOTE 1 The evaluation of requirements a) to c) should be carried out on a case by case basis taking into account specific factors, e.g. 3-bearing traction sheave shaft, brake design, nominal travel speed, maximum out of balance load, travel height, existing top clearance, height of car, gear ratio, design of worm and worm wheel teeth, fastening of worm wheel, age of machine, frequency of use, etc.

NOTE 2 The following list gives guidance on the protection means against uncontrolled movement of the car:

a) to detect uncontrolled movements away from a landing with landing doors not locked and car doors not closed;

b) to be activated at the latest when the car leaves the unlocking zone;

c) to act on car or counterweight or rope system or traction sheave;

d) to stop the car at a distance of not more than 0,90 m away from the landing;

e) to stop the car with a maximum retardation of 1 g;

f) to require the intervention of a competent person for release.

5.9.5 Protection of hydraulic lifts against free fall, descent with excessive speed and creeping of the car

5.9.5.1 The installation shall be checked and tested to ensure it is protected against free fall, descent with excessive speed and creeping of the car. Where not, the lift shall be provided with a combination of safety devices according to EN 81-2:1998, 9.5 and Table 3.

5.9.5.2 Where an electrical anti-creep system is provided it shall include automatic return to the lowest landing according to EN 81-2:1998, 14.2.1.5.

5.10 Guide rails, buffers and final limit switches

5.10.1 Counterweight or balancing weight guided by wire ropes

Where a counterweight or balancing weight is guided by only 2 wire ropes, the guidance system shall either be:

a) replaced by rigid steel guides in accordance with EN 81-1:1998, 10.2.1, or

b) upgraded to 4 wire ropes.

5.10.2 Buffers

Lifts shall be provided with adequate buffers or alternative means. Where this is not the case they shall be provided with buffers in accordance with EN 81-1:1998, 10.3 or EN 81-2:1998, 10.3.

5.10.3 Final limit switches

Lifts shall be provided with final limit switches according to EN 81-1:1998, 10.5 or EN 81-2:1998, 10.5.

5.11 Distance between car door and landing door

5.11.1 The horizontal distance between the inner surface of the well and the sill, door frame of the car or closing edge of car sliding doors shall be in accordance with EN 81-1:1998, 11.2 or EN 81-2:1998, 11.2. If not, a car door locking device or means to reduce the distance shall be fitted according to EN 81-1:1998, 8.9.3 or 11.2.1 or EN 81-2:1998, 8.9.3 or 11.2.1.

5.11.2 Persons shall be prevented from being present between closed car and landing doors or entering between the open car and landing doors. This is fulfilled when the distances comply with EN 81-1:1998, 11.2.3 or 11.2.4 or EN 81-2:1998, 11.2.3 or 11.2.4.

5.12 Lift machine

5.12.1 Electro-mechanical brake (electric lifts)

The electro-mechanical brake shall comply with EN 81-1:1998, 12.4.2.

5.12.2 Emergency operation

The lift shall be provided with an emergency operation system in accordance with EN 81-1:1998, 12.5 or EN 81-2:1998, 12.9.

All such emergency operation systems shall be provided with instructions which are clearly displayed as defined in EN 81-1:1998, 16.3.1 or EN 81-2:1998, 16.3.1.

5.12.3 Shut-off valve (hydraulic lifts)

Hydraulic systems shall include a shut-off valve between the jack and the power unit as defined in EN 81-2:1998, 12.5.1. This valve shall be located in the machine room.

5.12.4 Stopping the machine and checking its stopped position

There shall be a stopping means as defined in EN 81-1:1998, 12.7 or EN 81-2:1998, 12.4.

5.12.5 Slack rope/chain electric safety device

A slack rope/chain device shall be fitted to the suspension in accordance with EN 81-1:1998, 9.5.3 and 12.9 or EN 81-2:1998, 12.13.

5.12.6 Run-time limiter

All lifts shall incorporate a run-time limiter in accordance with EN 81-1:1998, 12.10 or EN 81-2:1998, 12.12.

5.12.7 Low cylinder pressure (hydraulic lifts)

All indirect acting hydraulic lifts and direct acting hydraulic lifts where the jack is not rigidly fastened to the car shall be provided with a low pressure device for manual lowering to respect the requirements of EN 81-2:1998, 12.9.1.5.

5.13 Electric installations and appliances

The following items address the common hazardous situations regarding the electrical installation. However, there may be other specific hazardous situations, e.g. the existing wiring and connections; any risks of electrical shock or bridging of a safety circuit. These shall be checked on a case by case basis using a risk assessment when carrying out an audit to annex B taking into account the regulations/standards which existed at the time of the installation of the lift.

5.13.1 Protection against electric shock

The following shall be met:

a) the electric equipment of the installation shall be fitted with casings in accordance with EN 81-1:1998, 13.1.2 or EN 81-2:1998, 13.1.2 providing a degree of protection of at least IP 2X;

b) where terminals remain live when the main switch is switched off, markings as defined in EN 81-1:1998, 13.5.3.3 or EN 81-2:1998, 13.5.3.3 shall be fitted on connection terminals if the voltage exceeds 50 V;

c) group controllers shall be checked to ensure that there is a notice warning maintenance personnel that there may still be a voltage present when the main supply of the individual controller is switched off.

5.13.2 Protection of the lift machine motors

The lift machine motor shall be checked for an adequate protection. Where it is found not to be fitted, then protection devices shall be fitted in accordance with EN 81-1:1998, 13.3.1, 13.3.2, and 13.3.3 or EN 81-2:1998, 13.3.1, 13.3.2, and 13.3.3.

