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ISO TC 187 WG 4 - prEN ISO 8100-1 ed2 final draft with track changes

ISO/TC 178/WG 4 "Safety requirements and risk assessment"
Convenorship: **SCC**
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Document type	Related content	Document date	Expected action
General / Other		2023-10-11	

Description

Please find attached the final versions of the EN ISO standards as prepared by WG1. These are the versions as submitted to ISO.

CEN/TC 10/WG 1 "Lifts and service lifts"
WG Secretariat: **AFNOR**
Convenor: **Hermann René Mr**

prEN ISO 8100-1 ed2 final draft with track changes 2023-09-05

Document type	Related content	Document date	Expected action
General / Other		2023-09-19	**INFO**

ISO/PRF 8100-1:2023(E)

Second edition

ISO TC 178/WG 04

Date: 2023-09-05

Lifts for the transport of persons and goods — Part 1: Safety rules for the construction and installation of passenger and goods passenger liftsPassenger and goods passenger lifts

Elévateurs pour le transport de personnes et d'objets — Partie 1: Règles de sécurité pour la construction et l'installation d'ascenseurs et d'ascenseurs de chargeExigences de sécurité des *ascenseurs*

WD/CD/DIS/FDIS stage

Warning for WDs and CDs

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Bibliography 281282

European Foreword

This document (prEN ISO 8100-1:2023) has been prepared by Technical Committee CEN/TC 10 “Lifts, escalators and moving walks”, the secretariat of which is held by AFNOR.

This document is currently submitted to the CEN Enquiry.

Commented [AD1]: CEN default text

This document will supersede EN 81-20:2020.

~~This is the second edition of the standard. The need for replacement was based on the following points:~~

~~— improvement in safety due to changes in proven technology;~~

~~— the need to reflect changes to the state of the art;~~

~~— incorporation of essential health and safety requirements from the relevant EU Directives;~~

Commented [SD2]: As agreed in WG1 comments N 1954

~~— elimination of reported errors;~~

~~— clarification of the text and incorporation of proposals resulting from interpretation requests[1];~~

Commented [SD3]: N2055 Combined Comments

~~— improvement of the references to other standards according to the progress in that field.~~

This document is part of the EN 81 series of standards. The structure of the EN 81 series is described in CEN/TR 81-10:2008.

Commented [AD4]: How to solve this?

This document has been prepared under a Standardization Request given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directive(s) / Regulation(s).

For relationship with EU Directive(s) / Regulation(s), see informative Annex ZA, which is an integral part of this document.

According to the CEN-CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Republic of North Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

~~[1] Within CEN/TC 10 an interpretation committee has been established to answer questions about the spirit in which the experts have drafted the various clauses of this standard. All such interpretations are published within CEN TS 81-11 until incorporated by amendment into the standards concerned.~~

Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

ISO draws attention to the possibility that the implementation of this document may involve the use of (a) patent(s). ISO takes no position concerning the evidence, validity or applicability of any claimed patent rights in respect thereof. As of the date of publication of this document, ISO *[had/had not]* received notice of (a) patent(s) which may be required to implement this document. However, implementers are cautioned that this may not represent the latest information, which may be obtained from the patent database available at www.iso.org/patents. ISO shall not be held responsible for identifying any or all such patent rights.

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 178, *Lifts, escalators, passenger conveyors*

This second edition cancels and replaces the first edition (ISO– 8100--1:2019), which has been technically revised.

The main changes are as follows:

— Editorial revision of the document structure according to the ISO/IEC Directives, part 2;

— Requirements for vertical sliding landing doors and car doors are added;

— Requirements for suspension means other than steel wire ropes are added;

— Requirements for automatic rescue operation are added;

— Requirements for traction lifts with increased available car area are added;

— Requirements for SIL-rated circuits (previously called PESSRAL) have been revised;

— Requirements for a working platform in the pit are added;

— Requirements to avoid the dragging of hands in doors are extended;

— Requirements for compensation means entering the refuge space in the pit are added;

— Requirements for the brake are aligned with overload limits;

— Performance and monitoring of the machine brake are revised;

— Requirements for pit ladders are revised;

— Fire classification of electric cables is specified.

For relationship with this document and ISO 8100-20, see informative Annex ~~G~~ D, which is an integral part of this document.

Commented [SD5]: As WG1 comments N1986

A list of all parts in the ISO 8100 series can be found on the ISO website.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Introduction

~~0.1 General~~

~~The content of this document was already published in EN 81-20:2014~~2020~~. This document contains only editorial changes and update of references.~~

This document is a type C standard as stated in ISO 12100:2010.

This document is of relevance, in particular, for the following stakeholder groups representing the market players with regard to machinery safety:

— machine manufacturers (small, medium and large enterprises);

— health and safety bodies (regulators, accident prevention organizations, market surveillance etc.).

Others can be affected by the level of machinery safety achieved with the means of the document by the above-mentioned stakeholder groups:

— machine users/employers (small, medium and large enterprises);

— machine users/employees (e.g. trade unions, organizations for people with special needs);

— service providers, e.g. for maintenance (small, medium and large enterprises);

— consumers (in case of machinery intended for use by consumers).

The above-mentioned stakeholder groups have been given the possibility to participate in the drafting process of this document

The machinery concerned and the extent to which hazards, hazardous situations and hazardous events are covered are indicated in the scope of this document.

When requirements of this type-C standard are different from those which are stated in type-A or type-B standards, the requirements of this type-C standard take precedence over the requirements of the other standards for machines that have been designed and built according to the requirements of this type-C standard.

~~0.2 General remarks~~

~~**0.2.1**~~ The object of this document is to define safety rules related to passenger and goods passenger lifts ~~with a view to safeguarding persons and objects against the risk of accidents associated with the normal use, maintenance and emergency operation of lifts~~.

~~**0.2.2** A study has been made of the various possible hazards with lifts, see Clause 4.~~

~~**0.2.2.1**~~ Persons to be safeguarded:

— users, including passengers ~~and competent and authorized persons~~, ~~e.g.~~ maintenance and inspection personnel ~~(see EN 13015:~~2001~~+A1:2008)~~;

— persons ~~in the surrounding area~~ at the landings and outside of the well, or any machine~~ry room~~space and pulley room, who can be effected by the lift.

Commented [SGD6]: Due to shortening of the introduction titles and numbers could be deleted.

Commented [IJ7]: This will be deleted in the next revision

Commented [AD8]: CEN/ISO default text

Commented [SGD9]: TFHAS
Proposal to move completely to scope not followed due to:
- already covered by the scope
- first part needed as starting subject for following clauses.

Commented [SD10]: deleteAdded reference

Commented [SD11]: As agreed in WG1 comments N 1954

Commented [SGD12]: TFHAS

Commented [SGD13]: TFAS

Commented [AD14]: N2237

~~0.2.2.2~~ Property to be safeguarded:

a) loads in car;

b) components of the lift installation;

c) building in which the lift is installed;

~~d) immediate surrounding area of the lift installation.~~

~~NOTE EN 81-71:2022 gives additional requirements covering lifts resistant to acts of vandalism and EN 81-77:2022 gives additional requirements covering lifts in seismic conditions.~~

~~0.2.3 When the weight, size and/or shape of components prevent them from being moved by hand, they are:~~

~~a) fitted with attachments for lifting gear; or~~

~~b) designed so that they can be fitted with such attachments (e.g. by means of threaded holes); or~~

~~c) shaped in such a way that standard lifting gear can easily be attached.~~

Commented [AD15]: N2237

Commented [SD16]: Added date

Commented [SD17]: Added date

Commented [SGD18]: TFHAS

Commented [SGD19]: TFHAS
Method for lifting of components added to 7.2.3 o).
Should also be covered in GEP document (see list at the end of TFHAS_74_v4.

~~0.3 Principles~~

~~0.3.1 General~~

~~In drawing up this document, the following principles have been used:~~

Commented [SGD20]: Not needed.

~~**0.3.2** This document does not repeat all the general technical rules applicable to every electrical, mechanical, or building construction design including the protection of building elements against fire.~~

~~However, it has been necessary to establish certain requirements for good constructiondesign, either because they are peculiar to lift manufacture or because, in the case of lift utilization, the requirements can be more stringent than elsewhere.~~

Commented [SGD21]: TFHAS
Not clear how the intention of 0.3.2 should be covered in the scope.
Not clear whether the text should be kept or moved to good engineering practice.
Move to GEP document

~~**0.3.3** This document states minimum rules for the installation of lifts into buildings/constructions. There can be regulations for the construction of buildings in some countries which cannot be ignored.~~

~~Typical clauses affected by this are those defining minimum values for the height of the machine and pulley rooms and for the dimensions of their access doors.~~

Commented [SGD22]: TFHAS
To be moved to new Annex on building interface information (see Annex E).

~~**0.3.4** As far as possible, this document sets out only the requirements that materials and equipment should meet in the interests of safe operation of lifts.~~

Commented [SGD23]: TFHAS

~~**0.3.5** Risk analysis, terminology and technical solutions have been considered, taking into account the methods of ISO 12100:2010, ISO 14798:2009 and the IEC 61508 series of standards.~~

Commented [SGD24]: TFHAS
Delete or move to GEP document.

~~**0.3.6** In order for this document to be a widely applicable standard, the average weight of a person has been determined to be 75 kg.~~

~~This document defines the maximum car area related to a specified design load in the car (rated load) and the minimum car area to transport a corresponding number of persons, based on 75 kg per person, in order to detect and discourage overloading.~~

Commented [SGD25]: TFHAS
Note added in 5.4.2.3.1.

~~0.4 Assumptions~~

~~0.4.1 General~~

~~In drawing up this document, the following assumptions have been made:~~

Commented [SGD26]: No remaining items.

~~**0.4.2** Negotiations have been made between the customer and the supplier, and an agreement was reached about:~~

~~a) the intended use of the lift;~~

~~b) the type and mass of the handling devices intended to be used to load and unload the car, in the case of goods passenger lifts;~~

~~c) environmental conditions such as temperature, humidity, exposure to sun or wind, snow, corrosive atmosphere;~~

~~d) civil engineering problems (for example, building regulations);~~

~~e) other aspects related to the place of installation;~~

~~f) the dissipation of heat from the components/equipment of the lift which would require ventilation of the well and/or the machinery space/location of equipment;~~

~~g) information about the aspects relating to noise and vibrations emitted by the equipment.;~~

~~h) Type and performance of automatic rescue operation if any;~~

~~**0.4.3** Relevant risks have been considered for each component that can be incorporated in a complete lift installation and rules have been drawn up accordingly.~~

~~Components are:~~

~~a) designed in accordance with usual engineering practice (see ISO/TS 8100-21:2018) and calculation codes, taking into account all failure modes;~~

~~b) of sound mechanical and electrical construction;~~

~~c) made of materials with adequate strength and of suitable quality;~~

~~d) free of defects;~~

~~e) free from harmful materials, e.g. asbestos.~~

~~**0.4.4** Components are kept in good repair and working order, so that the required dimensions remain fulfilled despite wear. All lift components are considered as requiring inspection to ensure safe continued operation during use.~~

~~The operational clearances specified in the standard should be maintained not only during the examination and tests before the lift is put into service, but also throughout the life of the lift.~~

~~NOTE Components not requiring maintenance (e.g. maintenance free, sealed for life) are still required to be available for inspection.~~

~~**0.4.5** Components are selected and installed so that foreseeable environmental influences and special working conditions do not affect the safe operation of the lift.~~

~~**0.4.6** By design of the load bearing elements, safe normal operation of the lift is assured for loads ranging from 0 % to 100 % of the rated load, plus any designed overload capacity (see 5.12.1.2).~~

Commented [IJ27]: See N1544

Commented [SD28]: Proposal is to remove to informative Annex as agreed in WG1 comments N 1954

Commented [SGD29]: TFHAS
Items d), e) and f) may be covered in annex for building interface information.

Commented [SGD30]: TFHAS
Move to GEP document.

Commented [SGD31]: TFHAS
Covered by 7.2.3 a).

Commented [SGD32]: TFHAS
Move to GEP document.

Commented [SD33]: Combined comments N2055 & N2175

Commented [SGD34]: TFHAS
Move to GEP document.

~~**0.4.7** The requirements in this document are such that the possibility of a failure of an electric safety device (see 5.11.2) or a type-tested safety component complying with all the requirements of this document and ISO 8100-2:2023, does not need to be taken into consideration.~~

Commented [SGD35]: TFHAS
Move to application guide (see items at end of TFHAS_74_v4).

~~**0.4.8** Users need to be safeguarded against their own negligence and unwitting carelessness when using the lift in the intended way.~~

Commented [SGD36]: TFHAS
Move to application guide.

~~**0.4.9** A user can, in certain cases, make one imprudent act. The possibility of two simultaneous acts of imprudence and/or the abuse of instructions for use is not considered.~~

Commented [SGD37]: TFHAS

~~**0.4.10** If in the course of maintenance work, a safety device normally not accessible to the users is deliberately neutralized, safe operation of the lift is no longer assured, but compensatory measures are taken to ensure users' safety, in conformity with maintenance instructions.~~

Commented [SGD38]: TFHAS

~~It is assumed that maintenance personnel are instructed and work according to the instructions.~~

~~**0.4.11** Horizontal forces and/or energies to consider are indicated in the applicable clauses of this document. Typically, where not otherwise specified in this document, the energy exerted by a person results in an equivalent static force of:~~

~~a) 300 N;~~

~~b) 1 000 N where impact can occur.~~

Commented [SGD39]: Move to GEP document.

~~**0.4.12** With the exception of the items listed below, which have been given special consideration, a mechanical device built according to good practice and the requirements of this document (including uncontrolled slipping of the traction means suspension means ropes on the traction sheave) does not deteriorate to a point of creating hazard without the possibility of detection, provided that all of the instructions given by the manufacturer have been duly applied:~~

Commented [SD40]: As agreed in WG1 comments N 1954

~~a) breakage of the suspension;~~

~~b) breakage and slackening of all linkage by auxiliary ropes, chains and belts;~~

~~c) failure of one of the mechanical components of the electromechanical machine brake which take part in the application of the braking action on the drum or disk;~~

Commented [SD41]: N1976 brake terminology

~~d) failure of a component associated with the main drive elements and the traction sheave;~~

~~e) rupture in the hydraulic system (jack excluded);~~

~~f) small leakage in the hydraulic system (jack included, see 6.3.1011).~~

Commented [SGD42]: TFHAS
Move to GEP document and also to application guide.

0.4.13 The possibility of the safety gear not engaging should the car free fall from a stationary position, at the lowest landing before the car strikes the buffer(s), is considered acceptable.

0.4.14 When the speed of the car is linked to the electrical frequency of the mains, the speed is assumed not to exceed 115 % of the rated speed or a corresponding lesser speed where specified in this document for inspection control, levelling, etc.

0.4.15 Means of access are provided for the hoisting of heavy equipment [see 0.4.2 e)].

0.4.16 To ensure the correct functioning of the equipment in the well and machinery space(s), i.e. taking into account the heat dissipated by the equipment, the ambient temperature in the well and the machinery space(s) is assumed to be maintained between +5 °C and +40 °C, unless otherwise indicated.

NOTE See IEC 60364-5-51:2005, Code AA5.

0.4.17 The well is suitably ventilated, according to national building regulation, taking into consideration the heat output as specified by the manufacturer, the environmental conditions of the lift and the limits given in 0.4.16, e.g. ambient temperature, humidity, direct sunlight, air quality and air tightness of buildings due to energy saving requirements.

NOTE See 0.4.2 and E.3 for further guidance.

0.4.18 Access ways to the working areas are adequately lit (see 0.4.2).

0.4.19 Minimum passageways, corridors, fire escapes, etc. are not obstructed by the open door/trap of the lift and/or any protection means for working areas outside of the well, where fitted according to the maintenance instructions (see 0.4.2).

0.4.20 Where more than one person is working at the same time on a lift, an adequate means of communication between these persons is ensured.

0.4.21 The fixing system of guards, used specifically to provide protection against mechanical, electrical or any other hazards by means of a physical barrier, which need to be removed during regular maintenance and inspection, remains attached to the guard or to the equipment when the guard is removed.

0.4.22 The fluids used for the operation of hydraulic lifts are according to ISO 6743-4:2015.

Commented [SGD43]: TFHAS
Move to application guide.

Commented [SGD44]: TFHAS

Commented [SGD45]: TFHAS
Move to building interface information.

Commented [SD46]: As per WG1 comments to align with clause 5.5 N 1954

Commented [SGD47]: TFHAS, see added clauses in 5.1.2 and 7.2.3 f).

Commented [SGD48]: TFHAS
Move to annex for building interface information and complete the information.

Commented [SGD49]: TFHAS
Move to annex on building interface information.

Commented [SGD50]: TFHAS
Move to annex on building interface information. Text needs to be reformulated accordingly.

Commented [SGD51]: TFHAS

Commented [SGD52]: TFHAS
Moved to 5.1.3.

Commented [SGD53]: TFHAS
Moved to 5.9.3.1.4.

Lifts for the transport of persons and goods —
Part 1: Safety rules for the construction and installation of passenger and goods passenger liftsPart 1: Passenger and goods passenger lifts

Commented [AD54]: ISO Titel is different!!!

1 Scope

1.1 This document specifies the safety rules for lifts permanently installed new in buildings, andwhich are intended for the transport of passengers or passengers and goods and passengers. This document applies to:

- lifts, with traction drive, positive drive or hydraulic drive;
- ,lifts serving defined landingsspecific levels
- ,lifts having a closed car designed for the transportation of persons or persons and goods;
- , suspended by ropes, belts, chains or jacks andlifts moving between along guide rails inclined not more than 15° to the vertical.
- lifts installed in buildings with boundary conditions which are in accordance with the requirements specified in Annex B;
- the electrical equipment of the lift, including lighting and socket outlets in the well.

This document does not specify additional requirements for:

- lifts installed in buildings with requirements for seismic conditions;
- lifts installed in buildings with requirements for accessibility;
- lifts exposed to vandalism;
- lifts to be used for firefighting;
- lifts intended for the transport of goods alone where the carrier is accessible, and fitted with controls situated inside the carrier or within reach of a person inside the carrier;
- the behavior of the lift when the control system of the lift receives a recall signal(s) in the event of fire in a building.

1.2 In addition to the requirements of this document, supplementary requirements need to be considered in special cases (use of lifts by persons with disabilities, in case of fire, potentially explosive atmosphere, extreme climate conditions, seismic conditions, transporting dangerous goods, etc.).

1.3 This document does not cover:

a) lifts with:

1) drive systems other than those stated in 1.1;

2) rated speed less than or equal to 0,15 m/s;

b) hydraulic lifts:

1) with a rated speed exceeding 1,0 m/s;

2) where the setting of the pressure relief valve (5.9.3.5.3) exceeds 50 MPa;

c) new passenger or goods passenger lifts in existing buildings1F[2] where, in some circumstances due to limitations enforced by building constraints, some requirements of this document cannot be met and local requirements, e.g., EN 81-21:2022 need to be considered;

d) lifting appliances, such as paternosters, mine lifts, theatrical 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 or lifts in wind turbines;

e) important modifications (see Annex C) to a lift installed before this document is brought into application;

f) safety during operations of transport, erection, repairs, and dismantling of lifts.

However, this document can usefully be taken as a basis.

Noise and vibrations are not dealt with in this document as they are not found at levels which could be considered harmful with regard to the safe use and maintenance of the lift (see also 0.4.2).

Commented [AD55]: TFHAS_74_v4

1.4 This document is not applicable to passenger and goods passenger lifts, which are installed before the date of its publication.

[2] An existing building is a building which is used or was already used before the order for the lift was placed. A building whose internal structure is completely renewed is considered a new building.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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.