5.13.3 Main switches

Lockable main switches as defined in EN 81-1:1998, 13.4.2 or EN 81-2:1998, 13.4.2 shall be fitted.

5.14 Protection against electric faults, controls, priorities

5.14.1 Phase reversal protection

The installation shall be checked to ensure that the phase reversal as mentioned in EN 81-1:1998, 14.1.1.1 j) or EN 81-2:1998, 14.1.1.1 j) shall not be on its own the cause of a dangerous malfunction of the lift.

5.14.2 Inspection control station and stopping device

Each car roof shall be provided with:

a) an inspection control station in accordance with EN 81-1:1998, 14.2.1.3 or EN 81-2:1998, 14.2.1.3, and

b) a stopping device according to EN 81-1:1998, 14.2.2 or EN 81-2:1998, 14.2.2.

5.14.3 Emergency alarm device

An emergency alarm device allowing two-way voice communication shall be fitted in accordance with EN 81-1:1998,14.2.3 or EN 81-2:1998, 14.2.3. The requirements of EN 81-28 shall be considered.

5.14.4 Communication between car and machine room

Where there is no direct means of audible communication between the car and the machine room an intercom system, or similar device, shall be fitted in accordance with EN 81-1:1998, 14.2.3.4 or EN 81-2:1998, 14.2.3.4.

5.14.5 Load control

To avoid the risk of the car starting if overloaded, a load control shall be fitted in accordance with EN 81-1:1998, 14.2.5 or EN 81-2:1998, 14.2.5.

5.15 Notices, markings and operating instructions

The installation shall be provided with notices, markings and operating instructions as defined in:

a) EN 81-1:1998, 15.2.1, 15.3, 15.4, 15.5.1, 15.5.3, 15.7, 15.11 and 15.15, or

b) EN 81-2:1998, 15.2.1, 15.2.5, 15.3, 15.4, 15.5.1, 15.5.3, 15.7, 15.11, 15.15, 15.17 and 15.18.

6 Verification of safety measures and/or protective devices

Before putting a lift back into service after modifications it shall be subject to examinations and tests in accordance with EN 81-1;1998, annex E.2 or EN 81-2:1998, annex E.2 or national regulations.

Modifications made on a specific component may have implications on the safety or function of other associated components. Therefore, the examinations and tests after modification shall not be limited only to those items modified but shall include these additional affected components and systems.

7 Information for use

Relevant documentation shall be provided for those components which are changed and completed according to clause 5 of this standard**.**

Annex A
(informative)

Method for national implementation of EN 81-80

All technical solutions for upgrading of existing lifts to the state-of-the-art are listed in clause 5 of this standard. Although immediate upgrading of all existing lifts to the state-of-the-art would be sensible from the safety point of view this may not be possible to be realised in a short period of time mainly for economic reasons.

This European Standard cannot lay down binding requirements for measures to be carried out on which lift and within which period of time. Such obligations for existing lifts are subject to national legislation. The procedures described in this annex are intended to assist in setting up national regulations for increasing the safety of existing lifts by showing how to identify and evaluate the existing hazardous situations and how to classify priority levels which apply to the necessary hazard and risk reduction measures.

A.1 Identification of hazardous situations

Annex B contains a checklist which can be used for identification of the hazardous situations relative to an individual lift. This list contains all hazardous situations indicated in 4.1 of this standard. The hazardous situations mentioned there have been listed on the basis of experience gathered from registered accidents as well as specific risk assessments. The state-of-the-art for safety of the European lift industry in the last decades served as a basis. There may be additional hazardous situations for very old lifts or lifts with special technology which are not covered by this standard. In this case additional risk assessments are necessary for the lifts in question.

The identification of the hazardous situation can be carried out in the course of any periodical survey or special examination on a given installation, but only technically competent and sufficiently trained persons should be allowed to carry out these examinations. This can be subject to national regulations.

A.2 Evaluation of hazardous situations

The hazardous situations as listed in 4.1 were subjected to risk assessment in preparation for this standard.

The risk assessment was based on the assumption that an existing lift either has none or insufficient equipment for preventing the hazardous situations.

Table A.1 shows the original risk profile which can be present in existing lift installations which have not been brought up to today's state of the art safety levels in accordance with the EN 81 series of standards.

In the risk profile in annex A some risks appear twice. The background for this doubled assessment is that some hazardous situations can lead to different effects, e.g. to catastrophic incidents with a lower probability and to critical incidents with a higher probability. Accident statistics may show different experiences from country to country. In these cases the double assessments should demonstrate that, even if catastrophic incidents may not be experienced in a country, there is still a certain probability for critical incidents.

Table A.1 — Original risk profile

Frequency	Severity			
	I	II	III	IV
	Number of hazardous situation			
A				
B			30	
C		6 25 30 60	37 46 57	
C-D	70	3 9 15 17 19 22 23 27 40 50 56 71	29 45	
D	1 3 7 8 12 13 14 16 17 26 27 31 32 33 34 39 40 43 50 53 54 58 59 60 62 66 71	18 21 24 41 44 47 48 52 63 65	28 42 49 61 64	
D-E	35 36 51 52 68 72 74	20 38 55 67 69 73		
E	10 11 24 55 73			
F				

Frequency (hazard cause level):	**Severity** (hazard effect category):
A Frequent, B Probable, C Occasional, D Remote, E Improbable, F Impossible	I Catastrophic, II Critical, III Marginal, IV Negligible

NOTE 1 Numbers in cells correspond to the number of hazardous situation as listed in Table 1.

NOTE 2 For the significance of shading patterns see Table A.3.

NOTE 3 For reasons of practical application, the frequency category D was subdivided into C-D, D and D-E.

However Table A.1 does not strictly apply to every existing lift. The earlier local requirements valid in the individual member states may already include requirements which cover many hazardous situations of 4.1. Some of these requirements can be regarded as almost equivalent to the current requirements of EN 81 standards or identical.

Some of these requirements only partly covered the hazardous situations, which means that the remaining residual risk may be still too high compared with the safety level which is achieved for a lift in accordance with EN 81 series of standards.

This is why re-evaluating the risks and comparing with previous national standards will lead to filtering the risk profile. On the one hand hazardous situations covered by almost equivalent requirements can be eliminated from the risk profile. On the other hand the residual risk can be re-evaluated and re-ranked in the risk profile.

The risk caused by insufficient well lighting (risk number 17) should serve as an example here:

Considering the worst case the risk assessment implies that no well lighting exists. The respective risk is evaluated at severity category I and frequency category D. Consequently the risk level in the original risk profile (see Table A.1) is high, which means that risk-reducing measures are necessary in any case.

Former valid standards, such as EN 81-1:1985 or EN 81-2:1987, for example, already required permanently installed well lighting. Such well lighting had to be mounted at determined positions in the well, but, in contrast to EN 81-1:1998 and EN 81-2:1998, a defined intensity of illumination was not required.

Therefore the well lighting used earlier cannot be considered to be equivalent to the well lighting used today. However, lifts equipped with well lighting in accordance with former standards have certainly a lower residual risk than lifts without well lighting. Consequently the remaining residual risk can be shifted to a lower risk level of the original risk profile, i.e. to I D-E or II D, for example.

Elimination of non-relevant risks and re-evaluation of some risks dependent on earlier valid standards is a filtering process which can be carried out on national level. This filtering process facilitates use of this standard by considerably reducing the number of relevant hazardous situations for existing lifts (e.g. of certain years of manufacture) which must be subjected to check list examination and by integrating already existing equivalent solutions in the risk assessment.

A.3 Classification of priority levels

As mentioned before, upgrading all existing lifts to the state-of-the-art for safety at the same time may not be possible for various reasons. This is why a procedure is recommended here which allows subdivision of the hazardous situations in priority levels which then can be removed in several timed steps by the respective measures proposed in this standard.

The safety levels of the risk profile according to ISO/TS 14798 have been used for classifying the priority levels. The risk profile is subdivided in 5 priority levels (see Tables A.2 and A.3) where only three of them are of practical relevance.

These priority levels are defined in accordance with safety considerations only. However, implementation of measures to reduce the risk is also a question of economic considerations, as the costs of the measures to be carried out may differ significantly. This is why it is quite possible that high cost measures move down and low cost measures move up in the priority ranking (however, high risks should be addressed in the short term).

The priority levels can be assigned to a schedule for the realisation of the measures. Table A.2 also contains a possible schedule.

Table A.2 — Priorities and schedule

Fields in risk profile		Priority	Schedule
S	**F**		
I	A, B, C	Extreme	Immediate, lift has to be stopped
II	A		
I	C-D, D	High	Short term
II	B, C, C-D		
III	A, B		
I	D-E	Medium	Medium term or together with a major modernisation
II	D		
III	C, C-D		
I	E	Low	Long term or together with a modernisation of the related component
II	D-E, E		
III	D		
IV	A, B		
I	F	-	-
II	F		
III	D-E, E, F		
IV	C, C-D, D, D-E, E, F		
Frequency (hazard cause level): A Frequent, B Probable, C Occasional, D Remote, E Improbable, F Impossible			**Severity** (hazard effect category): I Catastrophic, II Critical, III Marginal, IV Negligible
NOTE The length of the terms is subject to national filtering, e.g. short term within 5 years, medium term within 10 years.			

Table A.3 — Modified risk profile with priority levels

Frequency	Severity			
	I	II	III	IV
	Priority level			
A	Extreme	Extreme	High	Low
B	Extreme	High	High	Low
C	Extreme	High	Medium	
C-D	High	High	Medium	
D	High	Medium	Low	
D-E	Medium	Low		
E	Low	Low		
F				

Frequency (hazard cause level):	**Severity** (hazard effect category):
A Frequent, B Probable, C Occasional, D Remote, E Improbable, F Impossible	I Catastrophic, II Critical, III Marginal, IV Negligible

Annex B
(informative)

Safety check list for existing lifts

The safety check list proposed in this annex (Table B.2) is intended to be a tool to identify the significant hazards on an existing lift and to determine which type of protective measure(s) proposed by this standard is applicable (see Table B.1 for its principle of use). It can be amended taking into account national filtering (see annex A) and local requirements.

A risk assessment should be made on a case by case basis for safety items not covered in this standard.

NOTE If a risk is re-evaluated, this re-evaluation should be done following the risk analysis methodology (ISO/TS 14798) used to establish this standard.