ISO 1219-1:2012, *Fluid power systems and components — Graphical symbols and circuit diagrams — Part 1: Graphical symbols for conventional use and data-processing applications*

ISO 3008-2:2017, *Fire-resistance tests — Part 2: Lift landing door assemblies*

ISO 4344:2022, *Steel wire ropes for lifts — Minimum requirements*

ISO 4190-5:2006, *Lift (Elevator) installation — Part 5: Control devices, signals and additional fittings*

ISO 4413:2010, *Hydraulic fluid power — General rules and safety requirements for systems and their components*

ISO 6743-4:2015, *Lubricants, industrial oils and related products (class L) — Classification — Part 4: Family H (Hydraulic systems)*

ISO 7010:2019, *Graphical symbols — Safety colours and safety signs — Registered safety signs*

ISO 8100-2:2023, *Lifts for the transport of persons and goods —Part 2: Design rules, calculations, examinations and tests of lift components*

~~ISO/TS 8100-3:2019, *Requirements from Other Standards (ASME A17.1/CSA B44 and JIS A 4307-1/ JIS A 4307-2) not included in ISO 8100-1 or ISO 8100-2*~~

ISO 8102-1:2020, *Electrical requirements for lifts, escalators and moving walks — Part 1: Electromagnetic compatibility with regard to emission*

ISO 8102-2:2021, *Electrical requirements for lifts, escalators and moving walks — Part 2: Electromagnetic compatibility with regard to immunity*

ISO 8102-20:2022, *Electrical requirements for lifts, escalators and moving walks — Part 20: Cybersecurity*

ISO 12100:2010, *Safety of machinery — General principles for design — Risk assessment and risk reduction*

ISO 12543-2:2021, *Glass in building — Laminated glass and laminated safety glass — Part 2: Laminated safety glass*

ISO 12543-3:2021, *Glass in building — Laminated glass and laminated safety glass — Part 3: Laminated glass*

ISO 13857:2019, *Safety of machinery — Safety distances to prevent hazard zones being reached by upper and lower limbs*

ISO 14122-3:2016, *Safety of machinery — Permanent means of access to machinery — Part 3: Stairs, stepladders and guard-rails*

ISO 14122-4:2016, *Safety of machinery — Permanent means of access to machinery — Part 4: Fixed ladders*

ISO 29584:2015, *Glass in building — Pendulum impact testing and classification of safety glass*

Commented [AD56]: TFHAS_74_v4 moved to normative

Commented [AD57]: Some safety signs are mandatory

Commented [AD58]: ISO title is different than 81-50

Commented [SD59]: Moved to bibliography As agreed in WG1 comments N 1954

Commented [AD60]: WG1 2023-05-22

Commented [SD61]: N2055 combined comments ref in Normative annex F.3.1

Commented [IJ62]: Replacing EN 12600:2002

IEC 60204-1:2016+A1:2021, *Safety of machinery — Electrical equipment of machines — Part 1: General requirements*

IEC 60227-6:2001, *Polyvinyl chloride insulated cables of rated voltages up to and including 450/750 V — Part 6: Lift cables and cables for flexible connections*

~~IEC 60245-5:1994, *Rubber insulated cables — Rated voltages up to and including 450/750 V — Part 5: Lift cables*~~

Commented [AD63]: N2204

IEC 60332-1-2:2004+AMD1:2015, *Tests on electric and optical fibre cables under fire conditions — Part 1-2: Test for vertical flame propagation for a single insulated wire or cable —* Procedure *for 1 kW pre-mixed flame*

IEC 60332-3-24:2018, *Tests on electric and optical fibre cables under fire conditions – Part 3-24: Test for vertical flame spread of vertically-mounted bunched wires or cables – Category C*

IEC 60364-4-41:2005+AMD1:2017, *Low voltage electrical installations — Part 4-41: Protection for safety — Protection against electric shock*

~~IEC 60364-4-42:2010, *Low voltage electrical installations — Part 4-42: Protection for safety — Protection against thermal effects*~~

IEC 60364-6:2016, *Low voltage electrical installations — Part 6: Verification*

IEC 60417:2002, *Database — Graphical symbols for use on equipment*

IEC 60529:1989+AMD1:1999+AMD2:2013, *Degrees of protection provided by enclosures (IP Code)*

IEC 60598-1:2020, *Luminaires — Part 1: General requirements and tests*

IEC 60617:2012, *Database — Graphical symbols for diagrams*

IEC 60664-1:2020, *Insulation coordination for equipment within low-voltage systems — Part 1: Principles, requirements and tests*

~~IEC 60721-3-3:2019, *Classification of environmental conditions — Part 3-3: Classification of groups of environmental parameters and their severities - Stationary use at weatherprotected locations*~~

IEC 60754-2:2011+AMD1:2019, *Test on gases evolved during combustion of materials from cables — Part 2: Determination of acidity (by pH measurement) and conductivity*

IEC 60947-4-1:2018, *Low-voltage switchgear and controlgear — Part 4: Contactors and motor —starters - Section 1: Electromechanical contactors and motor-starters*

IEC 60947-5-1:2016, *Low-voltage switchgear and controlgear — Part 5-1: Control circuit devices and switching elements — Electromechanical control circuit devices*

IEC 60947-5-5:1997+AMD1:2005+AMD2:2016, *Low-voltage switchgear and controlgear — Part 5-5: Control circuit devices and switching elements — Electrical emergency stop device with mechanical latching function*

IEC 61034-2:2005+AMD1:2013+AMD2:2019, *Measurement of smoke density of cables burning under defined conditions – Part 2: Test procedure and requirements*

IEC 61310-3:2007, *Safety of machinery - Indication, marking and actuation — Requirements for the location and operation of actuators*

IEC 61508-1:2010, *Functional safety of electrical/electronic/programmable electronic safety-related systems — Part 1: General requirements*

Commented [AD64]: Referenced in a requirement

IEC 61800-5-2:2016, *Adjustable speed electrical power drive systems — Part 5-2: Safety requirements. Functional*

IEC 61810-1:2015+AMD1:2019, *Electromechanical elementary relays — Part 1: General requirements*

IEC 61810-3:2015, *Electromechanical elementary relays - Part 3: Relays with forcibly guided (mechanically linked) contacts*

Commented [IJ65]: See N1541, replaces EN 50205

EN 81-28:2022, *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 81-58:2022, *Safety rules for the construction and installation of lifts — Examinations and tests — Part 58: Landing door fire resistance test*

Commented [SD66]: As agreed in WG1 comments N 1954

EN 81-71:2022, *Safety rules for the construction and installation of lifts — Particular applications to passenger lifts and goods passenger lifts — Part 71: Vandal resistant lifts*

EN 1993-1-1:2006+A1:2014, *Eurocode 3 — Design of steel structures — Part 1-1: General rules and rules for buildings*

EN 12385-1:2002+A1:2008, *Steel wire ropes. Safety. General requirements*

Commented [SD67]: Added as referenced in 5.5.9.2

EN 12385-5:2021[3], *Steel wire ropes — Safety — Stranded ropes for lifts*

EN 13411-3:2022, *Terminations for steel wire ropes — Part 3: Safety. Ferrules and ferrule-securing*

EN 13411-6:2004+A1:2008, *Terminations for steel wire ropes — Part 6: Safety. Asymmetric wedge socket*

EN 13411-7:2021, *Terminations for steel wire ropes — Part 7: Safety. Symmetric wedge socket*

EN 13411-8:2011, *Termination for steel wire ropes — Part 8: Safety. Swage terminals and swaging*

Commented [SD68]: Moved from bibliography as referenced in 5.5.2.3.1

~~EN 131-2:2010+A1:2017, *Ladders — Requirements, testing, marking*~~

Commented [SD69]: N2055 Deleted as no longer referenced N2163 deleted the text to this standard

~~EN 10305-1:2016, *Steel tubes for precision applications — Technical delivery conditions — Part 1: Seamless cold drawn tubes*~~

[3] As impacted by EN 12385-5:2021/AC:2021

~~EN 10305-2:2016, *Steel tubes for precision applications — Technical delivery conditions — Part 2: Welded cold drawn tubes*~~

~~EN 10305-3:2016, *Steel tubes for precision applications — Technical delivery conditions — Part 3: Welded cold sized tubes*~~

~~EN 10305-4:2016, *Steel tubes for precision applications — Technical delivery conditions — Part 4: Seamless cold drawn tubes for hydraulic and pneumatic power systems*~~

~~EN 10305-5:2016, *Steel tubes for precision applications — Technical delivery conditions — Part 5: Welded cold sized square and rectangular tubes*~~

~~EN 10305-6:2016, *Steel tubes for precision applications — Technical delivery conditions — Part 6: Welded cold drawn tubes for hydraulic and pneumatic power systems*~~EN 10305 (all parts), *Steel tubes for precision applications — Technical delivery conditions*

~~EN 13015:2019~~2001+A1:2008, *Maintenance for lifts and escalators — Rules for maintenance instructions*

EN 13501-1:2018, *Fire classification of construction products and building elements — Part 1: Classification using data from reaction to fire tests*

EN 13501-6:2018+A1:2022, *Fire classification of construction products and building elements — Part 6: Classification using data from reaction to fire tests on electric cables*

EN 50214:2006, *Flat polyvinyl chloride sheathed flexible cables*

~~EN 50274:2002, *Low-voltage switchgear and controlgear assemblies — Protection against electric shock — Protection against unintentional direct contact with hazardous live parts*~~

Commented [AD70]: TFHAS_74_v4 references to EN 10305 are deleted

Commented [SD71]: As agreed in WG1 comments N 1954

Commented [AD72]: Not referenced anymore

3 Terms and definitions

For the purposes of this document, the following terms and definitions as well as terms and definitions given in ISO 12100:2010 apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at http://www.electropedia.org/

3.1
apron
smooth vertical part extending downwards from the sill of the landing or car entrance

~~**3.2**~~
~~**authorized person**~~
~~person with the permission of the natural or legal person who has the responsibility for the operation and use of the lift, to access restricted areas (machinery spaces, pulley rooms and lift well) for maintenance, inspection or rescue emergency operations~~

~~Note 1 to entry: Authorized persons should be competent for the tasks they have been authorized for (see also 3.7).~~

3.2
automatic operation
operation in which start of the movement of the lift happens in response to the momentary actuation of operating devices or in response to any other automatic starting function

3.3
automatic rescue operation
device or function that operates automatically in case of failure or loss of power supply to move the lift car to a landing

~~**3.3**~~
~~**available car area**~~
~~area of the car, which is available for passengers or goods during operation of the lift~~

3.4
balancing weight
mass which saves energy by balancing all or part of the mass of the car

3.5
buffer
mechanical device with characteristics to dissipate or store kinetic energy~~resilient stop at the end of travel, and comprising a means of braking using fluids or springs (or other similar means)~~

3.6
car
part of the lift which carries the ~~passengers and/or other~~ loads

~~**3.7**~~
~~**competent person**~~
~~person, suitably trained, qualified by knowledge and practical experience, provided with necessary instructions to safely carry out the required operations for maintaining or inspecting the lift, or rescuing users~~

Commented [SD73]: Combined Comments N2055 & N2147

Commented [AD74]: TFHAS_74_v4 comment EU-C3 56

Commented [SD75]: Combined comments N2055 & 2175

Commented [AD76]: TFHAS_74_v4

Commented [AD77]: TFHAS_74_v4

Commented [AD78]: TFHAS_74_v4

~~Note 1 to entry: National regulations can require certification of competence.~~

3.~~8~~7
counterweight
mass which ensures traction

3. ~~9~~8
direct acting lift
hydraulic lift where the ram or cylinder is directly attached to the car or ~~its~~ the car sling

3. ~~10~~9
down direction valve
electrically controlled valve in a hydraulic circuit for controlling the descent of the car

3. ~~11~~10
drive control system
system controlling and monitoring the running of the lift machine

3.~~12~~11
electrical anti-creep system
combination of measures ~~precautions~~ for hydraulic lifts against the danger of the car moving slowly away from the floor level~~creeping~~

3.12
electric safety device
safety contact, safety circuit or SIL-rated circuit, having the required reliability of operation

3.13
electric safety chain
~~the~~ total of the electric safety devices connected in such a way as to stop the lift when one of them is activated

3.14
full load pressure
static pressure exerted on the piping, jack, valve block, etc., with the car and rated load being at rest at the highest landing level

3.15
goods passenger lift
~~lift mainly intended for the transport of goods, which are generally accompanied by persons~~ passenger lift with additional measures for the transport of goods

3.16
guide rails
~~rigid~~ components which direct the motion~~provide guiding for the car, the counterweight or the balancing weight~~

3.17
headroom
part of the well between the highest landing served by the car and the ceiling of the well

3.18
hydraulic lift
lift in which movement of the car is controlled by flow of fluid~~lift in which the lifting power is derived from an electrically driven pump transmitting hydraulic fluid to a jack, acting directly or indirectly on the car (multiple motors, pumps and/or jacks may be used)~~

Commented [AD79]: TFHAS_74_v4 comment EU-C3 62

Commented [AD80]: TFHAS_74_v4

Commented [AD81]: the car moving slowly away from the floor level

Commented [SD82]: N2055 Combined Comments

Commented [SD83]: N2055 combined comments

Commented [AD84]: TFHAS_74_v4

Commented [AD85]: TFHAS_74_v4

3.19
indirect acting lift
hydraulic lift where the ram or cylinder is connected to the car or the car sling by suspension means (ropes, chains)

~~**3.20**~~
~~**installer**~~
~~legal or natural person taking responsibility to erect and commission the lift at its final location in the building~~

Commented [AD86]: TFHAS_74_v4

3.~~21~~20
instantaneous safety gear
safety gear in which retardation is not limited~~the full gripping action on the guide rails is almost immediate~~

Commented [AD87]: N2237

3.~~22~~21
jack
combination of a cylinder and a ram forming a hydraulic actuating unit

~~**3.23**~~
~~**laminated glass**~~
~~assembly of two or more glass layers, each of which is bonded together with one or more plastic or liquid interlayers~~

Commented [AD88]: TFHAS_74_v4 comment 5.4.7.5, updated with 2021 version,
modified by WG1 2023-05-22
definition is deleted, reference is made to product standard
It is clarified, that laminated safety glass is not intended

3.~~24~~22
levelling
operation which achieves the stopping accuracy ~~of stopping~~ at a landing~~s~~

Commented [AD89]: TFHAS_74_v4

3.~~25~~23
levelling accuracy
vertical distance between car sill and landing sill ~~during loading or unloading of the car~~

Commented [AD90]: TFHAS_74_v4

3.~~26~~24
lift machine
unit which drives and stops the lift, including any motor, gear, machine brake, sheave/sprockets and drum (traction or positive drive lift) or comprising the pump, pump motor and control valves (hydraulic drive lift)

Commented [SD91]: N1976

~~**3.25**~~
~~**load bearing member**~~
~~steel wire rope or steel wired strand inside of an elastomeric coated rope or belt~~

Commented [AD92]: N2237

3.~~27~~25
machine room
fully enclosed machinery space with ceiling, walls, floor and access door(s) in which machinery as a whole or in parts is placed

3.~~28~~26
machinery
equipment such as: control cabinet(s) and drive system, lift machine, main switch(es), and ~~means~~ devices for emergency operation~~s~~

Commented [SD93]: Combined comments N2055 & N2147

Commented [AD94]: TFHAS_74_v4

3.~~29~~27
machinery space
volume(s) inside or outside of the well where the machinery as a whole or in parts is placed, including the working areas associated with the machinery

Note 1 to entry: A machinery cabinet with its associated working area(s) is considered as a machinery space.

3.3028
maintenance
all the necessary operations to ensure the safe and intended functioning of the installation and its components after the completion of the installation and throughout its life cycle

Note 1 to entry: Maintenance can include:

a) lubrication, cleaning, etc.;

b) checks;

c) ~~rescue~~ emergency operation~~s~~;

d) the operations of setting and adjustment;

e) repair or changing of components which can occur due to wear or tear and do not affect the characteristics of the installation.

~~**3.34**~~
~~**minimum breaking force (MBF)**~~
~~specified value in kN below which the measured breaking force is not allowed to fall in a breaking force test~~

3.3029
mission time
~~mission time represents the~~ maximum period of time for which a system or subsystem can be used before it must be replaced.

~~**3.31**~~
~~**non return valve**~~
~~valve which allows flow in one direction only~~

3.30
on-board power supply
Integrated power supply located within limits of application of this standard ~~(see 5.10.1.1.1)~~. ~~Includes but is not limited to batteries, super capacitors and fuel cells.~~

3.3231
one-way restrictor
valve which allows free flow in one direction and restricted flow in the other direction

3.3332
overspeed governor
device to detect excessive speed of the lift and to trigger the operation of devices to stop the lift~~which, when the lift attains a predetermined speed, causes the lift to stop, and if necessary, causes the safety gear to be applied~~

3.3433
passenger
any person transported by a lift in the car

3.3534
pawl device
mechanical device for stopping involuntary descent of the car, and maintaining it stationary on fixed supports

Commented [SD95]: Combined comments N2055 & N2147

Commented [IJ96]: See N1722

Commented [SD97]: Combined comments N2055 deleted definition for MBF

Commented [IJ98]: See N1722

Commented [AD99]: TFHAS_74_v4

Commented [IJ100]: "Integrated" added as WG1 comment

Commented [AD101]: TFHAS_74_v4

Commented [IJ102]: See N1544

Commented [SD103]: As agreed in WG1 comments N 1954

Commented [AD104]: TFHAS_74_v4; HAS_78

3.~~36~~35
pit
the part of the well situated below the lowest landing served by the car

3.~~37~~36
positive drive lift
lift which is directly driven (not reliant on friction) by drum and ropes or by sprockets and chains or by sprockets and timing belts

3.~~38~~37
preliminary operation
energizing of the lift machine ~~and the brake/hydraulic valve~~ as preparation to a normal run when the car is in the door zone and doors are not closed and locked

~~**3.39**~~
~~**pressure relief valve**~~
~~valve which limits the pressure to a pre-determined value by exhausting fluid~~

~~**3.40**~~
~~**programmable electronic system in safety related applications for lifts**~~
~~**PESSRAL**~~
~~system for control, protection or monitoring based on one or more programmable electronic devices, including all elements of the system such as power supplies, sensors and other input devices, data highways and other communication paths, and actuators and other output devices, used in safety-related applications as listed in Table A.1~~

3.~~41~~38
progressive safety gear
safety gear in which retardation is limited~~effected by a braking action on the guide rails and for which special provisions are made so as to limit the forces on the car, counterweight or balancing weight to a permissible value~~

3.~~42~~39
pulley room
room not containing the lift machine, in which pulleys are located, and in which the overspeed governor can also be housed

3.~~43~~40
rated load
load which is intended to be carried in ~~normal~~ automatic operation, which can include handling devices ~~(see 0.4.2)~~

3.~~44~~41
rated speed
~~*v*~~
speed *v* in metres per second of the car for which the equipment has been built

Note 1 to entry: For hydraulic drive lifts:

- v_m is the rated speed upward~~s~~ in metres per second;
- v_d is the rated speed downward~~s~~ in metres per second;
- v_s is the higher value of both rated speeds v_m and v_d in metres per second.

Commented [IJ105]: See N17xx
Commented [SD106]: N2055 combined comments
Commented [SD107]: N1976
Commented [AD108]: TFHAS_74_v4
Commented [AD109]: N2237
Commented [AD110]: TFHAS_74_v4 comment 5.6.2.2.3
Commented [SD111]: Combined comments N2055 & N2175
Commented [AD112]: TFHAS_74_v4

3.4542
re-levelling
operation to correct the car position, after the lift has stopped ~~, to permit the stopping position to be corrected during loading or unloading~~at a landing

Commented [AD113]: TFHAS_74_v4

~~**3.46**~~
~~**rescue operations**~~
~~specific actions required to safely release persons entrapped in the car and well by competent persons~~

Commented [SD114]: Combined comments N2055 & N2147

3.43
residual breaking force
RBF
force the suspension means can withstand at the end of the lifetime, when discard criteria have been reached

Commented [SD115]: As agreed in WG1 Comments N 1954

3.4744
restrictor
valve in which the inlet and outlet are connected through a restricted passage way

~~**3.48**~~
~~**rupture valve**~~
~~valve designed to close automatically when the pressure drop across the valve, caused by the increased flow in a pre-determined flow direction, exceeds a pre-set amount~~

Commented [AD116]: TFHAS_74_v4

3.4945
safety circuit
circuit containing electrical~~contacts~~ and/or electronic components which is capable ~~regarded~~ to fulfil demands of an electric safety device

Commented [SD117]: As per WG1 comments 1954

Commented [SD118]: Corrected formatting N 1954

Note 1 to entry: ~~Electronic~~ Electrical components include electromechanical devices like contacts and relays. Electronic components include solid-state non-programmable electronic devices.

Commented [IJ119]: See N1722

~~**3.50**~~
~~**safety component**~~
~~component provided to fulfil a safety function when in use~~

Commented [AD120]: TFHAS_74_v4

3.5146
safety gear
mechanical device for stopping in the down direction, and maintaining stationary on the guide rails, the lift car, counterweight or balancing weight in case of overspeeding or breaking of the suspension

3.5247
safety integrity level
SIL
discrete level (one out of a possible three) for specifying the safety-integrity requirements of the safety functions allocated to the SIL-rated circuit~~the programmable electronic safety-related system~~, where safety-integrity level 3 has the highest level of safety integrity and safety-integrity level 1 has the lowest

Commented [IJ121]: See N1722

3.5348
safety rope
auxiliary rope attached to the car, the counterweight or balancing weight for the purpose of tripping a safety gear in case of suspension failure

3.5449
shut-off valve
manually operated two-way valve which can permit or prevent flow in either direction

3.~~55~~50
single acting jack
jack in which displacement in one direction is by fluid action and in the other by influence of gravity

3.51
SIL-rated circuit
circuit based on electrical (E), and/or electronic (E), and/or programmable electronic (PE) technology which is capable to fulfil demands of an electric safety device with a defined safety integrity level (SIL)~~.~~

Note 1 to entry:
The term is intended to cover any and all devices or systems operating on electrical principles.

EXAMPLE: Electrical/electronic/programmable electronic technology ~~devices~~ includes:
(a) electromechanical devices (electrical);
(b) solid-state non-programmable electronic devices (electronic);
(c) electronic devices based on computer technology (programmable electronic).

Commented [AD122]: N2237

Commented [IJ123]: AH06 to confirm if still needed

~~**3.56**~~
~~**sling**~~
~~metal framework carrying the car, counterweight or balancing weight, connected to the means of suspension~~

~~Note 1 to entry: This sling can be integral with the car enclosure.~~

Commented [AD124]: N2237

3.~~57~~52
special tool
tool unique to the equipment required in order to keep the equipment in a safe operating condition or for ~~rescue~~ emergency operation~~s~~

Commented [SD125]: Combined comments N2055 & N2147

3.~~58~~53
stopping accuracy
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

~~**3.66**~~
~~**Suspension member**~~
~~is one rope/coated rope/belt/timing belt in the system to suspend car/cwt and is engaged to car/cwt side terminations~~

Commented [SD126]: As agreed in WG1 comment N 1954

3.54
suspension means
includes all ropes/belts/chains suspending car/counterweight~~cwt~~/balancing weight and is engaged to car/counterweight~~cwt~~/balancing weight side termination

Commented [IJ127]: See N17xx

3.~~59~~55
traction lift
lift ~~whose suspension means~~ ~~lifting ropes are~~ which is driven by friction between ~~in the grooves of~~ the driving sheave ~~of the machine~~and the means of suspension

Commented [IJ128]: See N17xx

Commented [SD129]: N2055 combined comments

3.~~60~~56
travelling cable
flexible electric cable containing multiple cores between the car and a fixed point

~~3.61~~
~~type examination certificate~~
~~document issued by an approved body carrying out a type-examination in which it certifies that the product example under consideration complies with the provisions applicable to it~~

~~Note 1 to entry: For the process of type examination and definition of approved body, see ISO 8100-2:2023.~~

Commented [AD130]: TFHAS_74_v4; EU-C3 56

3.~~62~~57
unintended car movement
non-commanded movement of the car with doors open within the door zone away from the landing, excluding movements resulting from loading/unloading operation

3.~~63~~58
unlocking zone
zone, extending above and below the landing level, in which the car floor has to be to enable the corresponding landing door to be unlocked

3.~~64~~59
user
person making use of the services of a lift installation which includes passengers~~,~~ and persons waiting at the landings ~~and authorized persons~~

Commented [AD131]: TFHAS_74_v4

3.~~65~~60
well
space in which the car, the counterweight or the balancing weight travels. This space is usually bounded by the bottom of the pit, the walls and the ceiling of the well

4List of significant hazards

Commented [AD132]: TFHAS_74_v4
In accordance to CEN IR 3:2019 the whole chapter 4 is not necessary.
It is sufficient to have Annex ZA

This clause contains all the significant hazards, hazardous situations and events, as far as they are dealt with in this document, identified by risk assessment as significant for this type of machinery and which require action to eliminate or reduce the risk (see Table 1).

Table 1 — List of significant hazards

Commented [IJ133]: Will need to be updated

No.	Hazards as listed in ISO 12100:2010, Annex B	Relevant subclauses
1	Mechanical hazards due to	-
-	Acceleration, deceleration (kinetic energy)	5.2.5; 5.3.6, 5.5.3; 5.6.2; 5.6.3; 5.6.6; 5.6.7; 5.8.2; 5.9.2; 5.9.3
-	Approach of a moving element to a fixed part	5.2.5; 5.2.6; 5.5.8
-	Falling objects	5.2.5; 5.2.6
-	Gravity (stored energy)	5.2.5
-	Height from the ground	5.3; 5.4.7; 5.5; 5.6
-	High pressure	5.4.2; 5.9.3; See also 1.3
-	Moving elements	5.2; 5.3; 5.4; 5.5; 5.6; 5.7; 5.8
-	Rotating elements	5.5.7; 5.6.2; 5.9.1
-	Rough, slippery surface	5.2.1; 5.2.2; 5.4.7
-	Sharp edges	Not addressed. See 5.1.1
-	Stability	See 0.4.3
-	Strength	See 0.4.3
-	Crushing hazard	5.2.5; 5.3
-	Shearing hazard	5.3
-	Entanglement hazard	5.5.7; 5.6.2; 5.9.1
-	Drawing-in or trapping hazard	5.2.1; 5.3.1; 5.3.8; 5.4.11; 5.5.3; 5.5.7; 5.6.2; 5.9.1; 5.10.5; 5.12.1
-	Impact hazard	5.8
-	— Slip, trip and fall of persons (related to machinery)	5.2.1; 5.2.2; 5.3.11; 5.4.7; 5.3; 5.5; 5.6; 5.12.1.1.4
-	— Uncontrolled amplitude of movements	5.2.1; 5.2.5; 5.5.6; 5.8
-	— From insufficient mechanical strength of parts	See 0.4.3
-	— From inadequate design of pulleys, drums	5.5.3
-	— Falling of person from person carrier	5.3; 5.4.3; 5.4.6; 5.4.7
2	Electrical hazards	-
-	Arc	5.11.2

Commented [IJ134]: See N1537

No.	Hazards as listed in ISO 12100:2010, Annex B	Relevant subclauses
-	Live parts	5.2.6; 5.11.2; 5.12.1
-	Overload	5.10.4
-	Parts which have become live under faulty conditions	5.10.1; 5.10.2; 5.10.3; 5.11.2
-	Short-circuit	5.10.3; 5.10.4, 5.11.1; 5.11.2
-	Thermal radiation	5.10.1
3	Thermal hazards	-
-	Flame	5.3.6
-	Objects or materials with a high or low temperature	5.10.1
-	Radiation from heat sources	5.10.1
4	Hazards generated by noise	Not relevant (See 1.3)
5	Hazards generated by vibration	Not relevant (See 1.3)
6	Hazards generated by radiation	-
-	Low frequency electromagnetic radiation	5.10.1.1.3
-	Radio frequency electromagnetic radiation	5.10.1.1.3
7	Hazards generated by materials and substances	-
-	Combustible	5.4.4
-	Dust	5.2.1
-	Explosive	Not addressed (See 1.2)
-	Fibre	0.4.3
-	Flammable	5.9.3
-	Fluid	0.4.22; 5.2.1
8	Hazards generated by neglecting ergonomic principles in machinery design as, e.g. hazards from	-
-	Access	5.2.1; 5.2.2; 5.2.4; 5.2.5; 5.2.6; 5.6.2; 5.9.3; 5.12.1
-	Design or location of indicators and visual displays units	5.2.6; 5.3.9; 5.12.1.1; 5.12.4
-	Design, location or identification of control devices	5.4.8; 5.10.5; 5.10.8; 5.10.10; 5.12.1.1; 5.12.1.5
-	Effort	5.2.1; 5.2.3; 5.2.5; 5.2.6; 5.3.8; 5.3.12; 5.3.14; 5.4.7; 5.9.2
-	Local lighting	5.2.1; 5.2.2; 5.2.6; 5.3,107; 5.4.10; 5.10.1; 5.10.5; 5.10.7; 5.10.8
-	Repetitive activity	5.12.1
-	Visibility	5.2.5; 5.9.1; 5.12.1
9	Hazards associated with the environment in which the machine is used	-
-	Dust and fog	5.2.1

Commented [SD135]: As agreed in WG1 comments N 1954

No.	Hazards as listed in ISO 12100:2010, Annex B	Relevant subclauses
-	Electromagnetic disturbance	5.10.1
-	Moisture	5.2.1, 5.2.6
-	Temperature	5.2.1; 5.2.6; 5.3.12; 5.9.3; 5.10.4
-	Water	5.2.1; 5.2.6
-	Wind	5.7.2.3.1 a) 2)
-	Failure of the power supply	5.2.1; 5.2.3; 5.2.4; 5.2.5; 5.2.6; 5.3.12; 5.4.3; 5.4.6; 5.6.2; 5.9.2; 5.9.3; 5.12.1; 5.12.3
-	Failure of the control circuit	5.6.7
-	Unexpected start-up, unexpected overrun/overspeed (or any similar malfunction) from restoration of energy supply after an interruption	5.2.1; 5.2.6; 5.4.7; 5.6.2; 5.6.5; 5.6.6; 5.6.7; 5.8; 5.10.5; 5.12.2

4 ~~5~~Safety requirements and/or protective measures

4.1 ~~5.1~~ General

~~4.1.1~~~~5.1.1~~ Passenger and goods passenger lifts shall comply with the safety requirements and/or protective measures of the following clauses. In addition, the passenger and goods passenger lifts shall be designed according to the principles of ISO 12100:2010 for hazards relevant but not significant that are not dealt with by this document (e.g. sharp edges).

~~5~~4.1.2 ~~0.4.16~~The lift shall be capable of operating correctly in ambient temperatures ofbetween +5 °C and +40 °C.

If the lift is intended to operate at temperatures outside the above mentioned range, equipment shall be designed to comply with requirements of this standard also in the extended temperature range.

Commented [SGD136]: TFHAS comment on 0.4.16. AD: deleted and moved to building Annex

~~5~~4.1.32 ~~0.4.21~~ The fixing system of guards, used specifically to provide protection against mechanical, electrical or any other hazards by means of a physical barrier, which need to be removed during regular maintenance and inspection, shall remain attached to the guard or to the equipment when the guard is removed.

Commented [SGD137]: TFHAS comment on 0.4.21.

~~4.1.4~~~~5.1.2~~ ~~All~~ lLabels, notices, markings and ~~operating instructions~~signs shall be permanently affixed, indelible~~,~~ and legible ~~and readily understandable (if necessary aided by signs or symbols)~~. They shall be of durable material~~,~~ and placed in a visible position. Text information shall be ~~, and written~~ in the accepted language(s) of the country where the lift is installed.

Commented [AD138]: N2237

4.2 ~~5.2~~ Well, machinery spaces and pulley rooms

4.2.1 ~~5.2.1~~ General provisions

4.2.1.1 ~~5.2.1.1~~ Arrangement of lift equipment

~~5.2.1.1.1~~~~4.2.1.1.1~~ ~~All lift equipment shall be located in the well or in machinery spaces or pulley rooms.~~ 5.2.1.1.1 ~~All lift components~~ covered by this document, ~~except those provided for use by passengers, shall be located in the well but not inside the car, in a machine room, in a pulley room, in a machinery cabinet, or shall be accessible only by use of a key.~~ All lift components covered by this document, shall be accessible only by use of a key, except those provided for use by passengers.

Commented [RH139]: TFHAS_74_v4 comment 5.2.1.1

All lift components covered by this document, except those provided for use by passengers, shall be located:

- in a machine room; or
- in a pulley room; or
- in a machinery cabinet; or
- in the well.

~~5.2.1.1.2~~~~4.2.1.1.2~~ ~~If parts of different lifts are present in one machine and/or pulley room each lift shall be identified with a number, letter or colour consistently used for all parts (machine, controller, overspeed governor, switches, etc.).~~ Where parts (lift machine, controller, overspeed governor, switches, etc.) of a lift are installed in a machine room and/or a pully room which contains parts from other lifts, parts belonging to that lift shall be identified by consistently used number, letter or colour unique to that lift.

Commented [AD140]: TFHAS_74_v4 comment 5.6.2.2.3

Commented [AD141]: TFHAS_74_v4 EU-C3 101

~~4.2.1.2~~~~5~~.2.1.2 **Exclusive use of the well, machine and pulley rooms**

~~5.2.1.2.1~~4.2.1.2.1 The well, machine and pulley rooms shall not be used for purposes other than lifts. They shall not contain ducts, cables or devices other than for the lift.

The lift well, machine and pulley rooms may, however, contain equipment for air-conditioning or heating of these spaces, excluding steam heating and high-pressure water heating. However, any control and adjustment devices of the heating apparatus shall be located outside the well.

a) equipment for air-conditioning or heating of these spaces, excluding steam heating and high-pressure water heating. However, any control and adjustment devices of the heating apparatus shall be located outside the well;.

b) fire detectors or extinguishers, with a high operating temperature (e.g. above 80° C), appropriate for the electrical equipment and suitably protected against accidental impact.

When sprinkler systems are used, activation of the sprinkler shall only be possible, when the lift is stationary at a landing and the electrical supply of the lift and lighting circuits are automatically switched off by the fire or smoke detection system.

NOTE Such smoke, fire detection and sprinkler systems are the responsibility of the building management.

~~5.2.1.2.2~~ Machine rooms may contain machines for other kinds of lifts, e.g. goods only lifts.

~~5.2.1.2.3~~4.2.1.2.2 In the case of partially enclosed lift wells according to 5.2.5.2.3, the lift well is regarded as the area:

a) inside the enclosure where enclosures are present;

b) being within a horizontal distance of 1,50 m from movable components of the lift, where enclosures are missing.

There shall be no other devices other than for the lift to be present in those areas

~~4.2.1.3~~~~5~~.2.1.3 **Ventilation of the well, machinery spaces and pulley rooms**

The well, machinery spaces and pulley rooms shall not be used to provide ventilation of rooms other than those belonging to the lift.

Ventilation shall be such that the motors and equipmentmachinery, as well as electric cables, etc., are protected from dust, harmful fumes and humidity.

NOTE See E.3 for further guidance.

Commented [RH142]: TFHAS_74_v4 comment 5.2.1.2.1

Commented [RH143]: TFHAS_74_v4 comment 5.2.1.2.1

Commented [RH144]: TFHAS_74_v4 comment 5.2.1.2.2

Commented [RH145]: TFHAS_74_v4 comment 5.2.1.2.3
Moved to Annex E (Building)

Commented [AD146]: TFHAS_74_v4 comment 5.6.2.2.3

~~4.2.1.4~~4.2.1.2~~5.2.1.4~~ Lighting

~~5.2.1.4.1~~4.2.1.2.1 The well shall be provided with permanently installed electric lighting, giving the following intensity of illumination, even when all doors are closed, at any position of the car throughout its travel in the well:

a) at least 50 lx, 1,00 m above the car roof within its vertical projection;

b) at least 50 lx, 1,00 m above the pit floor, and above the pit platform (where provided) everywhere a person can stand, work and/or move between the working areas;

c) at least 20 lx outside of the locations defined in a) and b), excluding shadows created by car or components.

To achieve this, ~~sufficient number of lamps~~ luminaires shall be fixed throughout the well enclosure and, where necessary, additional ~~lamp(s)~~ luminaires ~~may be fixed~~ on the car roof as a part of the well's lighting system.

Commented [RH147]: TFHAS_74_v4 comment 5.2.1.4.1

Commented [SD148]: WG1 Comments & N1998

~~Lighting elements shall be protected against mechanical damage.~~

The mechanical strength of luminaires shall comply with IEC 60598-1:2020, 4.13 level 1 for fixed luminaires and level 3 for portable luminaires.

Commented [SD149]: WG1 Comments & N1998

The supply for this lighting shall be in conformity with ~~5~~4.10.7.1.

~~NOTE For specific tasks additional temporary lighting can be necessary, e.g. by hand lamp.~~

The light meter ~~should~~ shall be oriented towards the strongest light source when taking lux level readings.

~~5.2.1.4.2~~4.2.1.2.2 Machinery spaces and pulley rooms shall be provided with permanently installed electric lighting with an intensity of at least 200 lx at floor level everywhere a person needs to work, and 50 lx at floor level to move between working areas. The supply for this lighting shall be in conformity with ~~5.10.7.1~~4.10.7.1.

~~NOTE This lighting can be part of the lighting of the well.~~

~~4.2.1.5~~4.2.1.3~~5.2.1.5~~ Electric equipment in the pit, ~~and~~ in machinery spaces and in pulley rooms

~~5.2.1.5.1~~4.2.1.4.1~~4.2.1.3.1~~ There shall be in the pit:

a) stopping device(s) ~~visible and accessible on opening the door(s) to the pit, and from the pit floor,~~ in conformity with the requirements of ~~5.12.1.11~~4.12.1.11; ~~The stopping device(s) shall be~~located~~as follows~~:

1) ~~For pits with depth less than or equal to 1,60 m, the stop switch shall be~~ at any ~~pit~~ door giving access to the pit (landing door or access door);

— within a vertical distance of minimum 0,40 m and maximum 1,20 m above the access floor;

— within a horizontal distance of maximum 0,75 m from the door frame inner edge.

Where there are two landing doors at the same level giving access to the pit, then one shall be determined as the pit access door, having the access equipment;

2) ~~For pits with depth greater than 1,60 m, two stop switches shall be provided~~ In case of no pit platform~~:~~;

— ~~the upper switch within a vertical distance of minimum 1,0 m above the lowest landing floor and within a horizontal distance of maximum 0,75 m from the door frame inner edge~~ within a vertical distance of maximum 2,00 m above the pit floor;

— ~~the lower one within a maximum vertical distance of 1,20 m above pit floor operable from a refuge space.~~operable within 0,30 m of a refuge space

~~NOTE This device may be combined with the one on the inspection control station required in b).~~

~~NOTE This device may be the same as required in a) 1).~~

3) ~~In the case of a pit access door, other than landing doors, a single stop switch, within a horizontal distance of maximum 0,75 m from the access door frame inner edge, at 1,20 m in height from the pit floor.~~In the case of a pit platform~~:~~;

— within a vertical distance of maximum 2,00 m above the pit platform;

— within a vertical distance of maximum 2,00 m above the pit floor, if there are moving parts below the pit platform.

~~NOTE These device(s) may be combined with one on the inspection control station required in b).~~

~~1) Where there are two landing doors at the same level giving access to the pit, then one shall be determined as the pit access door, having the access equipment;~~

~~NOTE The stop switch can be combined with the inspection station required in b).~~

b) a permanently installed inspection control station according to ~~5.12.1.5~~4.12.1.5, operable within 0,30 m of a refuge space;

c) socket outlet(s) (~~5~~4.10.7.2) accessible from:

— the pit; where no platform is provided; or

— the pit platform.

Commented [SD150]: As per WG1 comments 2039

Commented [SD151]: As WG1 comments N2045 Annex I

Commented [SD152]: As agreed in WG1 comments 23/11/2020 (Annex I AH6 comments)

Commented [SD153]: As agreed in WG1 comments 23/11/2020 (Annex I AH6 comments)

Commented [SD154]: As agreed in WG1 comments 23/11/2020 (Annex I AH6 comments)

Commented [SD155]: As agreed in WG1 comments 23/11/2020 (Annex I AH6 comments)

Commented [SD156]: As agreed in WG1 comments 23/11/2020 (Annex I AH6 comments)

Commented [RH157]: TFHAS_74_v4 comment 5.2.1.5.1

Commented [AD158]: TFHAS_74_v4 comment 5.2.1.5.1

Commented [SD159]: N2055 combined comments

Commented [AD160]: TFHAS_74_v4 comment 5.2.1.5.1

—

d) means to switch the well lighting (~~5.2.1.4.1~~4.2.1.3.1~~4~~.2.1.2.1), positioned at any door giving access to the pit (landing door or pit access door):

— within a vertical distance of minimum 0,40 m and maximum 1,20 m from the access floor;

— within a horizontal distance of maximum 0,75 m from the door frame inner edge.

Where there are two landing doors at the same level giving access to the pit, then one shall be determined as the pit access door, having the access equipment.

~~d) means to switch the well lighting (see 5.2.1.4.1), positioned within a maximum horizontal distance of 0,75 m from the pit access door frame inner edge and at a minimum height of 1,0 m above the access floor level.~~

~~4.2.1.4.2~~4.2.1.3.2~~5.2.1.5.2~~ There shall be in machinery spaces and pulley rooms:

a) ~~a) in machinery spaces and pulley rooms~~ a switch accessible only to authorized persons and placed close to each access point, at an appropriate height, controlling the lighting of the areas and spaces~~at each access point, accessible only to authorized persons;~~means to switch the lighting of the spaces and rooms close to each access point;

b) ~~b) in machinery spaces and pulley rooms at least one~~ a socket outlet (~~see 5.10.7.2~~4.10.7.2) for each space and room. ~~provided at an appropriate place for each working area;~~

~~c) c)~~

~~5.2.1.5.3~~4.2.1.4.3~~4~~.2.1.3.3 There shall be in pulley rooms a stopping device, in conformity with ~~5~~4.12.1.11, ~~installed in the pulley room,~~ close to each ~~point of~~ access point.

~~4.2.1.6~~4.2.1.4~~5.2.1.6~~ Emergency release

If no means to escape are provided for person(s) trapped in the well, alarm initiation devices to the alarm system according to EN 81-28:2022 shall be installed at places where the risk of trapping exists (see ~~5.2.1.5.1~~4.2.1.4.1~~4~~.2.1.3.1, ~~5.2.6.4~~4.2.6.4 and ~~5.4.7~~4.4.7). ~~operable within 0,30 m of a from the refuge space(s).~~

~~If there is a risk of trapping in areas outside of the well, such risks should be discussed with the building owner [see 0.4.2 e)].~~

~~**4.2.1.7 5.2.1.7 Handling of equipment**~~

~~One or more suspension point(s) with the indication of the safe working load, as appropriate, shall be provided in the machinery spaces and where necessary, at the top of the well, conveniently positioned to permit the hoisting of heavy equipment (see 0.4.2 and 0.4.15).~~

~~4.2.1.8~~4.2.1.5~~5.2.1.8~~ Strength of walls, floors and ceilings

~~5.2.1.8.1~~4.2.1.7.1~~4~~.2.1.5.1 The structure of the well, machinery spaces and pulley rooms shall ~~conform to national building regulations and shall be able to support at least the loads which can be applied by the lift machine; by the guide rails at the moment of safety gear operation, in the case of eccentric load in the car; by the action of the buffers; by those which can be applied by the anti-rebound device; by loading and unloading the car; etc. See also Annex E, E.1.~~ be able to support the loads and reaction forces imposed by the lift components during the lift operation.