Table B.1 — The principle to use the check list

Nr.	Items to be checked	Clause	Requirement fulfilled?	Priority level	Protective measure(s) (risk reduction measure)	Possible measure to be adopted	Remarks
1	Item	5.x.y ↓	☒ Yes ☐ No ☐ Not applicable	High Mid Low	1. Action1 2. Action 2 3. Action 3	☐ Yes ☐ No ☐ Yes ☐ No ☐ Yes ☐ No	
2	Item	6.x.y	☐ Yes ☒ No ☐ Not applicable	High Mid Low	1. Action1 2. Action 2	☒ Yes ☐ No ☒ Yes ☐ No	

Table B.2 — Safety check-list for existing lifts

Nr.	Items to be checked	Clause	Requirement fulfilled?	Priority level	Protective measure(s) (risk reduction measure)	Possible measure to be adopted	Remarks
5.1 General requirements							
1	Installation without harmful material, e.g. asbestos	5.1.4	☐ Yes ☐ No	High	1. Remove asbestos which is subject to disintegration (e.g. replace brake lining material) 2. Do not carry out work on asbestos => put warning label	☐ Yes ☐ No ☐ Yes ☐ No	
5.2 Accessibility requirements							
2	Measures to ensure accessibility for disabled persons	5.2.1	☐ Yes ☐ No ☐ Not applicable		Measures according to EN 81-70	☐ Yes ☐ No	
3	Levelling and stopping accuracy	5.2.2	☐ Yes ☐ No	High	1. Change to regulated drive 2. Fit levelling device 3. Fit regulated valve (for hydraulic lifts)	☐ Yes ☐ No ☐ Yes ☐ No ☐ Yes ☐ No	
5.3 Requirements against vandalism							
4	Measures against vandalism	5.3	☐ Yes ☐ No		Measures according to prEN 81-71	☐ Yes ☐ No	
5.4 Behaviour of lifts in the event of fire							
5	Measures to ensure operation in the event of fire	5.4	☐ Yes ☐ No		Measures according to prEN 81-73	☐ Yes ☐ No	
5.5 Well							
6	Imperforate well enclosure	5.5.1.1	☐ Yes ☐ No ☐ Not applicable	High	a) Enclose the well with imperforate enclosure, or b) fit perforate well enclosure according to EN 294:1992, 4.5.2	☐ Yes ☐ No ☐ Yes ☐ No	
7	Partial well enclosure	5.5.1.2	☐ Yes ☐ No ☐ Not applicable	High	Fit well enclosure in accordance with - EN 81-1:1998, 5.2.1.2 or - EN 81-2:1998, 5.2.1.2	☐ Yes ☐ No	
8	Locking devices for access doors to well and pit	5.5.2	☐ Yes ☐ No ☐ Not applicable	High	Provide locking device according to - EN 81-1:1998, 5.2.2.2.1, or - EN 81-2:1998, 5.2.2.2.1	☐ Yes ☐ No	
	Car stops when access door to well or pit is open	5.5.2	☐ Yes ☐ No ☐ Not applicable	High	Fit safety device according to - EN 81 1: 1998, 5.2.2.2.2 or - EN 81 2: 1998, 5.2.2.2.2	☐ Yes ☐ No	
9	Wall of the well below each landing door sill	5.5.3	☐ Yes ☐ No	High	Fit landing door sill according to - EN 81-1:1998, 5.4.3 or - EN 81-2:1998, 5.4.3	☐ Yes ☐ No	
10	Protection of any accessible spaces below the car, counterweight or balancing weight	5.5.4	☐ Yes ☐ No ☐ Not applicable	Low	a) Ensure solid pier extending down to solid ground, or b) fit counterweight/ balancing weight with safety gear	☐ Yes ☐ No ☐ Yes ☐ No	
11	Counterweight or balancing weight screen	5.5.5	☐ Yes ☐ No ☐ Not applicable	Low	Fit counterweight or balancing weight screen according - EN 81-1:1998, 5.6.1 or - EN 81-2:1998, 5.6.1	☐ Yes ☐ No	

Nr.	Items to be checked	Clause	Requirement fulfilled?	Priority level	Protective measure(s) (risk reduction measure)	Possible measure to be adopted	Remarks
12	Partition of lifts in a common well in the pit	5.5.6.1	☐ Yes ☐ No ☐ Not applicable	High	Fit partition according - EN 81-1:1998, 5.6.2.1 or - EN 81-2:1998, 5.6.2.1	☐ Yes ☐ No	
13	Partition between moving parts of several lifts located in a common well	5.5.6.2	☐ Yes ☐ No ☐ Not applicable	High	Fit full height partition in the pit according to - EN 81-1:1998, 5.6.2.2 or - EN 81-2:1998, 5.6.2.2 where distances < 0,5 m	☐ Yes ☐ No	
14	Headroom and pit clearances	5.5.7	☐ Yes ☐ No	High	Ensure headroom and pit clearances are in accordance with a) EN 81-1:1998, 5.7.1, 5.7.2, 5.7.3 or - EN 81-2:1998, 5.7.1, 5.7.2, or b) prEN 81-21	☐ Yes ☐ No ☐ Yes ☐ No	
15	Safe access to pit	5.5.8	☐ Yes ☐ No	High	Provide access to pit according to - EN 81-1:1998, 5.7.3.2 or - EN 81-2:1998, 5.7.2.2	☐ Yes ☐ No	
16	Stopping device in pit and pulley room	5.5.9	☐ Yes ☐ No	High	Fit switch according to - EN 81-1:1998, 5.7.3.4, 6.4.5 or - EN 81-2:1998, 5.7.2.5, 6.4.5	☐ Yes ☐ No	
17	Adequate lighting of the well	5.5.10	☐ Yes ☐ No	High	Fit lighting of the well in accordance with EN 81-1:1998, 5.9 or EN 81-2:1998, 5.9	☐ Yes ☐ No	
18	Emergency release of persons trapped in the well	5.5.11	☐ Yes ☐ No	Mid	Fit emergency alarm device according to - EN 81-1:1998, 5.10 or - EN 81-2:1998, 5.10 and - 5.14.3 of this standard	☐ Yes ☐ No	
5.6 Machine and pulley rooms							
19	Safe access to machine room and pulley room	5.6.1	☐ Yes ☐ No	High	Fit safe access means reflecting - EN 81 1:1998, 6.2 or - EN 81-2:1998, 6.2	☐ Yes ☐ No	
20	Non-slip floor of machine and pulley room	5.6.2	☐ Yes ☐ No	Low	Provide non-slip floor according to - EN 81-1:1998, 6.3.1.2, 6.4.1.2 or - EN 81-2:1998, 6.3.1.2, 6.4.1.2	☐ Yes ☐ No	
21	Horizontal clearances in machine room	5.6.3	☐ Yes ☐ No	Mid	Protect moving equipment by guards according to - EN 294:1992, Table 4	☐ Yes ☐ No	
22	Levels and recesses in the machine room	5.6.4	☐ Yes ☐ No ☐ Not applicable	High	Fit devices reflecting - EN 81-1:1998, 6.3.2.4, 6.3.2.5 or - EN 81-2:1998, 6.3.2.4, 6.3.2.5	☐ Yes ☐ No	
23	Adequate lighting in machine and pulley room	5.6.5	☐ Yes ☐ No	High	Fit electrical lighting according to - EN 81-1:1998, 6.3.6, 6.4.7 or - EN 81-2:1998, 6.3.6, 6.4.7	☐ Yes ☐ No	
24	Metal supports or hooks for handling equipment in machine room and well	5.6.6	☐ Yes ☐ No ☐ Not applicable	Mid	Test and display safe working load on lifting means support and check for suitable position for use	☐ Yes ☐ No	