Commented [SD161]: As agreed in WG1 comments 23/11/2020 (Annex I AH6 comments)

Commented [SD162]: As agreed in WG1 comments 23/11/2020 (Annex I AH6 comments)

Commented [SD163]: As agreed in WG1 comments 23/11/2020 (Annex I AH6 comments)

Commented [SD164]: Undeleted As agreed in WG1 comments 23/11/2020 (Annex I AH6 comments)

Commented [SD165]: As agreed in WG1 comments 23/11/2020 (Annex I AH6 comments)

Commented [IJ166]: See N1538

Commented [SD167]: As agreed in WG1 comments N1954

Commented [RH168]: TFHAS_74_v4 comment 5.2.1.6

Commented [RH169]: TFHAS_74_v4 comment 5.2.1.7

Commented [AD170]: N2237

Commented [RH171]: TFHAS_74_v4 comment 5.2.1.8.1

~~5.2.1.8.24.2.1.7.24~~.2.1.5.2 The walls of the well shall have a mechanical strength such that when a force of 1 000 N, being evenly distributed over an area of ~~0,30 m × 0,30 m~~ 0,09 m² in round or square section, is applied at right angles to the wall at any point on either face, they shall resist without:

a) permanent deformation greater than 1 mm;

b) elastic deformation greater than 15 mm.

~~5.2.1.8.34.2.1.7.34~~.2.1.5.3 Glass panels, plane or formed, shall be made of laminated glass according to ISO 12543-3:2021.

They and their fixings shall withstand 1 000 N horizontal static force on an area of ~~0,30 m × 0,30 m~~ 0,09 m² at any point, from both inside and outside the well, without permanent deformation.

~~5.2.1.8.44.2.1.7.44~~.2.1.5.4 The floor of the pit shall be able to support beneath each guide rail, ~~except hanging guide rails,~~ the force due to the mass of the guide rails plus any load due to components fixed or linked to the guide(s) and/or any additional reaction, ~~N,~~ occurring during emergency stopping (e.g. load on traction sheave due to rebound when machine on rails), plus the reaction at the moment of operation of the safety gear and any push through force exerted by the guide rails clips (see ~~5.7.2.3.5~~4.7.2.3.5).

~~5.2.1.8.54.2.1.7.54~~.2.1.5.5 The floor of the pit shall be able to support beneath the car buffer supports, four times the static load imposed by the mass of the fully loaded car, evenly distributed between the total number of car buffers [see Formula (1)]:

$$F = 4 \cdot g_n \cdot (P + Q) \quad (1)$$

where

- F is the total vertical force in newtons;
- g_n is the standard acceleration of free fall, [9,81 (m/s²)];
- P is the mass of the empty car and components supported by the car, i.e. part of the travelling cable, compensation means ~~compensating ropes/chains~~ (if any), etc. in kilograms;
- Q is the rated load (mass) in kilograms.

~~5.2.1.8.64.2.1.7.64~~.2.1.5.6 The floor of the pit shall be able to support beneath the counterweight buffer supports, four times the static load imposed by the mass of the counterweight, evenly distributed between the total number of counterweight buffers [see Formula (2)]:

$$F = 4 \cdot g_n \cdot (P + q \cdot Q) \quad (2)$$

where

- F is the total vertical force in newtons;
- g_n is the standard acceleration of free fall, [9,81 (m/s²)];
- P is the mass of the empty car and components supported by the car, i.e. part of the travelling cable, compensation~~ing ropes/chains~~means (if any), etc. in kilograms;
- Q is the rated load (mass) in kilograms;
- q is the balance factor indicating the amount of counterbalance of the rated load by the counterweight.

~~5.2.1.8.74.2.1.7.74~~.2.1.5.7 For hydraulic lifts, the floor of the pit shall be able to support beneath each jack the loads and forces (in newtons) imposed to it.

Commented [SD172]: N2055 combined comments

Commented [AD173]: TFHAS_74_v4 comment 5.4.7.5

Commented [SD174]: N2055 combined comments

Commented [SD175]: Combined comments M2055

Commented [SD176]: Combined comments N2055

~~5.2.1.8.84.2.1.7.8~~4.2.1.5.8 For hydraulic lifts, the total vertical force imposed on the fixed stops during operation of the pawl device can be evaluated approximately according to the following formulae:

a) Pawl devices provided with energy accumulation type buffers [see Formula (3)]:

$$F = \frac{3 \cdot g_n \cdot (P+Q)}{n} \quad (3)$$

b) Pawl devices provided with energy dissipation type buffers [see Formula (4)]:

$$F = \frac{2 \cdot g_n \cdot (P+Q)}{n} \quad (4)$$

where

F is the total vertical force in newtons on fixed stops imposed during operation of pawl device;

g_n is the standard acceleration of free fall, [9,81 (m/s²)];

n is the number of pawl devices;

P is the mass of the empty car and components supported by the car, i.e. part of the travelling cables, compensation means [~~compensating ropes/chains~~ (if any), etc. in kilograms;

Q is the rated load (mass) in kilograms.

Commented [IJ177]: See N17xx

~~5.2.1.9 Surfaces of walls, floors and ceilings~~

Commented [RH178]: TFHAS_74_v4 comment; moved to Annex E

~~Surfaces of walls, floors and ceilings of wells, machine and pulley rooms shall be in durable material~~ e.g. concrete, brick or blockwork, ~~not favouring the creation of dust, e.g. concrete, brick or blockwork.~~

Commented [SD179]: Combined comments N2055

~~The surface of the floor where a person needs to work or to move between working areas shall be of non-slip material.~~

~~NOTE 1 For guidance, see ISO 14122-2:2016, Annex A 4.2.4.6.~~

Commented [SD180]: Combined comments N2055

~~The floor of working areas shall be approximately level, except for any buffer and guide rail bases and water drainage devices.~~

~~After the building-in of guide rail fixings, buffers, any grids, etc., the pit shall be impervious to infiltration of water.~~

~~For hydraulic lifts, the space in which the power unit is situated and the pit shall be designed in such a way that it is impervious, so that all the fluid contained in the machinery placed in these areas is retained if it leaks out or escapes.~~

~~NOTE 2 National regulations can require the protection of hydraulic pipe routed through the building.~~

4.2.2 ~~5.2.2~~ Access to the ~~well~~pit ~~and to machinery spaces and pulley rooms~~

Commented [RH181]: TFHAS_74_v4 comment; moved to Annex E

~~5.2.2.1 The well, machinery spaces and pulley rooms and the associated working areas shall be accessible. Provisions shall be made to allow access to spaces other than the car interior only to authorized persons. See also Annex D, Figure D.1.~~

~~5.2.2.2 The access way adjacent to any door/trap giving access to the well or to machinery spaces and pulley rooms shall be lit by a permanently installed electric lighting with an intensity of at least 50 lux~~lx~~.~~

~~NOTE National regulations can require lighting level greater than 50 lux~~lx~~.~~

~~5.2.2.3 If access to the lift for maintenance and rescue emergency operation purposes is via private premises, then permanent access of authorized persons to the premises and relevant instructions shall be provided.~~

~~The manufacturer/installer should make the building designer/architect/owner aware of the agreement regarding access, fire, entrapment and also problems of security associated with lifts serving directly into private premises (see 0.4.2).~~

~~NOTE Access via private premises can be subject to national regulations.~~

~~5.2.2.4~~4.2.2.1 A means to enter the pit shall be provided consisting of:

a) In case a pit platform is not provided:

1) where the pit depth is not exceeding 2,50 m, either:

— an access door, or

— a pit access ladder according to Annex C~~an access door where the pit depth exceeds 2,50 m~~;

2) where the pit depth exceeds 2,50 m:

— an access door~~either an access door or a ladder according to Annex FAnnex D inside the well, easily accessible from the landing door, where the pit depth is not exceeding 2,50 m~~.

b) In case a pit platform is provided, either:

1) an access door to the pit, a ladder to access the platform ~~according EN ISO 14122-4~~ and an access trap door according to ~~5.2.3~~4.2.3 and ~~5.2.4~~4.2.4, ; or~~where the access to the bottom of the pit is only possible via a platform in the pit.~~

2) an access door to the pit platform, a ladder to access the pit and an access trap door according to ~~5.2.3~~4.2.3 and ~~5.2.4~~4.2.4; or

3) a ladder according to Annex C~~inside the well, easily accessible from the landing door~~, where the distance to the pit platform is not exceeding 2,50- m, and a ladder to access the pit and an access trap door according ~~5.2.3~~4.2.3 and ~~5.2.4~~4.2.4.

Any pit access door shall comply with the requirements of ~~5.2.3~~4.2.3.

~~Where a pit access door is greater than 500mm from the pit floor a ladder shall also be provided.~~Where the vertical distance between a pit access door and the pit floor exceeds 500 mm a ladder shall be provided.~~Ladders shall comply with Annex F.~~

~~If the ladder is not a fixed ladder (see Annex F, Type 1), it~~Where there is a risk of the ladder in its deployed ~~position colliding with moving elements of the lift, the ladder shall be provided with an electric safety device(s) in accordance with 5.11.2 to prevent the lift from operating if the ladder is not in its stored position.~~If the ladder is not a fixed ladder (see Annex C, Type 1), automatic operation of the lift shall be prevented if the ladder is not in its stored position.

If the ladder is stored on the pit floor, all pit refuge spaces shall be maintained when the ladder is in its stored position.

Commented [SD182]: Combined comments N2055 & N2147

Commented [RH183]: TFHAS_74_v4 comment 5.2.2.4

Commented [SD184]: Updated text N2055 combined comments

Commented [AD185]: Editorial clarification aligned with AH6

Commented [SD186]: Updated text N2055 combined comments

Commented [SD187]: N2055 combine comments

Commented [AD188]: N2237 -019

Commented [SD189]: N2055 combined comments

Commented [SD190]:

Commented [AD191]: N2237 -019

Commented [SD192]: N2055 combined comments

Commented [SD193]: N2055 combined comments (changed to “exceeds 500mm”)

Commented [SD194]: As agreed in WG1 comments Annex II N 1954

Commented [SD195]: As agreed in WG1 comments 23/11/2020 (Annex II)

Commented [SD196]: Combined comments N2055 (deleted text from the end of this sentence “ ISO 14122-4:2016 for height above 2,5 m)”

Commented [SD197]: Combined comments N2055 and 2163

Commented [SD198]: As agreed in WG1 Comments N 1954

Commented [AD199]: AH6 2023-03-22

~~5.2.2.5 A safe access for persons to machinery spaces and pulley rooms shall be provided. For preference, this should be effected entirely by way of stairs. If it is not possible to install stairs, ladders satisfying the following requirements shall be used:~~

~~a) the access to the machinery spaces and pulley rooms shall not be situated more than 4 m above the level accessible by stairs. For access over 3 m in height by ladder, fall protection shall be provided;~~

~~b) ladders shall be fastened to the access permanently or at least by rope or chain in such a way that they cannot be removed;~~

~~c) ladders exceeding 1,50 m in height shall, when in position for access, form an angle between 65° and 75° to the horizontal and shall not be liable to slip or turn over;~~

~~d) the clear width of the ladder shall be at least 0,35 m, the depth of the steps shall not be less than 25 mm and in the case of vertical ladders the distance between the steps and the wall behind the ladder shall not be less than 0,15 m. The steps shall be designed for a load not less than 1 500 N;~~

~~e) adjacent to the top end of the ladder there shall be at least one hand hold within easy reach;~~

~~f) around a ladder, within a horizontal distance of 1,50 m, the risk of falling by more than the height of the ladder shall be prevented.~~

~~NOTE National building regulations can require access only by stairs.~~

~~5.2.2.6~~4.2.2.2 A pit platform shall be provided when the vertical distance exceeds 2,20 m from the standing area(s) on the pit floor to:

— equipment mounted on the underside of the car which needs to be maintained with the car at its lowest possible position during pit inspection operation (see ~~5.12.1.5.2.14~~.12.1.5.2.1 g); or

— equipment placed in the pit which needs to be maintained.

Commented [RH200]: TFHAS_74_v4 comment; moved to Annex E

Commented [SD201]: Removed Title N2055 combined comments

Commented [SD202]: Combined comments N2055

Where a platform is provided in the pit, the following shall be applied:

a) the vertical distance from the floor of the standing area(s) on the pit platform to equipment which needs to be maintained from the pit platform shall not ~~be greater than~~exceed 2,20 m;

b) the clear vertical height between the bottom of the pit and the lowest parts of the pit platform shall be at least 1,50 m for movement or where testing and maintenance work has to be executed;

c) refuge space(s) according ~~5.2.5.8.1~~4.2.5.8.1 shall be available on the pit platform;

d) clearances between the platform and the car shall comply with ~~5.2.5.8.2~~4.2.5.8.2;

e) the horizontal perpendicular distance between the pit platform and the ~~shaft~~ walls of the well or components of the lift shall not exceed 0,30 m, unless it is provided with a balustrade in conformity with ~~5.4.7.4~~4.4.7.4. It shall not be possible to pass a ball with a diameter of 0,15 m through any gap between the pit platform and the sill of a door giving direct access to the pit platform;

f) the pit platform shall be provided with a toe board of a minimum height of 0,10 m on its outer edges;

g) the ~~dimensions of~~ openings in the pit platform, ~~e.g.~~ for rails, buffers and, electrical ~~lines~~ cables, ~~etc.~~ shall be ~~as small as possible according to their purpose and~~ provided with at least 0,05 m high ferrules, if they are not already protected by a toe board;

h) no load bearing component of the lift, e.g. guide rails, or hydraulic jack, shall be supported by the pit platform. There shall be a clear distance of at least 0,30 m above unprotected rotating, or vertically moving parts.

i) the pit platform shall have ~~sufficient~~a strength to support the maximum number of persons, as indicated in ~~5.2.5.8.1~~4.2.5.8.1. However, the pit platform shall resist a minimum force of 2 000 N at any position on an area of 0,30 m × 0,30 m without permanent deformation greater than 1 mm;

j) the maximum permissible load shall be indicated on the platform;

k) the pit platform shall be designed as follows:

— slip resistant;

— plane surface;

~~From the platform, presence of a component in the pit shall be visible through the pit platform.~~

4.2.3 ~~5.2.3~~Access, ~~and~~ emergency, ~~doors — Access~~ trap and ~~doors — I~~inspection doors

~~5.2.3.1~~4.2.3.1 When the distance between consecutive landing door sills exceeds 11 m, one of the following conditions shall be fulfilled. There shall be:

a) intermediate emergency doors; or

b) adjacent cars each fitted with an emergency door, provision for which is made in ~~5.4.6.2~~4.4.6.2.

NOTE "Consecutive" is understood as meaning two adjacent floors, with landing doors, regardless of open through or open adjacent configurations.

Commented [SD203]: Combined comments N2055

Commented [SD204]: Added word 'minimum' N2055 combined comments

Commented [AD205]: N2237 -154

Commented [SD206]: Added as WG1 comment (5.2.5.8.2) to update original N1874 Annex IV 5.2.2.6 h) proposal

Commented [SD207]: Combined comments N2055 (074)

Commented [SD208]: Combined comments N2055 (061)

Commented [SD209]: New clause 5.2.2.6 - Original text from 5.2.7 Platform in the pit moved to 5.2.2.6 and updated as per WG1 Comments Annex IV N 1954

Commented [AD210]: N2055,-061 requires to delete the whole sentence

Commented [SD211]: As agreed in WG1 comments 23/11/2020

~~5.2.3.2~~4.2.3.2 Access, ~~and~~ emergency, ~~doors, access~~ trap ~~doors~~ and inspection doors shall have the following dimensions:

a) access doors to machine rooms and access doors to the well shall have a minimum height of 2,00 m and a minimum width of 0,60 m;

b) access doors to pulley rooms shall have a minimum height of 1,40 m and a minimum width of 0,60 m;

c) access trap doors for persons to machine and pulley rooms shall give a clear passage of at least 0,80 m × 0,80 m, and shall be counterbalanced;

d) emergency doors shall have a minimum height of 1,80 m and a minimum width of 0,50 m;

e) inspection doors shall have a maximum height of 0,50 m and a maximum width of 0,50 m ~~and shall have sufficient dimensions to carry out the required work through the door~~;

f) access trap doors on the pit platform shall give a clear passage of at least 0,50 m × 0,70 m.

~~5.2.3.3~~4.2.3.3 Access, ~~and~~ emergency ~~doors~~ and inspection doors shall:

a) not open towards the inside of the well or machine or pulley room;

b) be provided with a key-operated lock, capable of being ~~re~~closed ~~and relocked~~ without the use of a key and automatically locked when closed;

c) be openable from inside the well, machine or pulley room without a key, even when locked;

d) be provided with an electric safety device in conformity with ~~5.11.2~~4.11.2, checking the closed position;

An electric safety device is not required in the case of:

1) access door(s) to machine and pulley rooms; and

2) ~~in the case of~~ access door(s) to the pit (~~5~~4.2.2.4), if the pit door(s) does not give access to a hazardous zone. This is regarded to be the case if the free vertical distance between the lowest parts of car, counterweight or balancing weight including guide shoes, apron, etc. during ~~normal~~ automatic operation and the bottom of the pit or the pit platform is at least 2,00 m.

The presence of travelling cables, compensation means ~~compensating ropes/chains~~ and their equipment, tensioning pulleys for the overspeed governor and similar installations is not regarded as being hazardous.

e) be imperforate ~~, satisfy the same requirements for mechanical strength as the landing doors,~~ and comply with the regulations relevant to the fire protection for the building concerned;

f) have a mechanical strength such that when a force of 1 000 N, being evenly distributed over an area of ~~0,30 m × 0,30 m~~ 0,09 m^2 in round or square section, is applied at right angles at any point from outside the well, it shall resist without elastic deformation greater than 15 mm.

Commented [SD212]: As agreed in WG1 comments 23/11/2020

Commented [RH213]: TFHAS_74_v4 comment 5.2.3.2 e)

Commented [SD214]: N2055 combined comments

Commented [SD215]: As agreed in WG1 comments 23/11/2020

Commented [SD216]: N2055 combined comments

Commented [SD217]: N2055 combined comments

Commented [SD218]: Combined comments N2055 & N2175

Commented [SD219]: As per WG 1 comments N 1954 under 5.2.5.2.1

Commented [IJ220]: China comment to assist in translation

Commented [IJ221]: See N1537

Commented [GE222]: INT #8

~~5.2.3.4~~4.2.3.4 Access trap doors~~,~~ shall comply with the following:

a) when they are closed, they shall be able to support 2 000 N on an area of 0,20 m × 0,20 m at any position;

b) trap doors shall not open downward~~s~~. Hinges, if any, shall be of a type which cannot be unhooked;

c) trap doors used only for access of material ~~may~~ shall be unlocked from the inside only;

d) when a trap door is in the open position, precautions shall be taken to prevent the fall of persons (e.g. a guardrail) and prevent the trap_door from closing such as to cause a crushing hazard (e.g. by counterbalance).

~~NOTE National regulations can require a specific height for such protection from falls.~~

4.2.4 ~~5.2.4~~Notices

~~5.2.4.1~~4.2.4.1 A notice bearing the following minimum inscription:

“Lift Machinery — Danger
Access forbidden to unauthorized persons”

shall be fixed to the outside of doors or trap- doors (excluding landing doors and doors of emergency and test panels) giving access to machine and pulley rooms.

In the case of trap- doors, a ~~permanently visible~~ notice shall indicate to those using the trap- door:

“Danger of falling — Reclose the trap- door”

~~5.2.4.2~~4.2.4.2 Outside of the well, near the access doors and emergency doors, if any, there shall be a notice stating:

"Lift well — Danger
Access forbidden to unauthorized persons"

Commented [SD223]: Undeleted clause 5.2.3.4 As agreed in WG1 comments 23/11/2020

Commented [RH224]: TFHAS_74_v4 comment 5.2.3.4

Commented [AD225]: N2237 -156

Commented [IJ226]: China comment to correct requirements

Commented [RH227]: TFHAS_74_v4 comment 5.2.3.4

Commented [RH228]: TFHAS_74_v4 comment 5.2.4.1

4.2.5 ~~5.2.5~~Well

4.2.5.1~~5.2.5.1~~ General provisions

~~5.2.5.1.1~~4.2.5.1.1 The well may contain one or more lift cars.

~~5.2.5.1.2~~4.2.5.1.2 The counterweight or the balancing weight of a lift shall be in the same well as the car.

~~5.2.5.1.3~~4.2.5.1.3 For hydraulic lifts jacks shall be in the same well as the car. They may extend into the ground or other spaces.

4.2.5.2~~5.2.5.2~~ Well enclosure

4.2.5.2.1 ~~5.2.5.2.1~~ General

~~5.2.5.2.1.1~~4.2.5.2.1.1 ~~A lift shall be separated from the surroundings~~The well shall be ~~by:~~ according ~~5.2.5.2.2~~4.2.5.2.2 or ~~5.2.5.2.3~~4.2.5.2.3.

~~a) walls, floor and ceiling; or~~

~~b) sufficient space.~~

~~5.2.5.2.1.2~~4.2.5.2.1.2 Any horizontal projection from the wall into the well or any horizontal beam - including separator beams - greater than 0,15 m in width and 0,25 m in length, shall be protected from a person standing there, unless access is prevented by a car top balustrade in accordance with ~~5.4.7.4~~4.4.7.4.

Protection shall be:

a) the projection is chamfered to at least 45° to the horizontal where the projection is greater than 0,15m; or

b) a deflector forming an inclined surface of minimum 45° to the horizontal, capable of resisting a force of 300 N applied at right angles to the deflector at any point, distributed evenly over a surface of 5 cm² in round or square section, such that it shall resist:

— without permanent deformation greater than 1mm;

— without elastic deformation greater than 15 mm.

4.2.5.2.2 ~~5.2.5.2.2~~ Totally enclosed well

~~5.2.5.2.2.1~~The well shall be totally enclosed by imperforate walls, floor and ceiling.

The only permissible openings are:

a) openings for landing doors;

b) openings for access and emergency doors to the well and inspection doors;

c) vent openings for escape of gases and smoke in the event of fire;

d) ventilation ~~openings~~apertures;

e) necessary openings for the functioning of the lift between the well and the machine or pulley rooms.

~~5.2.5.2.2.2 Any horizontal projection from a wall into the well or horizontal beam greater than 0,15 m width x 0,25 m in length x 1,20 m high, including separator beams, shall be protected from a person standing there, unless access is prevented by a car top balustrade in accordance with 5.4.7.4.;~~

Commented [SD229]: Renumbered due to insertion of 5.2.5.2.1.2

Commented [RH230]: TFHAS_74_v4 comment 5.2.5.2.1

Commented [AD231]: N2237 -157

Commented [SD232]: Combined comments N2055

Commented [SD233]: WG1 comments N1986

Commented [SD234]: N2055 combined comments

Commented [IJ235]: See N1537 & N 1538

Commented [SD236]: Combined comments N2055 moved text from 5.2.5.2.2.2

Commented [SD237]: Combined comments N2055

Commented [IJ238]: See N 1538

Commented [IJ239]: WG1 Comment

Commented [SD240]: As per WG1 comments N1986

Commented [SD241]: Reworded and moved to General 5.2.5.2.1.2

~~Protection shall be such as:~~

~~e) a) the projection, where greater than 0,15 m, shall be chamfered to at least 45° to the horizontal; or~~

~~f) b) a deflector forming an inclined surface of minimum 45° to the horizontal, capable of resisting a force of 300 N applied at right angles to the deflector at any point, distributed evenly over a surface of 5 cm² in round or square section, such that it shall resist:~~

~~— without permanent deformation greater than 1mm;~~

~~— without elastic deformation greater than 15 mm.~~

4.2.2.5.2.3 ~~5.2.5.2.3~~ Partially enclosed well

Where the well is required to be partially enclosed, e.g. observation lifts in connection with galleries or atriums, tower buildings, etc., the following apply (see Figure 1 and Figure 2):

a) the height of the enclosure at places normally accessible to persons shall be ~~sufficient to prevent such persons from:~~ in conformity with Figure 1 and Figure 2:

~~f) 1) being endangered by moving parts of the lift; and~~

~~g) 2) interfering with the safe operation of the lift by reaching lift equipment within the well, either directly or with hand-held objects;~~

~~h) b) the height is assumed to be sufficient if it is in conformity with Figure 1 and Figure 2. i.e.:~~

1) minimum 3,50 m at a landing door side;

2) minimum 2,50 m at other sides and with a minimum horizontal distance of 0,50 m to moving parts of the lift.

   If the distance to moving parts exceeds 0,50 m, the value of 2,50 m can be reduced progressively to a minimum height of 1,10 m in a distance of 2,00 m;

b) ~~c)~~ the enclosure shall be imperforate;

c) ~~d)~~ the enclosure shall be located within 0,15 m maximum of the edges of floors, stairs or platforms (see Figure 1) or be protected in accordance with ~~5.2.5.2.2~~1.24.2.5.2.1.2;

d) ~~e)~~ provisions shall be taken to prevent the interference with the operation of the lift by other equipment [see ~~5.2.1.2.3~~4.2.1.2.2 ~~b) and~~ ~~7.2.2 e)~~6.2.3 d)];

~~f) special precautions shall be taken for lifts exposed to weather (see 0.4.5), e.g. wall climbing lifts installed against the exterior walls of a building.~~

Commented [IJ242]: See N1537 & N 1538

Commented [SD243]: N2055 combined comments (moved text to 5.2.5.2.1.2)

Commented [RH244]: TFHAS_74_v4 comment 5.2.5.2.3

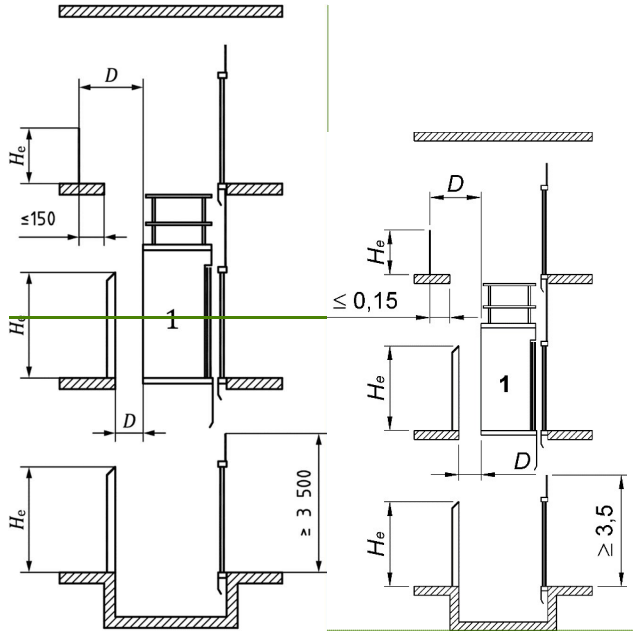
Commented [AD245]: N2237 -158

Commented [SD246]: N2055 Correct Ref due to change to 5.2.5.2.2.2

Commented [AD247]: 4.2.1.2 is deleted N2237

Commented [RH248]: TFHAS_74_v4 comment 5.2.5.2.3

Dimensions in ~~milli~~metres



Key

1 Car

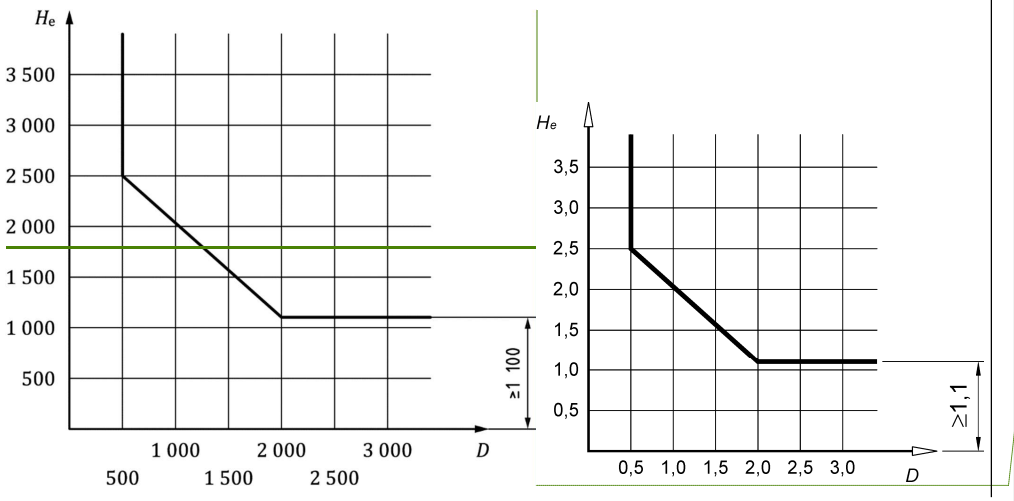
D distance to moving parts of the lift (see Figure 2)

H_e height of the enclosure

Figure 1 — Partially enclosed well

Commented [SD249]: Updated figure 1 with units in meters as per WG1 comments N1954

Dimensions in ~~milli~~metres



Key

H_e height of the enclosure

D distance to moving parts of the lift

Figure 2 — Partially enclosed well — Distances

4.2.5.3 ~~5.2.5.3 Construction of~~ Clearances related to the walls of the well and landing doors facing a car entrance

~~5.2.5.3.1~~4.2.5.3.1 The horizontal distance between the inner surface of the well and the sill, door frame of the car ~~or~~ and closing edge of car sliding doors shall not exceed ~~0,15~~ 0,12 m, over the full height of the well (See Figure 3).

The distance given above:

a) ~~may be extended to~~ shall not exceed 0,20 m over a height not exceeding 0,50 m. There shall not be more than one of such recesses in between two consecutive landing doors;

b) ~~may be extended to~~ shall not exceed 0,20 m throughout the travel on goods passenger lifts in which the landing doors are vertically sliding;

c) is not limited if the car is provided with a mechanically locked door in accordance with ~~5.3.9.2~~4.3.9.2, which can only be opened in the unlocking zone of a landing door.

The operation of the lift shall automatically depend on the locking of the corresponding car door except in the cases covered in ~~5.12.1.4~~4.12.1.4 and ~~5.12.1.8~~4.12.1.8. This locking shall be ~~proved~~ checked by an electric safety device in conformity with ~~5.11.2~~4.11.2.

Commented [SD250]: Updated figure 2 with units in meters as per WG1 comments N1954

Commented [RH251]: TFHAS_74_v4 comment 5.2.5.3

Commented [AD252]: WG1 2023-06-28

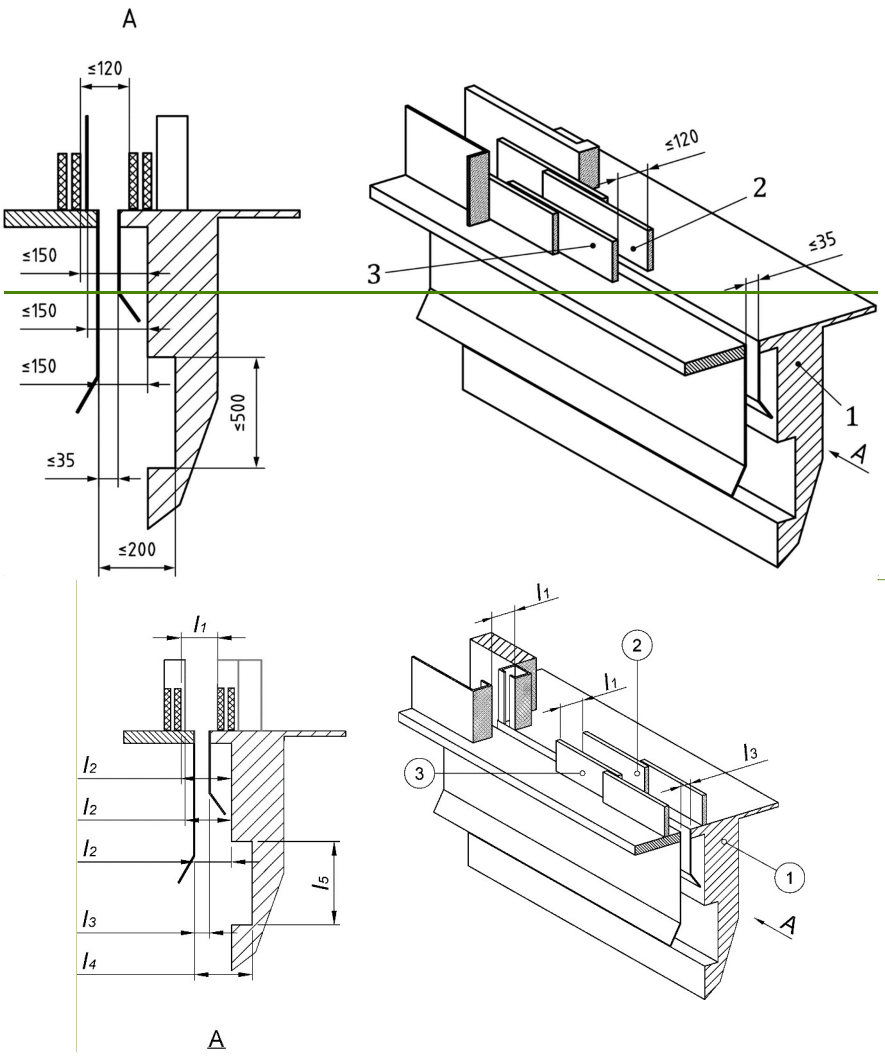
Commented [SD253]: Combined comments N2055 (574)

Commented [RH254]: TFHAS_74_v4 comment 5.2.5.3.1

Commented [RH255]: TFHAS_74_v4 comment 5.2.5.3.1

Commented [AD256]: Editorial alignement

Commented [SD257]: Moved text as it belongs to bullet point c, As agreed in WG1 comments N1986



Key

1	lift well wall
2	landing door leading panel
3	car door leading panel
l_1	distance ≤ 0,10 m [~~5.3.4.2~~4.3.4.2]
l_2	distance ≤~~0,15~~ 0,12 m [~~5.2.5.3.1~~4.2.5.3.1]
l_3	distance ≤ 35 mm [~~5.3.4.1~~4.3.4.1]
l_4	distance ≤ 0,20 m [~~5.2.5.3.1~~4.2.5.3.1 a)]
l_5	distance ≤ 0,50 m [~~5.2.5.3.1~~4.2.5.3.1 a)]

Figure 3 — Clearances between car and wall facing the car entrance

Commented [SD258]: New Figure 3 WG1 comments N1954 (added 4 to key to identify the door frame of the car & inner car wall return to reflect right hand drawing)

Commented [SD259]: N 2055 combined comments - Corrected Symbols *l 1 l 5* to '≤'

~~5.2.5.3.2~~4.2.5.3.2 Below each landing door sill~~, the wall of the well~~ the surface facing the car apron shall comply with the following requirements:

Commented [RH260]: TFHAS_74_v4 comment 5.2.5.3.2

a) it shall form a vertical surface which is directly connected to the landing door sill, whose height is at least half the unlocking zone plus 50 mm and whose width is at least the clear opening of the car access plus 25 mm on both sides;

b) this surface shall be continuous and be composed of smooth and hard elements, such as metal sheets, and shall be capable of withstanding a force of 300 N applied at a right angle to the wall at any point, being evenly distributed over an area of 5 cm^2 in round or square section, it shall resist:

   1) without permanent deformation greater than 1mm;

Commented [IJ261]: See N1537

   2) without elastic deformation greater than 15 mm;

c) any projections shall not exceed 5 mm. Projections exceeding 2 mm shall be chamfered at least 75° to the horizontal.

d) Furthermore, it shall be either:

   1) connected to the lintel of the next door; or

   2) extended downwards using a hard smooth chamfer whose angle to the horizontal plane shall be at least 60°. The projection to this chamfer on the horizontal plane shall not be less than 20 mm.

4.2.5.4 ~~5.2.5.4~~ Protection of any spaces located below the well

If accessible spaces do exist below the well~~, the base of the pit shall be designed for an imposed load of at least 5 000 N/m^2, and~~ the counterweight or the balancing weight shall be equipped with safety gear.

Commented [RH262]: TFHAS_74_v4 moved to Annex E

4.2.5.5 ~~5.2.5.5~~ Protection in the well

~~5.2.5.5.1~~4.2.5.5.1 The travelling area of the counterweight or the balancing weight shall be guarded by ~~means of~~ a screen(s)~~, which~~:

— where the vertical distance of the lowest point of the counterweight resting on its fully compressed buffer(s) or of the balancing weight in its lowest position, is less than 2,00 m from the pit floor;

— where a pit platform is provided, and the vertical distance of the lowest point of the counterweight resting on its fully compressed buffer(s) or of the balancing weight in its lowest position, is less than 2,00 m from the pit platform and the horizonal distance between the pit platform edges and the counterweight or the balancing weight is less than 0,50 m.

The screen shall comply with the following:

a) if this screen is perforate, ISO 13857:2019, 4.2.4.1 shall be respected;

b) this screen shall extend from the lowest point of the counterweight resting on its fully compressed buffer(s) or balancing weight in its lowest position to a minimum height of 2,00 m from the pit floor or platform where provided;

c) in no case shall the lowest part of the screen~~it~~ be more than:

— 0,30 m from the pit floor;

— 0,10 m from the pit platform where provided; ~~to the lowest part of the screen.~~

For buffers travelling with the counterweight, see ~~5.8.1.1~~4.8.1.1.

d) the width shall be at least equal to that of the counterweight or balancing weight;

e) if the gap between the counterweight/balancing weight guide rails and the well wall exceeds 0,30 m then this area shall also be guarded in accordance with b) and c);

f) the screen may have slot(s) ~~with the minimum width necessary~~ to permit free passage of compensation means or for the purpose of visual inspection;

g) the screen shall ~~have sufficient rigidity to ensure that~~ not deflect to cause the counterweight or balancing weight to collide with it when a force of 300 N being evenly distributed over an area of 5 cm² in round or square section is applied at right angles at any point of the screen~~, it shall not deflect to cause the counterweight or balancing weight to collide with it~~;

~~h) the car and its associated components shall be at a distance of at least 50 mm from the counterweight or balancing weight (if there is one) and its associated components.~~

Commented [AD263]: N2237 -159

Commented [SD264]: As agreed in WG1 comments 23/11/2020

Commented [SD265]: As agreed in WG1 comments N1986

Commented [SD266]: As agreed in WG1 comments N1986

Commented [RH267]: TFHAS_74_v4 comment 5.2.5.5.1

Commented [RH268]: TFHAS_74_v4 comment 5.2.5.5.1.

Commented [SD269]: Moved to separate clause (5.2.5.5.3) as per WG1 comments N 1954

~~5.2.5.5.24~~.2.5.5.2 Where the well contains several lifts there shall be a partition between the moving parts of different lifts. This partition shall comply with the following:

a) If this partition is perforate, ISO 13857:2019, 4.2.4.1 shall be respected;

b) The partition shall ~~have sufficient a~~ rigidity to ensure that when a force of 300 N being evenly distributed ~~over an area of 5 cm² in round or square section, is applied at right angles at any point of the partition, it shall not deflect to cause the moving parts to collide with it;~~ not deflect to cause the moving parts to collide with it when a force of 300 N being evenly distributed over an area of 5 cm² in round or square section is applied at right angles at any point of the partition.

c) ~~5.2.5.5.2.1~~ This partition shall extend from within 0,30 m from the pit floor or pit platform if provided to a height of 2,50 m

— above the pit platform if provided; or

— above the floor of the door giving access to the pit ~~of the lowest landing~~.

The width shall ~~be~~ prevent access from one pit to another, with the maximum free distance of 0,15~~0m~~ m to the adjacent wall. ~~sufficient as to prevent access from one pit to another.~~

Where the conditions of ~~not giving access to a hazardous zone according to 5.2.3.3~~4.2.3.3 d)2) are met, ~~then~~ such a partition screen ~~shall not be provided~~ below the lowest point of the travel of the car is not required ~~may be avoided~~.

d) ~~5.2.5.5.2.2~~ The partition shall extend through the full height of the well where ~~if~~ the horizontal distance between the inner edge of any balustrade and a moving part (car, counterweight or balancing weight) of an adjacent lift is less than 0,50 m.

This partition shall be at least the width of the moving part and extend a further 0,10 m on each side throughout the height of the well.

~~5.2.5.5.3~~4.2.5.5.3 The car and its associated components shall be at a distance of at least 50 mm from the counterweight or balancing weight (if there is one) and its associated components.

Commented [AD270]: N2237 -160, -161

Commented [AD271]: N2237 -162

Commented [RH272]: TFHAS_74_v4 comment 5.2.5.5.2

Commented [IJ273]: See N1538

Commented [SD274]: AS WG1 comments N2045

Commented [SD275]: Combined comments N2055

Commented [SD276]: Moved from 5.2.5.5.1 h) to separate clause as per WG1 comments N 1954

4.2.5.6 ~~5.2.5.6~~ Guided travel of car, counterweight and balancing weight

4.2.5.6.1 ~~5.2.5.6.1~~ Extreme position of car, counterweight and balancing weight

~~5.2.5.6.1.1~~4.2.5.6.1.1 The extreme positions of car, counterweight and balancing weight according to Table 1 shall be considered for requirements on guided travel according to ~~5.2.5.6~~4.2.5.6, and refuge spaces and clearances according to ~~5.2.5.7~~4.2.5.7 and ~~5.2.5.8~~4.2.5.8.

Table 1 — Extreme positions of car, counterweight and balancing weight

Position	Traction drives	Positive drives	Hydraulic drives
Highest position of car	Counterweight on fully compressed buffer $+0{,}035v^2$[a]	Car on fully compressed upper buffer	Ram in its ultimate position achieved through the means of ram stroke limitation $+0{,}035v_m^2$
Lowest position of car	Car on fully compressed buffer	Car on fully compressed lower buffer	Car on fully compressed buffer
Highest position of counterweight/balancing weight	Car on fully compressed buffer $+0{,}035v^2$	Car on fully compressed lower buffer $+0{,}035v^2$	Car on fully compressed buffer $+0{,}035v_d^2$
Lowest position of counterweight/balancing weight	Counterweight on fully compressed buffer	Car on fully compressed upper buffer	Ram in its ultimate position achieved through the means of ram stroke limitation $+0{,}035v_m^2$

[a] $0{,}035v^2$ represents half the gravity stopping distance corresponding to 115 % of the rated speed: $\frac{1}{2} \cdot \frac{(1{,}15 \cdot v)^2}{2 \cdot g_n} = 0{,}033\,7v^2$, rounded to $0{,}035v^2$.