Nr.	Items to be checked	Clause	Requirement fulfilled?	Priority level	Protective measure(s) (risk reduction measure)	Possible measure to be adopted	Remarks
5.7 Landing doors and car doors							
25	Imperforate landing and/or car doors	5.7.1	☐ Yes ☐ No	High	Fit landing and/or car doors according to - EN 81-1:1998, 7.1, 8.6.1 or - EN 81-2:1998, 7.1; 8.6.1	☐ Yes ☐ No	
26	Strength of landing door fixing	5.7.2	☐ Yes ☐ No	High	Replace door fixings according to - EN 81-1:1998, 7.2.3.1 and 7.4.2.1 or - EN 81-2:1998, 7.2.3.1 and 7.4.2.1	☐ Yes ☐ No	
27	Landing and car doors which contain glass	5.7.3	☐ Yes ☐ No ☐ Not applicable	High	a) Fit glass according to - EN 81-1:1998, 7.2.3.2, 7.2.3.3, 7.2.3.4, 8.6.7.2, 8.6.7.3 and 8.6.7.4 or - EN 81-2:1998, 7.2.3.2, 7.2.3.3, 7.2.3.4,8.6.7.2, 8.6.7.3 and 8.6.7.4, or b) fit glass according to - EN 81-1:1998, annex J or - EN 81-2:1998, annex J, or c) reduce size of window to be in accordance with - EN 81-1:1998, 7.6.2 or - EN 81-2:1998, 7.6.2, or d) remove vision panel, replace by a solid panel and add “car here” indicator	☐ Yes ☐ No ☐ Yes ☐ No ☐ Yes ☐ No ☐ Yes ☐ No	
28	Precautions against dragging of children hands in horizontally sliding car doors or landing doors with glass	5.7.4	☐ Yes ☐ No ☐ Not applicable	Low	Fit protection according to - EN 81-1:1998, 7.2.3.6 and 8.6.7.5 or - EN 81-2:1998, 7.2.3.6 and 8.6.7.5	☐ Yes ☐ No	
29	Lighting on the landing	5.7.5	☐ Yes ☐ No	Mid	Install sufficient lighting on each landing according to - EN 81-1:1998, 7.6.1 or - EN 81-2:1998, 7.6.1	☐ Yes ☐ No	
30a	Car door and landing door protective devices on a lift not intended to be used by disabled persons	5.7.6	☐ Yes ☐ No ☐ Not applicable	High	a) Fit devices according to - EN 81-1:1998, 7.5.2.1.1 and 8.7.2.1.1 or - EN 81-2:1998, 7.5.2.1.1 and 8.7.2.1.1, or b) preferably a device according to - EN 81-70:2003, 5.2.3 and 5.2.4	☐ Yes ☐ No ☐ Yes ☐ No	
30b	Car door and landing door protective devices on a lift intended to be used by disabled persons	5.7.6	☐ Yes ☐ No ☐ Not applicable	High	Fit a device according to - EN 81-70:2003, 5.2.3 and 5.2.4	☐ Yes ☐ No	
31	Landing door locking devices	5.7.7	☐ Yes ☐ No	High	Replace all landing door locking devices to - EN 81-1:1998, 7.7 or - EN 81-2:1998, 7.7	☐ Yes ☐ No	
32	Emergency unlocking of landing doors with special device (e.g. triangular key)	5.7.8.1	☐ Yes ☐ No	High	Fit door locking device according to - EN 81-1:1998, 7.7.3.2 or - EN 81-2:1998, 7.7.3.2	☐ Yes ☐ No	
33	Non-accessibility of landing door locking devices from outside the well by unauthorised persons	5.7.8.2	☐ Yes ☐ No	High	a) Fit imperforate wall enclosure, or b) fit protection around landing door locking device	☐ Yes ☐ No ☐ Yes ☐ No	