~~5.2.5.6.1.2~~4.2.5.6.1.2 When for traction lifts the slowdown of the lift machine is monitored, in accordance with ~~5.12.1.3~~4.12.1.3, the value of $0{,}035v^2$, in Table 1 ~~may be reduced taking into account~~ shall be calculated with the speed at which the car or counterweight comes into contact with the buffer (see ~~5.8.2.2.2~~4.8.2.2.1 b)).

~~5.2.5.6.1.3~~4.2.5.6.1.3 For traction lifts which are fitted with compensation means ~~compensating ropes~~ having a tensioning pulley equipped with an anti-rebound device (braking or lock-down device), the value of $0{,}035v^2$ in Table 1 ~~may~~ shall be replaced by a ~~figure~~ value for the movement of the car related to the possible travel of that pulley ~~(depending on the roping used)~~ plus 1/500 of the travel of the car, with a minimum of 0,20 m to take account of the elasticity of the ropes.

~~5.2.5.6.1.4~~4.2.5.6.1.4 In the case of direct acting hydraulic lifts, the value of $0{,}035v^2$ mentioned in Table 1 need not be taken into account.

4.2.5.6.2 ~~5.2.5.6.2~~ In the case of traction lifts

When the car or counterweight is at its highest position according to ~~5.2.5.6.1~~4.2.5.6.1, its guide rail lengths shall be such as would accommodate a further guided travel of at least 0,10 m.

4.2.5.6.3 ~~5.2.5.6.3~~ In the case of positive drive lifts

~~5.2.5.6.3.1~~4.2.5.6.3.1 The guided travel of the car upwards from the top floor until it strikes the upper buffers shall be at least 0,50 m. The car shall be guided to the limit of its buffer stroke.

Commented [RH277]: TFHAS_74_v4 comment 5.2.5.6.1.1

Commented [SD278]: As per WG1 comments N 1954

Commented [RH279]: TFHAS_74_v4 comment 5.2.5.6.1.1

Commented [AD280]: TFHAS_74_v4 comment 5.6.2.2.3

Commented [RH281]: TFHAS_74_v4 comment 5.6.5.1.2

Commented [IJ282]: See N17xx

Commented [RH283]: TFHAS_74_v4 comment 5.6.5.1.3

Commented [IJ284]: WG1 editorial change

~~5.2.5.6.3.2~~4.2.5.6.3.2 When the balancing weight, if there is one, is at its highest position according to ~~5.2.5.6.1~~4.2.5.6.1, its guide rail lengths shall be such as would accommodate a further guided travel of at least 0,30 m.

4.2.5.6.4 ~~5.2.5.6.4~~ In the case of hydraulic lifts

~~5.2.5.6.4.1~~4.2.5.6.4.1 When the car is at its highest position according to ~~5.2.5.6.1~~4.2.5.6.1, its guide rail lengths shall be such as would accommodate a further guided travel of at least 0,10 m.

~~5.2.5.6.4.2~~4.2.5.6.4.2 When the balancing weight, if there is one, is at its highest position according to ~~5.2.5.6.1~~4.2.5.6.1, its guide rail lengths shall be such as would accommodate a further guided travel of at least 0,10 m.

~~5.2.5.6.4.3~~4.2.5.6.4.3 With the balancing weight, if there is one, at its lowest position according to ~~5.2.5.6.1~~4.2.5.6.1, its guided length shall be such as would accommodate a further guided travel of at least 0,10 m.

4.2.5.7 ~~5.2.5.7~~ Refuge spaces on car roof and clearances in headroom

~~5.2.5.7.1~~4.2.5.7.1 When the car is at its highest position according to ~~5.2.5.6.1~~4.2.5.6.1, at least one clear area on the car roof ~~where~~ shall provide a refuge space ~~can be accommodated shall be provided on the car roof,~~ selected from Table 2.

For type 2 refuge spaces, the ~~a~~ reduction to accommodate parts fixed on the car roof shall not exceed ~~is allowed on one side at the lower edge where the refuge space touches the car roof. A reduction of~~ 0,10 m wide by 0,30 m high ~~may be included in order to accommodate parts fixed on the car roof~~ (see Figure 4).

If more than one person is necessary on the car roof for carrying out inspection and maintenance work, an additional refuge space shall be provided for each additional person.

In the case of more than one refuge space, they shall be of the same type and not interfering with each other.

Dimensions in ~~milli~~metres

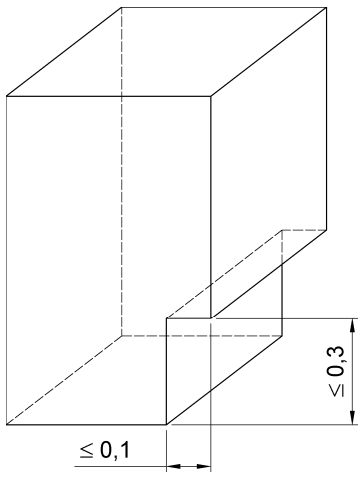


Figure 4 — Maximum dimensions of a reduction in the refuge space

Commented [AD285]: N2237 -163

Commented [RH286]: TFHAS_74_v4 comment 5.6.5.7.1

Commented [SD287]: Aligned figure with units in the clause (meters)

A sign on the car roof readable from the landings giving access to the car roof shall clearly indicate the allowed number of persons and the type of posture (Table 2) considered for the refuge space(s) accommodation.

Where a counterweight is used a sign shall be placed on or near the counterweight screen (see ~~5.2.5.5.1~~4.2.5.5.1) stating the maximum allowed clearances between the counterweight and the counterweight buffer when the car is at its upmost landing level in order to maintain the car headroom dimensions.

Table 2 — Dimensions of refuge spaces in headroom

Type	Posture	~~Pictogram~~Sign	Horizontal dimensions of the refuge space m	Height of the refuge space m
1	Upright		0,40 × 0,50	2,00
2	Crouching		0,50 × 0,70	1,00
NOTE The overhead obstacle warning sign ISO 7010:2019, W020 is incorporated in these safety signs.				

~~5.2.5.7.24~~.2.5.7.2 When the car is at its highest position according to ~~5.2.5.6.14~~.2.5.6.1, the clear distance between the lowest parts of the ceiling of the well (including beams and parts situated under the ceiling) (see Figure 5) and:

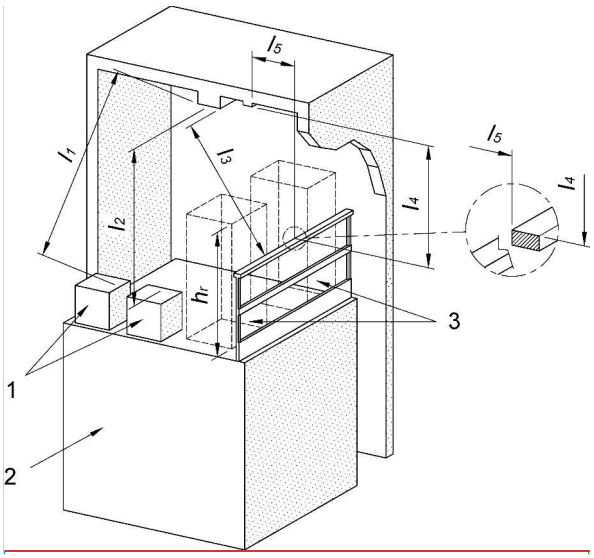
a) the highest pieces of equipment fixed on the car roof, except for those covered in b) and c) below, shall be at least 0,50 m in any vertical or inclined direction within the projection of the car roof limited by the balustrade(s) ~~5.4.7.24~~.4.7.2 b) if any;

b) the highest part of the guide shoes or rollers, of the suspension means terminations ~~rope terminations~~ and of the header or parts of vertically sliding doors, if any, shall be at least 0,10 m in any vertical direction within a horizontal distance of 0,40 m within the projection of the car;

c) the highest part of the balustrade shall be at least:

1) 0,30 m within a horizontal distance of 0,40 m within the projection of the car and 0,10 m on the outside of the balustrade;

2) 0,50 m in any inclined distance beyond 0,40 m within the projection of the car.



Key

l_1	distance ≥ 0,50 m [~~5.2.5.7.24~~.2.5.7.2 a)]	1	highest parts installed on the car roof
l_2	distance ≥ 0,50 m [~~5.2.5.7.24~~.2.5.7.2 a)]	2	car
l_3	distance ≥ 0,50 m [~~5.2.5.7.24~~.2.5.7.2 c) 2)]	3	refuge space(s)
l_4	distance ≥ 0,30 m [~~5.2.5.7.24~~.2.5.7.2 c) 1)]	h_r	height of refuge spaces (Table 2)
l_5	distance ≤ 0,40 m [~~5.2.5.7.24~~.2.5.7.2 c) 1)]		

Figure 5 — Minimum distances between parts fixed on car roof and lowest parts fixed to ceiling of well

Commented [SD288]: Combined comments N2055 & N2173

Commented [SD289]: As per WG1 Comments N 1954

Commented [IJ290]: See N1537

Commented [SD291]: Updated Figure 5 clearer image no technical change to the figure

~~5.2.5.7.3~~4.2.5.7.3 Any single continuous area on the car roof, or on equipment on the car roof, with a minimum clear area of 0,12 m² and the minimum dimension of the smallest side being greater than 0,25 m, is considered as a place where a person can stand. When the car is at its highest position according to ~~5.2.5.6.1~~4.2.5.6.1, the vertical clearance above any such area and the lowest parts of the ceiling of the well (including beams and parts situated under the ceiling), shall be the height of the relevant refuge space(s) according to ~~5.2.5.7.1~~4.2.5.7.1.

~~5.2.5.7.4~~4.2.5.7.4 When the car is at its highest position according to ~~5.2.5.6.1~~4.2.5.6.1. ~~T~~the free vertical distance between the lowest parts of the ceiling of the well and the highest parts of an upward travelling ram-head assembly shall be at least 0,10 m.

Commented [IJ292]: Editorial Comment for consistency with 5.2.5.8.1

Commented [SD293]: Combined comments N2055

4.2.5.8~~5.2.5.8~~ Refuge spaces and clearances in the pit

~~5.2.5.8.1~~4.2.5.8.1 When the car is at its lowest position according to ~~5.2.5.6.1~~4.2.5.6.1, at least one clear area on the pit floor shall provide~~where~~ a refuge space ~~can be accommodated shall be provided on the pit floor,~~ selected from Table 3.

Commented [AD294]: N2237 -164

If more than one person is necessary in the pit to carry out inspection and maintenance work, an additional refuge space shall be provided for each additional person.

Where due to restricted free floor area it is necessary to have the compensation means entering the refuge space, it is allowed under the following conditions:

a) Where the compensation means comprises of several elements, only a single compensation element may enter the refuge space;

b) This single compensation element ~~means~~ shall not enter the refuge space by more than 0,15 m measured in the horizontal direction;

Commented [AD295]: N2237 -033

c) The compensation means shall be able to be pushed away from the refuge space with a force not exceeding 300N, when ~~at any position of~~ the car is at its lowest position;

Commented [SD296]: N2055 combined comments

d) The compensation means shall have a smooth surface and be free of snags;

e) A warning sign shall be placed in the pit, visible from the entrance to the well stating.

"Attention – flexible component ~~encroaches~~ enters the refuge space"

Commented [SD297]: Combined comments N2055

Commented [IJ298]: See N1691

In the case of more than one refuge space, they shall be of the same type and not interfering with each other.

A sign in the pit readable from the entrance(s) shall clearly indicate the allowed number of persons and the type of posture (Table 3) considered for the refuge spaces(s) accommodation.

Table 3 — Dimensions of refuge spaces in the pit

Type	Posture	~~Pictogram~~Sign	Horizontal dimensions of the refuge space m	Height of the refuge space m
1	Upright		0,40 × 0,50	2,00
2	Crouching		0,50 × 0,70	1,00
3	Laying		0,70 × 1,00	0,50

NOTE The overhead obstacle warning sign ISO 7010:2019, W020 is incorporated in these safety signs.

~~5.2.5.8.24~~4.2.5.8.2 When the car is at the lowest position according to ~~5.2.5.6.14~~4.2.5.6.1, the following conditions shall be satisfied:

a) the free vertical distance between the bottom of the pit and the lowest parts of the car shall be at least 0,50 m. This distance may be reduced:

   1) for ~~any~~ parts of the apron or parts of the vertically sliding car door(s) ~~to a minimum of 0,10 m~~ within a maximum horizontal distance ~~of 0,15 m to~~ from the adjacent wall(s) according to Figure 7;

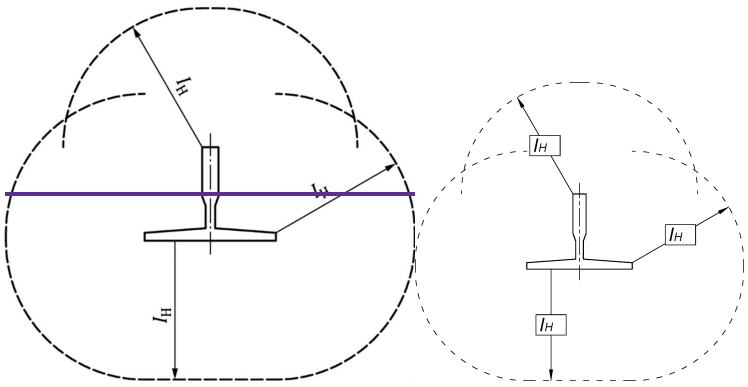
   2) for car frame parts, safety gears, guide shoes, pawl devices, within a maximum horizontal distance from the guide rails according to Figure~~s~~ 6 and Figure 7.

b) the free vertical distance between the highest parts fixed in the pit and on the pit platform, for instance a tensioning device for compensation means ~~ropes~~ being in its highest position, jack supports, pipes and other fittings, and the lowest parts of the car, except for items detailed in ~~5.2.5.8.24~~4.2.5.8.2 a) 1) and 2), shall be at least 0,30 m;

c) the free vertical distance between the bottom of the pit or the top of equipment installed there and the lowest parts of the downwards-travelling ram-head assembly of an inverted jack shall be at least 0,50 m.

   However, if it is impossible to gain involuntary access under the ram head assembly (e.g. by providing screens in accordance with ~~5.2.5.5.14~~4.2.5.5.1), this vertical distance may be reduced from 0,50 m to 0,10 m minimum;

d) the free vertical distance between the bottom of the pit and the lowest guiding yoke of a telescopic jack below the car of a direct acting lift shall be at least 0,50 m.



Key

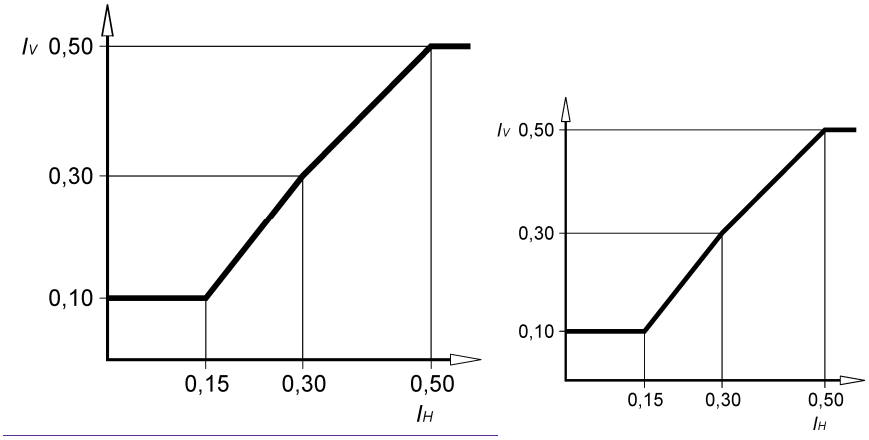
l_H horizontal distance around guide rail

Figure 6 — Horizontal distance around guide rail

Commented [SD299]: Combined comments N2055

Commented [SD300]: As WG1 comments N1986

Commented [IJ301]: See N17xx



Key

l_V minimum vertical distance [m]

l_H horizontal distance X_H [m]

Figure 7 — Minimum vertical distances ~~for car frame parts, safety gear, guide shoes and pawl devices~~

Commented [SD302]: Combined comments N2055

4.2.6 ~~5.2.6~~ Machinery spaces and pulley rooms

4.2.6.1 ~~5.2.6.1~~ General provisions

The spaces and the associated working areas for maintenance/inspection work and emergency operation shall be suitably protected against environmental influences. ~~See 0.3.3, 0.4.2 and 0.4.5.~~

Commented [AD303]: TFHAS_74_v4

4.2.6.2 ~~5.2.6.2~~ Notices ~~and instructions~~

Commented [RH304]: TFHAS_74_v4 comment 5.2.6.2

~~5.2.6.2.1~~4.2.6.2.1 Notices shall be provided to permit ~~easy~~ identification ~~and location of light switches and each incoming and on-board power supply disconnection and isolation device (see 5.10.5).~~of the main switch(es) and the light switch~~(e(es)).~~

Commented [AD305]: N2237 -165

Commented [IJ306]: See N1544

Commented [SD307]: Changed Back To original EN81-20:2020 text as per WG1 comments Annex III N 1954

~~5.2.6.2.2~~4.2.6.2.2 If, after release of ~~a~~ the main switch, some parts remain live (interconnection between lifts, lighting, on-board power supplies etc.) notice (s) located close to the main switch shall indicate this ~~,and allow to locate and to identify the relevant disconnection and isolation device(s) (see 5.10.5~~4.10.5).

Commented [SD308]: As per WG1 comments Annex III N1986

~~5.2.6.2.3~~4.2.6.2.3 In the machine room (~~5.2.6.3~~4.2.6.3), the machinery cabinet (~~5.2.6.5.1~~4.2.6.5.1) or at the emergency and tests panel(s) (~~5.2.6.6~~4.2.6.6), there shall be detailed ~~instructions~~ notices ~~[see (7.2.2 g), h) and i)]~~ to be followed in the event of lift breakdown (6.2.5), particularly concerning the use of the device for ~~rescue~~ emergency operations and the emergency unlocking key for landing doors.

Commented [SD309]: Combined comments N2055 & N2147

4.2.6.3 ~~5.2.6.3~~ Machinery in a machine room

4.2.6.3.1 ~~5.2.6.3.1~~ Traction sheave in the well

~~The traction sheave may be installed in the well, provided that:~~

~~a) the examinations and the tests and the maintenance operations are able to be carried out from the machine room;~~

~~b) the openings between the machine room and the well are as small as possible.~~

Where the traction sheave is installed in the well, means shall be provided to carry out examinations and the tests and the maintenance operations from the machine room.

Commented [RH310]: TFHAS_74_v4 comment 5.2.6.3.1

4.2.6.3.2 ~~5.2.6.3.2~~ Dimensions

~~5.2.6.3.2.1~~4.2.6.3.2.1 ~~The dimensions of machine rooms shall be sufficient to permit easy and safe working on equipment.~~

In the machine room a~~A~~ clear height of at least 2,10 m ~~at working areas~~ shall be provided at working areas, and:

Commented [RH311]: TFHAS_74_v4 comment 5.2.6.3.2.1

a) a clear horizontal area in front of the control panels and cabinets. This area is defined as follows:

   1) depth, measured from the external surface of the enclosures, at least 0,70 m;

   2) width, the greater of the following values: 0,50 m or the full width of the cabinet or panel.~~;~~

b) a clear horizontal area of at least 0,50 m × 0,60 m for maintenance and inspection of moving parts at points where this is necessary and, if need be, ~~manual~~ emergency operation (~~5.9.2.3.4~~14.9.2.3.4).

Commented [SD312]: Combined comments N2055 & N2147

Commented [SD313]: Updated due to changes from N2192

~~5.2.6.3.2.2~~4.2.6.3.2.2 The clear height for movement shall not be less than 1,80 m.

This clear height for movement is taken to the underside of the lowest striking point and measured from the floor of the access area.

The access ways to the clear spaces mentioned in ~~5.2.6.3.2.1~~4.2.6.3.2.1 shall have:

a) a width of at least 0,50 m; or~~;~~

Commented [RH314]: TFHAS_74_v4 comment 5.2.6.3.2.2

b) ~~This value may be reduced to~~ a width of at least 0,40 m where there are no moving parts or hot surfaces, as defined in ~~5.10.1.1.6~~4.10.1.1.6.

~~5.2.6.3.2.3~~4.2.6.3.2.3 There shall be a clear vertical distance of at least 0,30 m above unprotected rotating parts of the lift machine.

Commented [AD315]: TFHAS_74_v4 comment 5.6.2.2.3

~~5.2.6.3.2.4~~4.2.6.3.2.4 When the machine room floor comprises a number of levels differing by more than 0,50 m, fixed ladders according to ~~5.2.2.5~~ISO 14122-4:2016 or stairways and guardrails according to ISO 14122-3:2016, clause 7 shall be provided.

Commented [RH316]: TFHAS_74_v4 comment 5.2.6.3.2.4

~~5.2.6.3.2.5~~4.2.6.3.2.5 When the floor of the machine rooms has any recesses with a depth of more than 0,05 m and a width between 0,05 m and 0,50 m wide, or any ducts, they shall be covered. This applies only to areas where a person may work or move between different working areas.

Commented [AD317]: Tbc! 5.2.2.5 does not anymore exist, reference to ISO 14122?

Recesses with a width of more than 0,50 m shall be considered as different levels, see ~~5.2.6.3.2.4~~4.2.6.3.2.4.

4.2.6.3.3 ~~5.2.6.3.3~~ Other openings

The dimension of holes in the slab and room floor shall be ~~reduced to a minimum~~limited for their purpose.

Commented [RH318]: TFHAS_74_v4 comment 5.2.6.3.3

~~With the aim of removing the danger of objects falling through openings situated above the well, including those for electric cables, ferrules shall be used, which project at least 50 mm above the slab or finished floor.~~

Ferrules, projecting at least 50 mm above the slab or finished floor, shall be provided

Commented [AD319]: TFHAS_74_v4 comment 5.2.6.3.3

4.2.6.4 ~~5.2.6.4~~ Machinery inside the well

4.2.6.4.1 ~~5.2.6.4.1~~ General provisions

~~**5.2.6.4.1.1** In the case of wells partially enclosed at the exterior of buildings, the machinery shall be suitably protected against environmental influences.~~

~~5.2.6.4.1.2~~4.2.6.4.1.1 The clear height for moving inside the well from one working area to another one shall not be less than 1,80 m.

~~5.2.6.4.1.3~~4.2.6.4.1.2 In the case of:

— a retractable platform (~~5.2.6.4.5~~4.2.6.4.5) and/or movable stops [~~5.2.6.4.5.2~~4.2.6.4.5.2 b)]; or

— manually operated mechanical device (4.2.6.4.3.1~~5.2.6.4.3.1~~, 4.2.6.4.4.1~~5.2.6.4.4.1~~),

a clear notice(s) giving all the necessary instructions for operation shall be affixed adjacent to the activation point(s) of those device(s)~~at an appropriate place(s) in the well~~.

4.2.6.4.2 ~~5.2.6.4.2~~ Dimensions of working areas inside the well

~~4.2.6.4.2.1~~5.2.6.4.2.1 ~~The dimensions of working areas at the machinery shall be sufficient to permit easy and safe working on equipment.~~

~~A~~ In the well a clear height of at least 2,10 m ~~at working areas~~ shall be provided at working areas, and:

a) a clear horizontal ~~space~~ area in front of the control panels and cabinets. This area is defined as follows:

1) depth, measured from the external surface of the enclosures, at least 0,70 m;

2) width, the greater of the following values: 0,50 m or the full width of the cabinet or panel;

Car balustrades are not considered as an obstacle.

b) a clear horizontal area of at least 0,50 m × 0,60 m for maintenance and inspection of parts at points where this is necessary.

~~4.2.6.4.2.2~~5.2.6.4.2.2 There shall be a clear vertical distance of at least 0,30 m above unprotected rotating parts of the lift machine.

Commented [AD320]: TFHAS_74_v4 move to Annex E

Commented [RH321]: TFHAS_74_v4 comment 5.2.6.4.1.3

Commented [AD322]: Aligned with TFHAS_74 comment on 5.2.6.3.2.1

Commented [SD323]: TFHAS_74_v4 comment 5.2.6.3.2.2
As per WG1 comments N 1954

Commented [SD324]: Combined comments N2055

Commented [AD325]: TFHAS_74_v4 comment 5.2.6.2.2.3

4.2.6.4.3 ~~5.2.6.4.3~~ Working areas in the car or on the car roof

4.2.6.4.3.1~~5.2.6.4.3.1~~ Where maintenance/inspection work on the machinery is to be carried out from inside the car or from the car roof, and if ~~any kind of~~ uncontrolled or unexpected car movement resulting from maintenance/inspection can be dangerous to persons, the following applies:

a) any dangerous movement of the car shall be prevented by a mechanical device;

b) ~~all movement of the car shall be prevented by means of~~the inactive position of the mechanical device shall be checked by an electric safety device in conformity with ~~5.11.2~~4.11.2 ~~unless the mechanical device is in its inactive position~~;

c) when this mechanical device is in its active position and cannot be disengaged due to forces exerted on it; it shall be possible to leave the well:

1) via the landing door by a clear opening of at least 0,50 m × 0,70 m above the car door header/door drive;

2) via the car by access through an emergency trap door in the car roof according to ~~5.4.6~~4.4.6. Steps, ladder and/or hand hold(s) shall be provided to allow a safe descent into the car; or

3) via an emergency door as described in ~~5.2.3~~4.2.3.

Instructions regarding the escape procedure shall be given in the lift documentation.

~~5.2.6.4.3.2 The necessary devices for emergency operation and for dynamic tests shall be arranged so that they can be carried out from outside of the well in accordance with 5.2.6.6.~~

4.2.6.4.3.2~~5.2.6.4.3.23~~ If inspection doors are located in the walls of the car, they shall:

a) comply with 4.2.3.2~~5.2.3.2~~ e);

b) in the case of inspection doors with a width of more than 0,30 m, be provided with a barrier to avoid falling into the well;

c) not open towards the outside of the car;

d) be provided with a key-operated lock, capable of being closed without the use of a key and automatically locked when closed~~reclosed and relocked without a key~~;

e) be provided with an electric safety device in conformity with ~~5.11.2~~4.11.2, checking the locked position;

f) satisfy the same requirements as the walls of the car.

Commented [RH326]: TFHAS_74_v4 comment 5.2.6.4.3.1

Commented [AD327]: Editorial alignement

Commented [SD328]: Combined comments N2055 & N2147

Commented [SD329]: Clause change - Combined comments N2055 & N2147

Commented [AD330]: N2225 comment 081

4.2.6.4.3.3~~5.2.6.4.3.34~~ Where it is necessary to move the car from inside with an open inspection door, the following applies:

a) an inspection control station according to 4.12.1.5~~5.12.1.5~~ shall be available near the inspection door;

b) this inspection control station shall be accessible only ~~to authorized persons, e.g. by placing it behind the inspection door,~~ by use of a key and arranged so that it is not possible to use it to drive the car when standing on the car roof;

c) if the smaller dimension of the opening exceeds 0,20 m the clear horizontal distance between the outside edge of the opening in the car wall and equipment installed in the well in front of that opening shall be at least 0,30 m.

4.2.6.4.4 ~~5.2.6.4.4~~ Working areas in the pit

4.2.6.4.4.1~~5.2.6.4.4.1~~ Where machinery is to be maintained or inspected from the pit, and if ~~any kind of~~ uncontrolled or unexpected car movement resulting from maintenance/inspection can be dangerous to persons, the following applies:

a) a permanently installed device shall be provided to mechanically stop the car with any load up to rated load and from any speed up to rated speed to create a free distance of at least 2,00 m between the floor of the working area and the lowest parts of the car, excluding those mentioned in ~~5.2.5.8.2~~ 4.2.5.8.2 a~~)~~) 1) and 4.2.5.8.2 a) 2). The retardation of the car by mechanical devices other than safety gears shall not exceed that produced by the buffers (see ~~5.8.2~~4.8.2);

b) the mechanical device shall be able to maintain the car stopped;

c) the mechanical device can be operated manually or automatically;

d) the opening by the use of a key of any door providing access to the pit shall be checked by an electric safety device according to ~~5.11.2~~4.11.2, which prevents all further movement of the lift. Movement shall only be possible under the requirements given in f) below;

e) all movement of the car shall be prevented by ~~means of~~ an electric safety device in conformity with ~~5.11.2~~4.11.2 unless the mechanical device is in its inactive position;

f) when the mechanical device is in its active position as checked by ~~means of~~ an electric safety device in conformity with ~~5.11.2~~4.11.2, electrically driven movement of the car shall only be possible from the inspection control station(s);

g) the return of the lift to ~~normal~~ automatic operation shall only be permitted after ~~made by~~ operation of an electrical reset device placed outside of the well in close proximity of the door giving access to the pit and accessible ~~to authorized persons~~ only~~, e. g. inside a locked cabinet~~ by use of a key.

4.2.6.4.4.2~~5.2.6.4.4.2~~ When the car is in the position according to 4.2.6.4.4.1~~5.2.6.4.4.1~~ a), it shall be possible to leave the pit either:

a) through a vertical gap from the landing door level to the lowest edge of the car apron of at least 0,50 m; or

b) through an access door to the pit.

~~5.2.6.4.4.3 The necessary devices for emergency operation and for dynamic tests shall be arranged so that they can be carried out from outside of the well in accordance with 5.2.6.6.~~

Commented [SD331]: Clause change - Combined comments N2055 & N2147

Commented [RH332]: TFHAS_74_v4 comment 3.2

Commented [RH333]: TFHAS_74_v4 comment 5.2.6.4.4.1

Commented [AD334]: Editorial alignement

Commented [SD335]: Combined comments N2055 & N2175

Commented [SD336]: As per WG1 comments N 1954

Commented [RH337]: TFHAS_74_v4 comment 3.2

Commented [SD338]: Combined comments N2055 & N2147

4.2.6.4.5 ~~5.2.6.4.5~~ Working areas on a platform

4.2.6.4.5.1~~5.2.6.4.5.1~~ Where machinery is to be maintained or inspected from a platform, it shall be:

a) permanently installed; and

b) retractable if it is in the travel path of the car or counterweight/balancing weight.

4.2.6.4.5.2~~5.2.6.4.5.2~~ Where machinery is to be maintained or inspected from a platform positioned into the travel path of the car, the counterweight or the balancing weight:

a) the car shall be stationary by using a mechanical device in conformity with 4.2.6.4.3.1~~5.2.6.4.3.1~~ a) and b); or

b) where the car needs to be moved, the travel path of the car, the counterweight or the balancing weight shall be limited by movable stops, working with any load up to rated load and from any speed up to rated speed, in such a way that the car, the counterweight or the balancing weight are ~~is~~ stopped:

   1) at least 2,00 m above the platform ~~if the car, the counterweight or the balancing weight runs~~ when running down with rated speed towards the platform;

   2) below the platform in compliance with ~~5.2.5.7.2~~4.2.5.7.2, ~~if the car, the counterweight or the balancing weight runs~~ when running up with rated speed towards the platform.

4.2.6.4.5.3~~5.2.6.4.5.3~~ The platform shall be:

a) able to support at any position the mass of two persons, each counting for 1 000 N over an area of 0,20 m × 0,20 m without permanent deformation. If the platform is intended to be used for handling heavy equipment, the dimensions shall be considered accordingly, and the platform shall have a mechanical strength to withstand the loads and forces to which it is intended to be subjected ~~(see 5.2.1.7~~4.2.1.6~~)~~. ~~The maximum permissible load shall be indicated on the platform;~~

b) provided with a balustrade in conformity with 4.4.7.4~~5.4.7.4~~;

c) equipped with means ensuring that:

   1) the ~~step rise~~vertical distance between the floor of the platform and the level of the access does not exceed 0,50 m;

   2) it shall not be possible to pass a ball with a diameter of 0,15 m through any gap between the platform and the sill of the access door.

4.2.6.4.5.4~~5.2.6.4.5.4~~ In addition to 4.2.6.4.5.3~~5.2.6.4.5.3~~, any retractable platform shall be provided with:

a) an electric safety device in conformity with ~~5.11.2~~4.11.2, checking the fully retracted position;

b) means for putting it into or removing it from the working position. This operation shall be possible from the pit or by means located outside of the well and accessible only ~~to authorized persons~~ by use of a key. The manual effort for operation of the platform shall not exceed 250 N;

c) if the access to the platform is not through a landing door, the opening of the access door shall be impossible when the platform is not in the working position, or alternatively, means shall be provided to prevent persons from falling into the well.

Commented [AD339]: N2237 -171

Commented [IJ340]: Editorial comment for consistency

Commented [SD341]: As per WG1 comments N 1954

Commented [SD342]: Corrected punctuation for this clause N2055 combined comments

Commented [IJ343]: Editorial comment for consistency

Commented [SD344]: As per WG1 comments N 1954

Commented [IJ345]: Editorial comment for consistency

Commented [SD346]: As per WG1 comments N 1954

Commented [IJ347]: N1537

Commented [AD348]: moved to building annex N2237

Commented [AD349]: N2237 -172

Commented [RH350]: TFHAS_74_v4 comment 3.2

~~4.2.6.4.5.5~~~~5.2.6.4.5.5~~ In the case of 4.2.6.4.5.2~~5.2.6.4.5.2~~ b), movable stops shall be automatically operated when the platform is lowered. They shall be provided with:

a) buffers in conformity with ~~5.8~~4.8;

b) an electric safety device in conformity with ~~5.11.2~~4.11.2, which only allows car movement if the stops are in their fully retracted position;

c) an electric safety device in conformity with ~~5.11.2~~4.11.2, which only allows car movement with a lowered platform if the stops are in their fully extended position.

~~4.2.6.4.5.6~~~~5.2.6.4.5.6~~ Where it is necessary to move the car from the platform, an inspection control station according to 4.12.1.5~~5.12.1.5~~ shall be available for use on the platform.

When the movable stop(s) is(are) in its active position, electrically driven movement of the car shall only be possible from the inspection control station(s).

~~5.2.6.4.5.7 The necessary devices for emergency operation and dynamic tests shall be arranged so that they can be carried out from outside of the well in conformity with 5.2.6.6.~~

~~4.2.6.4.5.7~~~~5.2.6.4.5.8~~7 The maximum permissible load shall be indicated on the platform.

4.2.6.4.6 ~~5.2.6.4.6~~ Working areas outside of the well

When the machinery is in the well and is intended to be maintained/inspected from outside of the well, the working areas in accordance with 4.2.6.3.2.1~~5.2.6.3.2.1~~ and 4.2.6.3.2.2~~5.2.6.3.2.2~~ ~~may~~ shall be provided outside of the well. Access to this equipment shall ~~only~~ be possible by an inspection door in conformity with 4.2.3~~5.2.3~~.

4.2.6.5 ~~5.2.6.5~~ Machinery outside of the well

4.2.6.5.1 ~~5.2.6.5.1~~ Machinery cabinet

~~4.2.6.5.1.1~~~~5.2.6.5.1.1~~ The machinery of a lift shall be located inside a cabinet which shall not be used for purposes other than the lift. It shall not contain ducts, cables or devices other than for the lift.

~~4.2.6.5.1.2~~~~5.2.6.5.1.2~~ The machinery cabinet shall consist of imperforate walls, floor, roof and door(s).

The only permissible openings are:

a) ventilation ~~openings~~apertures;

b) necessary openings for the functioning of the lift between the well and the machinery cabinet;

c) vent openings for escape of gases and smoke in the event of fire.

These openings ~~when accessible to non-authorized persons~~ except openings towards the well, the machine room or the pulley room, shall comply with the following requirements:

— protection according to ISO 13857:2019, Table 5 against contact with danger zones; and

— degree of protection of at least IP2XD to IEC 60529:1989+AMD1:1999+AMD2:2013 against contact with electrical equipment.

Commented [SD351]: Combined comments N2055 & N2147

Commented [RH352]: TFHAS_74_v4 comment 5.2.6.4.5.8,
AD: Rejected, it is deleted in 5.2.6.4.5.3 a)

Commented [RH353]: TFHAS_74_v4 comment 5.2.6.4.6

Commented [RH354]: Usually not allowed by National fire authorities

Commented [RH355]: TFHAS_74_v4 comment 3.2 and 5.2.1.1.1

~~4.2.6.5.1.3~~~~5.2.6.5.1.3~~ The door(s) shall:

a) have ~~sufficient~~ dimensions which enables to carry out the required work through the open door;

b) not open towards the inside of the cabinet;

c) be provided with a key-operated lock, capable of being closed without the use of a key and automatically locked when closed~~reclosed and relocked without a key~~.

4.2.6.5.2 ~~5.2.6.5.2~~ Working area

The working area in front of a machinery cabinet shall comply with the requirements according to 4.2.6.4.2~~5.2.6.4.2~~.

4.2.6.6~~5.2.6.6~~ Devices for emergency operation and tests ~~operations~~

~~4.2.6.6.1~~~~5.2.6.6.1~~ In the case of 4.2.6.4.3~~5.2.6.4.3~~, 4.2.6.4.4~~5.2.6.4.4~~ and 4.2.6.4.5~~5.2.6.4.5~~, the ~~necessary~~ devices for emergency operation and tests ~~operations~~ shall be provided on a panel(s) suitable for carrying out from outside of the well all emergency operations and dynamic tests of the lift such as tests of traction, safety gear, buffer, ascending car overspeed protection means, unintended car movement protection, rupture valve, restrictor, pawl device, cushioned stop and pressure. ~~The panel(s) shall be accessible to authorized persons only.~~

If the emergency and test devices are not protected inside a machinery cabinet, they shall be enclosed with a ~~suitable~~ cover, which:

a) does not open towards the inside of the well;

b) is provided with a key-operated lock, capable of being closed without the use of a key and automatically locked when closed~~reclosed and relocked without a key~~.

~~4.2.6.6.2~~~~5.2.6.6.2~~ The panel(s) shall provide the following:

a) emergency operation devices according to ~~5.9.2.2.2.7~~ ~~5.9.2.3.1~~ ~~and~~ 4.9.2.3~~5.9.2.3~~ or 4.9.3.9~~5.9.3.9~~, together with an intercom system in conformity with 4.12.3.2~~5.12.3.2~~;

b) ~~control equipment~~ devices which enables dynamic tests to be carried out;

c) direct observation of the lift machine or display device(s), which gives indication of:

— the direction of movements of the car;

— the reaching of an unlocking zone; and

— the speed of the car.

~~4.2.6.6.3~~~~5.2.6.6.3~~ The devices on the panel(s) shall be lit by a permanently installed electric lighting with an intensity of at least 200 lx measured at the device.

A switch placed on, or close to, the panel shall control lighting of the panel(s).

The electrical supply for this lighting shall be in conformity with 4.10.7.1~~5.10.7.1~~.

~~4.2.6.6.4~~~~5.2.6.6.4~~ There shall be working areas according to 4.2.6.3.2.1~~5.2.6.3.2.1~~ in front of emergency and test panels.

Commented [RH356]: TFHAS_74_v4 comment 5.2.6.5.1.3

Commented [AD357]: N2225 comment 081

Commented [SD358]: Combined comments N2055 & N2147

Commented [RH359]: TFHAS_74_v4 comment 5.2.6.6.1

Commented [SD360]: TFHAS_74_v4 comment 5.6.4.3.1
Combined comments N2055 & N2147

Commented [AD361]: N2225 comment 081

Commented [SD362]: Updated ref due to changes from N2192
AD: already there

Commented [RH363]: TFHAS_74_v4 comment 5.2.6.6.2

4.2.6.7 ~~5.2.6.7~~ Construction and equipment of pulley rooms

4.2.6.7.1 ~~5.2.6.7.1~~ Dimensions

~~4.2.6.7.1.1~~~~5.2.6.7.1.1~~ Pulley room dimensions shall ~~be sufficient to~~ provide~~: easy and safe access for authorized persons to all the equipment.~~

~~In particular:~~

a) ~~the~~ a clear height for movement ~~shall not be less than~~of at least 1,50 m.

This clear height for movement is taken to the underside of the lowest striking point and measured from the floor of the access area;

b) a clear horizontal area ~~shall be provided~~, of at least 0,50 m × 0,60 m, for maintenance and inspection of moving parts at points where it is necessary.

c) ~~The~~ access ways to these areas ~~shall have~~having:

1) a width of at least 0,50 m.

2) a width of at least ~~This value may be reduced to~~ 0,40 m where there are no moving parts or hot surfaces, as defined in ~~5.10.1.1.6~~4.10.1.1.6.

~~4.2.6.7.1.2~~~~5.2.6.7.1.2~~ There shall be a clear vertical distance of at least 0,30 m high above unprotected pulleys.

4.2.6.7.2 ~~5.2.6.7.2~~ Openings

The dimensions of holes in the slab and pulley room floor shall be ~~reduced~~ limited ~~to a minimum~~ for their purpose.

Ferrules, projecting at least 50 mm above the slab or finished floor, shall be provided~~With the aim of removing the danger of objects falling through openings situated over the well, including those for electric cables, ferrules shall be used which project at least 50 mm above the slab or finished floor~~.

Commented [RH364]: TFHAS_74_v4 comment 5.2.6.7.1.1

Commented [AD365]: N2237 -038

Commented [AD366]: N2237 -038

Commented [AD367]: N2237 -038

Commented [RH368]: TFHAS_74_v4 comment 5.2.6.7.1.1

Commented [RH369]: TFHAS_74_v4 comment 5.2.6.7.2

Commented [AD370]: N2237 -176

Commented [AD371]: N2237 -176

4.3 ~~5.3~~ Landing doors and car doors

4.3.1 ~~5.3.1~~ General provisions

~~4.3.1.1~~~~5.3.1.1~~ Landing levels shall be provided with landing doors and the access of passengers into the car shall be through a car door~~The openings in the well giving normal access to the car shall be provided with landing doors and the access to the car shall be through a car door~~.

~~4.3.1.2~~~~5.3.1.2~~ The doors shall be imperforate.

~~4.3.1.3~~~~5.3.1.3~~ When closed, the landing and car doors shall, apart from the necessary clearances, completely close the landing and car entrances.