Nr.	Items to be checked	Clause	Requirement fulfilled?	Priority level	Protective measure(s) (risk reduction measure)	Possible measure to be adopted	Remarks
34	Automatic closing of horizontally sliding landing doors	5.7.9	☐ Yes ☐ No ☐ Not applicable	High	Install closing device according to the last paragraph of - EN 81-1:1998, 7.7.3.2 or - EN 81-2:1998, 7.7.3.2	☐ Yes ☐ No	
35	Sliding doors with multiple panels	5.7.10	☐ Yes ☐ No ☐ Not applicable	Mid	Fit devices in accordance with - EN 81-1:1998, 7.7.6 or - EN 81-2:1998, 7.7.6	☐ Yes ☐ No	
36	Fire resistance of landing doors	5.7.11	☐ Yes ☐ No ☐ Not applicable	Mid	Fit landing doors according to the fire rating as required by national or local regulations.	☐ Yes ☐ No	
37	Power operated horizontal sliding car door only operates if hinged landing door is closed	5.7.12	☐ Yes ☐ No ☐ Not applicable	Mid	1. Ensure landing door is not unlocked until the car door has fully opened, and 2. ensure car door does not start to close until the landing door has been closed	☐ Yes ☐ No ☐ Yes ☐ No	
5.8 Car, counterweight and balancing weight							
38	Safe ratio of car floor area to rated load	5.8.1	☐ Yes ☐ No	Low	1. Reduce the available car floor area, or 2. restrict the use of that type of lift to instructed users only, or 3. verify the intended use of lift	☐ Yes ☐ No ☐ Yes ☐ No ☐ Yes ☐ No	
39	Presence of car apron	5.8.2	☐ Yes ☐ No	High	Fit car apron according to - EN 81-1:1998, 8.4 or - EN 81-2:1998, 8.4 If not possible fit apron according to prEN 81-21	☐ Yes ☐ No ☐ Yes ☐ No	
40	Presence of car door(s)	5.8.3	☐ Yes ☐ No	High	a) Fit power operated car door(s) according to - EN 81-1:1998, 8.6, 8.7, 8.8, 8.9 and 8.10 or - EN 81-2:1998, 8.6, 8.7, 8.8, 8.9 and 8.10, or b) fit manual car door(s) according to - EN 81-1: 1998, 8.6, 8.7.1 8.9 and 8.10 or - EN 81-2: 1998, 8.6, 8.7.1 8.9 and 8.10	☐ Yes ☐ No ☐ Yes ☐ No	
41	Locking of emergency trap door on the car	5.8.4	☐ Yes ☐ No ☐ Not applicable	Mid	Fit locking device of the trap door in accordance with - EN 81-1:1998, 8.12.4.2 or - EN 81-2:1998, 8.12.4.2	☐ Yes ☐ No	
42	Sufficient strength of car roof and emergency trap door	5.8.5	☐ Yes ☐ No	Low	Reinforce car roof and emergency trap door according to - EN 81-1:1998, 8.13.1 or - EN 81-2:1998, 8.13.1	☐ Yes ☐ No	

Nr.	Items to be checked	Clause	Requirement fulfilled?	Priority level	Protective measure(s) (risk reduction measure)	Possible measure to be adopted	Remarks
43	Protection against falling from car roof	5.8.6	☐ Yes ☐ No ☐ Not applicable	High	a) Reduce free distance between outer edge of the roof and adjacent wall to 0,30 m, or b) fit car roof balustrade according to - EN 81–1:1998, 8.13.3 or - EN 81–2:1998, 8.13.3 or - prEN 81-21, or c) fit full height partition, so that the distance is less than 0,30 m	☐ Yes ☐ No ☐ Yes ☐ No ☐ Yes ☐ No	
44	Sufficient car ventilation	5.8.7	☐ Yes ☐ No	Mid	a) Create or provide sufficient car ventilation. b) Where no national regulations exist, apply – EN 81-1:1998, 8.16 or – EN 81-2:1998, 8.16	☐ Yes ☐ No ☐ Yes ☐ No	
45	Normal lighting in the car	5.8.8.1	☐ Yes ☐ No	Mid	Fit lighting according to - EN 81-1:1998, 8.17.1, 8.17.2, 8.17.3. or - EN 81-2:1998, 8.17.1, 8.17.2, 8.17.3.	☐ Yes ☐ No	
46	Emergency lighting in the car	5.8.8.2	☐ Yes ☐ No	Mid	1. Fit emergency lighting according to - EN 81-1:1998, 8.17.4 or - - EN 81-2:1998, 8.17.4 2. Illuminate alarm button	☐ Yes ☐ No ☐ Yes ☐ No	
5.9 Suspension, compensation and overspeed protection							
47	Protection against injury from traction sheaves, pulleys and sprockets	5.9.1	☐ Yes ☐ No ☐ Not applicable	Mid	Fit protection according to - EN 81-1:1998, 9.7 or - EN 81-2:1998, 9.4	☐ Yes ☐ No	
48	Protection against the ropes/chains leaving the pulleys/sprockets	5.9.1	☐ Yes ☐ No ☐ Not applicable	Mid	Fit protection according to - EN 81-1:1998, 9.7 or - EN 81-2:1998, 9.4	☐ Yes ☐ No	
49	Protection against the introduction of objects between ropes/chains and pulleys/sprockets	5.9.1	☐ Yes ☐ No ☐ Not applicable	Low	Fit protection according to - EN 81-1:1998, 9.7 or - EN 81-2:1998, 9.4	☐ Yes ☐ No	
50a	Presence of safety gear activated by a compatible overspeed governor for electric lifts	5.9.2	☐ Yes ☐ No ☐ Not applicable	High	Fit a safety gear actuated by a compatible overspeed governor in accordance with - EN 81-1:1998, 9.8 and 9.9	☐ Yes ☐ No	
50b	Safety gear and compatible overspeed governor system for electric lifts function correctly	5.9.2	☐ Yes ☐ No ☐ Not applicable	High	a) Adjust the system (without interfering with the safety component), or b) if adjustment not possible fit a safety gear actuated by a compatible overspeed governor in accordance with - EN 81-1:1998, 9.8 and 9.9	☐ Yes ☐ No ☐ Yes ☐ No	
51	Electric safety device at governor rope tensioning device	5.9.3	☐ Yes ☐ No ☐ Not applicable	Mid	Fit electric safety device according to - EN 81-1:1998, 9.9.11.3 or - EN 81-2:1998, 9.10.2.10.3	☐ Yes ☐ No	
52	Ascending car overspeed protection (electric lifts)	5.9.4	☐ Yes ☐ No ☐ Not applicable	Mid	Fit ascending car overspeed protection means as defined in - EN 81-1:1998, 9.10	☐ Yes ☐ No	

Nr.	Items to be checked	Clause	Requirement fulfilled?	Priority level	Protective measure(s) (risk reduction measure)	Possible measure to be adopted	Remarks
53	Adequate lift machine design for preventing uncontrolled up or down movement of the car with open doors on electric lifts see note 1 to 5.9.4 of this standard	5.9.4, 5.12.1	☐ Yes ☐ No ☐ Not applicable	High	a) Change machine to an EN 81-1 type machine or b) install protective means against uncontrolled movement according to 5.9.4, note 2 of this standard and/or c) fit brake as required in - EN 81-1:1998, 12.4.2	☐ Yes ☐ No ☐ Yes ☐ No ☐ Yes ☐ No	
54a	Protection of hydraulic lifts against free fall, descent with excessive speed and creeping of the car	5.9.5.1	☐ Yes ☐ No ☐ Not applicable	High	Fit a combination of safety devices according to - EN 81-2:1998, 9.5 and Table 3	☐ Yes ☐ No	
54b	Automatic return of the car to the lowest floor level when an electric anti-creep system is used	5.9.5.2	☐ Yes ☐ No ☐ Not applicable	High	Fit automatic return control of the car to lowest floor according to - EN 81-2:1998, 14.2.1.5	☐ Yes ☐ No	
5.10 Guide rails, buffers and final limit switches							
55	Guidance system for counterweight or balancing weight	5.10.1	☐ Yes ☐ No ☐ Not applicable	Low	Counterweight or balancing weight: a) Fit either rigid guide system according to EN 81-1:1998, 10.2.1, or b) upgrade guidance system to 4 wire ropes	☐ Yes ☐ No ☐ Yes ☐ No	
56	Adequate buffers or alternative means	5.10.2	☐ Yes ☐ No	High	Fit buffers according to - EN 81-1:1998, 10.3 or - EN 81-2:1998, 10.3	☐ Yes ☐ No	
57	Presence of final limit switches	5.10.3	☐ Yes ☐ No	Mid	Fit final limit switches according to - EN 81 1:1998, 10.5 or - EN 81-2:1998, 10.5	☐ Yes ☐ No	
5.11 Distance between car door and landing door							
58	Horizontal distance between the inner surface of the well and the sill, door frame of the car or closing edge of car sliding doors	5.11.1	☐ Yes ☐ No	High	a) Fit means to reduce the distance as in - EN 81-1:1998, 11.2.1 or - EN 81-2:1998, 11.2.1, or b) fit car door locking device as in - EN 81-1:1998, 8.9.3 or - EN 81-2:1998, 8.9.3	☐ Yes ☐ No ☐ Yes ☐ No	
59	Horizontal distance between closed car door and landing door	5.11.2	☐ Yes ☐ No ☐ Not applicable	High	Put the installation in accordance with - EN 81 1:1998, 11.2.3 or 11.2.4, or - EN 81-2:1998, 11.2.3 or 11.2.4	☐ Yes ☐ No	
5.12 Lift machine							
60a	Emergency operation system for electric lifts	5.12.2	☐ Yes ☐ No ☐ Not applicable	High	Fit emergency operation system according to - EN 81-1:1998, 12.5 and provide instructions as defined in EN 81-1:1998, 16.3.1	☐ Yes ☐ No	
60b	Emergency operation system for hydraulic lifts	5.12.2	☐ Yes ☐ No ☐ Not applicable	High	Fit emergency operation system according to - EN 81-2:1998, 12.9 and provide instructions as defined in EN 81-2:1998, 16.3.1	☐ Yes ☐ No	

Nr.	Items to be checked	Clause	Requirement fulfilled?	Priority level	Protective measure(s) (risk reduction measure)	Possible measure to be adopted	Remarks
61	Shut-off valve (hydraulic lifts)	5.12.3	☐ Yes ☐ No ☐ Not applicable	Low	Fit shut-off valve according to - EN 81-2:1998, 12.5.1	☐ Yes ☐ No	
62	Stopping the machine and checking its stopped position	5.12.4	☐ Yes ☐ No	High	Fit stopping means according to - EN 81-1:1998, 12.7 or - EN 81-2:1998, 12.4	☐ Yes ☐ No	
63	Slack rope/chain device	5.12.5	☐ Yes ☐ No ☐ Not applicable	Mid	Fit safety device against slack rope/chain according to - EN 81-1:1998, 9.5.3, 12.9 or - EN 81-2:1998, 12.13	☐ Yes ☐ No	
64	Run time limiter	5.12.6	☐ Yes ☐ No ☐ Not applicable	Low	Incorporate run time limiter according to - EN 81-1:1998, 12.10 or - EN 81-2:1998, 12.12	☐ Yes ☐ No	
65a	Low cylinder pressure device on indirect hydraulic lifts	5.12.7	☐ Yes ☐ No ☐ Not applicable	Mid	Fit low cylinder pressure device to respect - EN 81-2:1998, 12.9.1.5	☐ Yes ☐ No	
65b	Low cylinder pressure device on direct acting hydraulic lifts where the jack is not rigidly fastened to the car	5.12.7	☐ Yes ☐ No ☐ Not applicable	Mid	Fit low cylinder pressure device to respect - EN 81-2:1998, 12.9.1.5	☐ Yes ☐ No	
5.13 Electric installations and appliances							
66	Protection against electric shock (IP2X) Protection and marking of electrical equipment	5.13.1	☐ Yes ☐ No	High	1. Fit electric equipment with casings in accordance with - EN 81-1:1998, 13.1.2 or - EN 81-2:1998, 13.1.2 providing a degree of protection of at least IP 2X 2. Fit markings as defined in - EN 81-1:1998, 13.5.3.3 or - EN 81-2:1998, 13.5.3.3 on connection terminals if the voltage exceeds 50 V 3. Fit a notice warning maintenance personnel that there may still be a voltage present when the main supply of the individual controller is switched off in group controllers	☐ Yes ☐ No ☐ Yes ☐ No ☐ Yes ☐ No	
67	Protection of lift machine motor	5.13.2	☐ Yes ☐ No	Low	Fit temperature monitoring device according to - EN 81 1:1998, 13.3.1, 13.3.2 and 13.3.3 or - EN 81-2:1998, 13.3.1, 13.3.2 and 13.3.3	☐ Yes ☐ No	
68	Presence of lockable main switches in machine room	5.13.3	☐ Yes ☐ No	Mid	Fit lockable main switches as defined in - EN 81-1:1998, 13.4.2 or - EN 81-2:1998, 13.4.2	☐ Yes ☐ No	
5.14 Protection against electric faults, controls, priorities							

Nr.	Items to be checked	Clause	Requirement fulfilled?	Priority level	Protective measure(s) (risk reduction measure)	Possible measure to be adopted	Remarks
69	No dangerous malfunction of the lift in the case of power phase reversal	5.14.1	☐ Yes ☐ No	Low	Fit phase reversal protection to ensure that phase reversal cannot be the cause of a dangerous malfunction of the lift as required by - EN 81-1:1998, 14.1.1.1.j) or - EN 81-2:1998, 14.1.1.1.j)	☐ Yes ☐ No	
70a	Inspection control station	5.14.2 a	☐ Yes ☐ No	High	Fit car inspection control station according to - EN 81-1:1998, 14.2.1.3 or - EN 81-2:1998, 14.2.1.3	☐ Yes ☐ No	
70b	Stopping device on car roof	5.14.2 b	☐ Yes ☐ No	High	Fit a stopping device according to - EN 81-1:1998, 14.2.2 or - EN 81-2:1998, 14.2.2	☐ Yes ☐ No	
71	Emergency alarm device	5.14.3	☐ Yes ☐ No	High	Fit emergency alarm device according to - EN 81-1:1998, 14.2.3. or - EN 81-2:1998, 14.2.3. (The requirements of EN 81-28 (remote alarm for lifts) shall be considered)	☐ Yes ☐ No	
72	Direct communication between car and machine room	5.14.4	☐ Yes ☐ No	Mid	Fit intercom system or similar device according to - EN 81-1:1998, 14.2.3.4 or - EN 81-2:1998, 14.2.3.4	☐ Yes ☐ No	
73	Presence of load control	5.14.5	☐ Yes ☐ No	Low	Fit load control according to - EN 81-1:1998, 14.2.5 or - EN 81-2:1998, 14.2.5	☐ Yes ☐ No	
5.15 Notices, markings and operating instructions							
74	Information on safe use and maintenance of lift	5.15	☐ Yes ☐ No	Mid	Provide correct notices , markings, and operating instructions as defined in - EN 81-1:1998, 15.2.1, 15.3, 15.4, 15.5.1, 15.5.3, 15.7, 15.11 and 15.15, or - EN 81-2:1998, 15.2.1, 15.2.5, 15.3, 15.4, 15.5.1, 15.5.3, 15.7, 15.11, 15.15, 15.17 and 15.18.	☐ Yes ☐ No	

Bibliography

[1] EN 292-1:1991, *Safety of machinery - Basic concepts, general principles for design - Part 1: Basic terminology, methodology.*

[2] EN 292-2:1991, *Safety of machinery - Basic concepts, general principles for design - Part 2: Technical principles and specifications.*

[3] EN 60529:1991, *Degrees of protection provided by enclosures (IP Code) (IEC 60529:1989).*

[4] ISO/TS 14798:2000, *Lifts (elevators) escalators and passenger conveyors, Risk analysis methodology.*

[5] *European Parliament and Council Directive 95/16/EC of the 29th of June, 1995 on the approximation of the laws of the Member States relating to lift*s.

[6] *Directive 98/37/EC of the European Parliament and of the Council of 22 June 1998 on the approximation of the laws of the Member States relating to machinery, amended by Directive 98/79/EC of 27 October 1998.*

[7] *Council Directive 89/655/EEC of 30 November 1989 concerning the minimum safety and health requirements for the use of work equipment by workers at work, amended by Council Directive 95/63/EEC of 5 December 1995.*

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