~~4.3.1.4~~~~5.3.1.4~~ When closed, the clearance between door panels, or between panels and uprights, lintels or sills, shall not exceed ~~6~~ 5 mm. ~~This~~ This values, due to wear, may reach ~~10~~8 mm, ~~with the~~ exception ~~of~~ for doors as required in ~~made from glass [see~~ 4.3.6.2.2.1~~5.3.6.2.2.1~~ i) ~~3~~and 4.3.6.2.2.1~~5.3.6.2.2.1~~ j)~~]~~. These clearances are measured at the back of recesses, if present.

~~4.3.1.5~~~~5.3.1.5~~ In the case of hinged car doors, they shall strike stops to prevent them swinging outside the car.

~~4.3.1.6~~~~5.3.1.6~~ In the case of hinged landing doors, they shall strike stops to prevent them swinging inside the well.

~~4.3.1.7~~~~5.3.1.7~~ In the case of vertically sliding doors:

a) They shall be provided with means to stop the closing panel(s) when the distance between the closing rigid members of the panel is not less than 20 mm and not more than 50 mm.

b) A non-shearing, and non-crushing member of either the meeting or overlapping type shall be provided on the leading edge of the panel to close the distance between the rigid door sections when in contact with the stops. This member shall allow a minimum compressible clearance of 20 mm.

c) Rigid members that overlap the meeting edge within the opening width are prohibited.

4.3.2 ~~5.3.2~~ Height and width of entrances

4.3.2.1~~5.3.2.1~~ Height

Landing doors and car doors shall be such that a minimum clear height of the entrance is 2,00 m.

4.3.2.2~~5.3.2.2~~ Width

The clear entrance of the landing doors shall not extend more than 50 mm in width beyond the clear car entrance on both sides.

4.3.3 ~~5.3.3~~ Sills, guides, door suspension

4.3.3.1~~5.3.3.1~~ Sills

Every landing door and car ~~entrance~~ door shall incorporate a sill withstanding forces as defined in ~~of sufficient strength (see~~ 4.7.2.3.6~~5.7.2.3.6)~~ to withstand the passage of loads being introduced into the car.

NOTE A slight counter slope provided in front of each landing sill helps to avoid water from washing, sprinklers, etc., draining into the well.

Commented [AD372]: N2237 -040

Commented [AD373]: TFHAS_74_v4

Commented [SD374]: WG1 comments N1970

Commented [SD375]: Combined comments N2055 & N2200

Commented [IJ376]: See N1564

Commented [IJ377]: See N1564

Commented [AD378]: TFHAS_74_v4

4.3.3.2 ~~5.3.3.2~~ Guides

~~4.3.3.2.1~~~~5.3.3.2.1~~ Landing and car doors shall be designed to prevent, ~~during normal operation,~~ derailment, mechanical jamming, or displacement.

~~4.3.3.2.2~~~~5.3.3.2.2~~ Horizontally sliding landing and car doors shall be guided top and bottom.

~~4.3.3.2.3~~~~5.3.3.2.3~~ Vertically sliding landing and car doors shall be guided at both sides.

4.3.3.3 ~~5.3.3.3~~ Suspension of vertically sliding doors

~~4.3.3.3.1~~~~5.3.3.3.1~~ Panels of vertically sliding landing and car doors shall be fixed to two independent suspension elements.

The failure of one suspension element shall by design not permit a panel to fall or means shall be provided to prevent the panel from falling if one suspension element fails.

In the event of a failure of at least one suspension element the door shall not operate further.

~~4.3.3.3.2~~~~5.3.3.3.2~~ Suspension ~~ropes, chains, belts~~elements shall be designed with a safety factor of at least 8.

~~4.3.3.3.3~~~~5.3.3.3.3~~ The pitch diameter of suspension rope pulleys shall be at least ~~25~~ 20 times the rope diameter.

~~4.3.3.3.4~~~~5.3.3.3.4~~ Suspension ~~ropes, and chains or belts~~elements shall be guarded against leaving the pulleys, pulley grooves or sprockets.

~~4.3.3.3.5~~~~5.3.3.3.5~~ Vertically sliding panels shall be counterbalanced, that they will not open or close by gravity.

Fastenings shall be provided to prevent the fall and the detachment or dislodgment of the balancing weights ballast.

Balancing weight(s) shall be fixed securely to the supporting system. Where more than one suspension ~~means~~element is fastened to one balancing weight, ~~they~~ shall be individually fixed to the balancing weight. Balancing weights shall not be fixed using clamping screws only. The method of fixing shall ensure that accidental displacement is prevented.

4.3.4 ~~5.3.4~~ Horizontal door clearances

~~5.3.4.1~~~~4.3.4.1~~ The horizontal distance between the sill of the car and sill of the landing doors shall not exceed 35 mm (see Figure 3).

~~5.3.4.2~~~~4.3.4.2~~ The horizontal distance giving access to the well shall not exceed ~~0,12 m~~0,10 m (see Figure 3):

a) between the leading edges of the car door and the landing doors during ~~the whole of~~ their ~~normal~~ operation cycle;

b) between the door jambs at the closing side of side opening doors;

c) between the door jambs of vertical sliding doors up to a height of 2,50 m.

Commented [SD379]: Combined comments N2055 & N2175

Commented [IJ380]: See N1564

Commented [AD381]: N2237 -178

Commented [IJ382]: See N1564

Commented [AD383]: N2237 -178

Commented [AD384]: TFHAS_74_v4

Commented [AD385]: N2237 -178

Commented [SD386]: Combined comments N2055

Commented [SD387]: Combined comments N2055

Commented [IJ388]: See N1564

Commented [IJ389]: See N1564

Commented [SD390]: Reduce to 0,10m as WG1 comments N1954 & AH2 proposal N1950

Commented [AD391]: This text from c) belongs also to a) and b)

Commented [SD392]: As WG1 comments N1954 & N1950

~~Where additional building doors are added in front of the landing door, the trapping of persons in the space between should be avoided (see also 5.2.2.1 and 5.2.2.3).~~

4.3.4.3~~5.3.4.3~~ In the case of:

a) the combination of:

— a hinged landing door and a folding car door (see Figure 8);

— a hinged landing door and a horizontal sliding car door (see Figure 9 a) and Figure 9 b); except a hinged landing door and a horizontal sliding car door 3 panel side-opening or 6 panel centre-opening having a door width more than 0,90 m (See Figure 9 c);

— horizontal sliding car and landing doors, which are not mechanically coupled (see Figure 10);

it shall not be possible to place a ball with a diameter of ~~0,15~~ 0,12 m according to Figure 8, Figure 9 a), Figure 9 b) or Figure 10 respectively in any gap between the closed door~~s~~.

b) the combination of:

— a hinged landing door and a horizontal sliding car door 3 panel side-opening or 6 panel centre opening having a door width of more than 0,90 m [see Figure 9 c)];

it shall not be possible to place a ball with a diameter of 0,15 m according to Figure 9 c) in any gap between the closed doors.

c) the combination of:

— a hinged landing door and a vertical sliding car door (see Figure 11);

it shall not be possible to place a ball with a diameter of 0,15 m according to Figure 11 between the closed landing door and leading panel(s) of the car door.

The top edge of the fast panel and the inner lower edge of the following panel shall be chamfered to at least 45° to the horizontal (see Figure 13).

d) the combination of:

— a vertical sliding landing door and a vertical sliding car door, which are not mechanically coupled (see Figure 12);

it shall not be possible to place a ball with a diameter of 0,15 m according to Figure 12 in any gap between the leading edge of the fast panel of one door and the leading panel of the opposite door.

The top edge of the fast panel and the inner lower edge of the following panel of landing and car doors shall be chamfered to at least 45° to the horizontal (see Figure 13).

Commented [IJ393]: ISO editors have deleted "Note"

Commented [AD394]: TFHAS_74_v4

Commented [SD395]: As per WG1 comments N 1954 & AH2 proposal 1950

Commented [SD396]: Reduce to 0,12m as WG1 comments N1950

Commented [IJ397]: See N1564

Commented [SD398]: As WG1 comments 1954 and N1950

Commented [IJ399]: See N1564

Dimensions in ~~milli~~metres

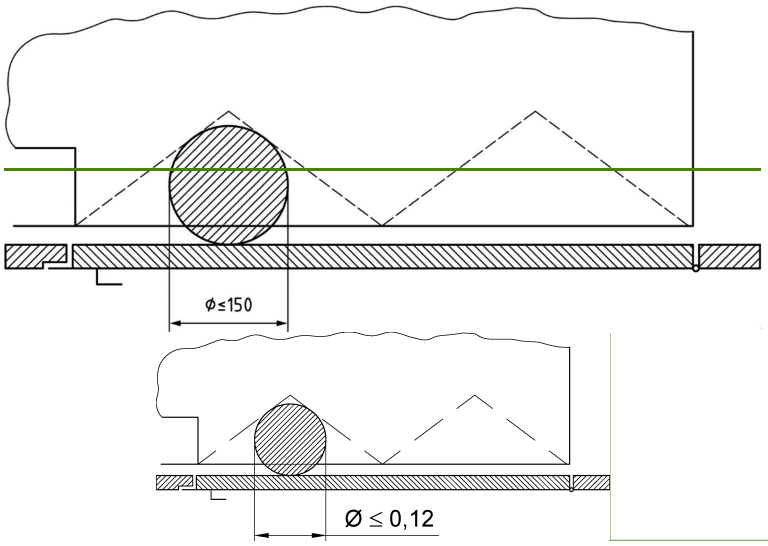
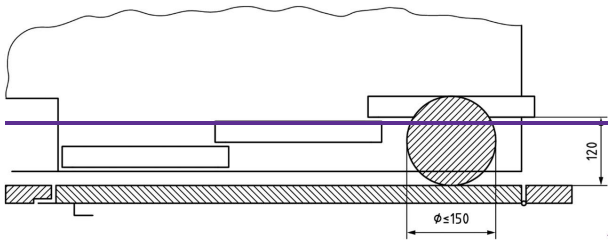


Figure 8 — Hinged landing door and folding car door

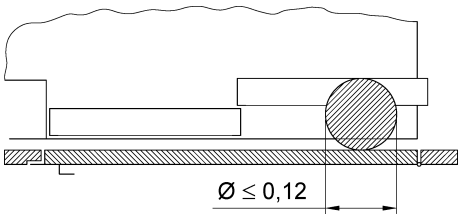
Dimensions in ~~milli~~metres



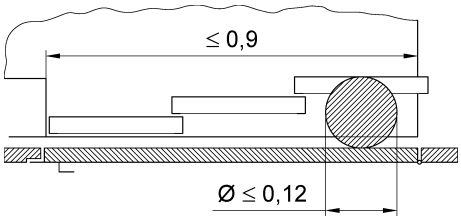
Commented [SD400]: Changed to meters to align with units as in the clauses

Commented [SD401]: Changed to meters to align with Figure

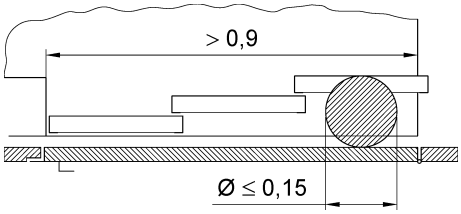
Commented [SD402]: Replaced Figure 8 as per WG1 comments N1950 now in meters



a) 2-panel side opening



b) 3-panel side-opening, ≤ 0,90 m opening width



c) 3-panel side-opening, > 0,90 m opening width

Figure 9 — Hinged landing door and horizontal sliding car door

Commented [SD403]: WG1 comments N1950

Commented [SD404]: Added new Figure as per WG1 comments N1950

Commented [SD405R404]: Updated Figure with clear line definition as per combined comments N2055

Commented [SD406]: Added new Figure as per WG1 comments N1950

Commented [SD407R406]: Updated Figure with clear line definition as per combined comments N2055

Commented [SD408]: Replaced Figure 9 with 9a as per WG1 comments N1950

Commented [SD409R408]: Updated Figure with clear line definition as per combined comments N2055

Dimensions in ~~milli~~metres

Commented [SD410]: Insert new Figure 10 as per WG1 Comments N1950

Commented [SD411R410]: Updated Figure with clear line definition as per combined comments N2055

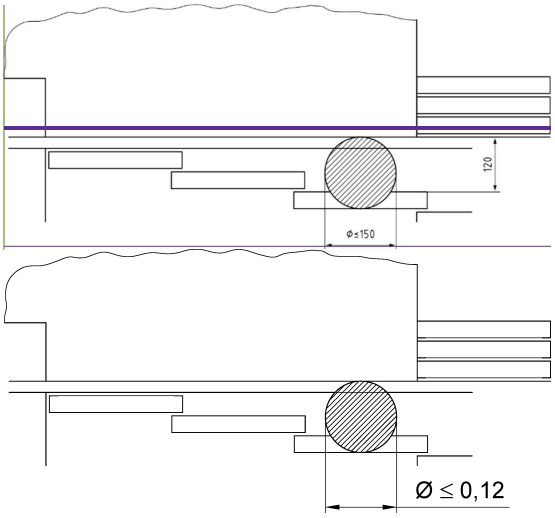
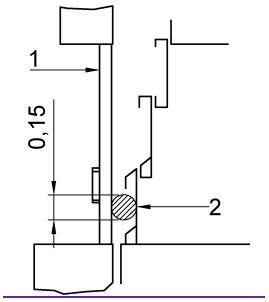


Figure 10 — Horizontal sliding car and landing doors, not mechanically coupled

NOTE Figure 10 is also applicable for the "car door closed and landing door open" situation.

Dimensions in metres



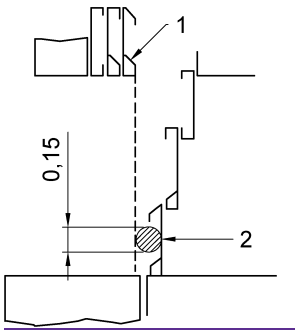
Key

1 Hinged landing door

2 leading panel

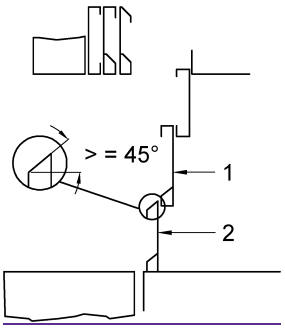
Figure 11 — Hinged landing door and vertical sliding car door

Dimensions in metres



Key
1 leading edge of the fast panel
2 leading panel of opposite door

Figure 12 — ~~v~~Vertical sliding landing door and vertical sliding car door, not mechanically coupled



Key
1 following panel
2 fast panel

Figure 13 — ~~c~~Chamfers on vertically sliding car door

4.3.5 ~~5.3.5~~Strength of landing and car doors

~~4.3.5.1 5.3.5.1 General~~

~~Components shall be made of material that maintains the strength property over their intended lifetime under the environmental conditions.~~

Commented [AD412]: TFHAS_74_v4
5.3.5.1 relates to Good Engineering Practice and be moved to such document.

~~4.3.5.2~~4.3.5.1~~5.3.5.2~~ **Behaviour under fire conditions**

Where fire classification for landing doors is required, EN 81-58:2022 or ISO 3008-2:2017 shall be applied.~~Landing doors shall comply with the regulations relevant to the fire protection for the building concerned. EN 81-58:2022 or ISO 3008-2:2017 shall be applied for the testing and certification of such doors.~~

Commented [AD413]: TFHAS_74_v4

~~4.3.5.3~~4.3.5.2~~5.3.5.3~~ **Mechanical strength**

~~4.3.5.2.1~~5~~.3.5.3.1~~ Complete landing doors, with their locks, and car doors shall have a mechanical strength such that in the locked position of landing doors and closed position of car doors:

a) when a static force of 300 N, being evenly distributed over an area of 5 cm² in round or square section, is applied at right angles to the panel/frame at any point on either face, they shall resist without:

   1) permanent deformation greater than 1 mm;

   2) elastic deformation greater than 15 mm;

   After such a test, the safety function of the door shall not be affected.

b) when a static force of 1 000 N, being evenly distributed over an area of 100 cm² in round or square section, is applied at right angles at any point of the panel or frame with width larger than 100mm, from the landing side for landing doors, or from the inside of the car for car doors, they shall resist without ~~significant~~ permanent deformation affecting functionality and safety [see 4.3.1.4~~5.3.1.4~~ (maximum clearance ~~10~~ 8 mm) and 4.3.9.1~~5.3.9.1~~].

Commented [SD414]: Corrected Typo N2055 combined comments

Commented [SD415]: As per WG1 Comments N1954

Commented [AD416]: N2237 -180

Commented [SD417]: Combined comments N2055

For glass doors, see 4.3.6.2.2.1~~5.3.6.2.2.1~~ i) 3).

~~NOTE For a) and b), the probe surface used to apply the test forces can be of soft material to avoid damage to the door coating.~~

Commented [AD418]: TFHAS_74_v4

~~4.3.5.2.2~~~~5.3.5.3.2~~ Horizontal sliding doors and folding doors on the landing and car ~~doors~~ shall be provided with ~~devices~~ retainers for ~~retaining~~ keeping the door panel(s) in position ~~should the~~ if any of their guiding elements ~~fixed to the door panel~~ fails.

Hanger plate retainer(s) shall have overlapping to its counterpart(s) in normal operation position. Retainers shall be metallic devices which are either:

a) devices separated from the guiding elements which do not need to be removed for replacement of the normal guiding elements; or

b) non-removable or integrated part of the door panel / hanger with or without integrated guiding element.

All door panels ~~with these devices installed~~ in their complete door assembly shall withstand a pendulum shock test as specified in ~~5.3.5.3.4~~4.3.5.2.4 a) at striking points according to Table ~~15 a)~~ and Figure ~~11~~ 14 ~~under the worst possible failure conditions of the normal guiding elements.~~

~~Retainer should be understood as a mechanical means preventing the door panels from leaving their guides which may be either an additional component or part of the panel/hanger.~~

The test shall be performed with the door ~~panel~~assembly in the ~~normal operational~~closed position, including the upper normal ~~upper~~ guiding means in place and the lower normal guiding means removed. ~~The means simulating the normal guiding elements keeping this position shall not give any horizontal support during the test.~~

~~NOTE: It is assumed, t~~The door shall resists the pendulum shock test also with the normal guiding means installed.

~~4.3.5.2.3~~~~5.3.5.3.3~~ Under the application of a manual force of 150 N in the direction of the opening of the leading landing door panel(s) of horizontally sliding doors and folding doors, at the most unfavourable point, the clearances defined in 4.3.1.4~~5.3.1.4~~ ~~may exceed 6 mm, but they~~ shall not exceed:

a) 30 mm for side opening doors;

b) 45 mm in total for centre opening doors.

Commented [IJ419]: See N1537

Commented [AD420]: N2237 -044

Commented [SD421]: WG1 Comments N1984

Commented [IJ422]: See N1564

Commented [SD423]: As WG1 comments N2045

Commented [AD424]: WG1 2023-06-28

Commented [SD425]: Combined comments N2055

4.3.5.2.4~~5.3.5.3.4~~ In addition, for:

— landing doors with glass panels;

— car doors with glass panels, and;

— side frames of landing doors that are wider than 0,15 m, including additional panels to the side of the door frame used to enclose the well;

the following shall be fulfilled (see Figure ~~11~~14):

~~Where additional panels to the side of the door frame are used to enclose the well, they should be considered as side frames.~~

a) when an impact energy equivalent to a falling height of 0,80 m of the soft pendulum shock device (ISO 8100-2:2023, ~~5.14~~16~~/~~4.16) is striking the middle of:

— the glass panel(s) in doors, or

— side frames, or

— glass panel(s) in the side frames,

~~in the middle of the panel or frame width,~~ at striking points according to Table ~~4~~5 ~~a)~~ or Table 5~~5 b)~~, from the landing side or from the inside of the car, the following shall be satisfied:

~~1) they may have permanent deformation;~~

1) ~~2)~~ there shall be no loss of integrity of the door assembly. The door assembly shall remain in place with no gaps greater than 0,12 m into the well;

~~3) after the pendulum test, the doors do not need to be able to operate;~~

2) ~~4)~~ for glass elements, there shall be no cracks;

After the pendulum test the doors do not need to be able to operate.

b) when an impact energy equivalent to a falling height of 0,50 m of the hard pendulum shock device (ISO 8100-2:2023, ~~5.14~~16~~/~~4.16) is applied on glass doors or glass panels bigger than stated in ~~5.3.7.2.1~~4.3.7.2.1 a), striking in the middle of:

— the glass door, or

— glass panels in doors, or

— glass panels in side frames,

~~the door panels or glass panels in frames~~ at striking points from the landing side or from the inside of the car according to Table ~~4~~5 ~~a)~~ or Table 5~~5 b)~~, there shall be:

1) no cracks;

2) no damage on the surface of the glass except chips of 2 mm maximum in diameter.

~~NOTE In the case of multiple glass panels, the weakest configuration of the panels can be taken into account.~~

Commented [SD426]: Align units/ decimal places with the table and figures in 5.4.5.3.4

Commented [AD427]: N2237 -182

Commented [SD428]: Align units/ decimal places with the table and figures in 5.4.5.3.4

Commented [SD429]: As per WG1 comments - Update ref for pendulum shock device from 5.14 – 5.16 in line with for latest draft of ISO 8100-2

Commented [IJ430]: China comment to assist in translation

Commented [AD431]: TFHAS_74_v4

Commented [SD432]: Align units/ decimal places with the table and figures in 5.4.5.3.4

Commented [SD433]: As per WG1 comments - Update ref for pendulum shock device from 5.14 – 5.16 in line with for latest draft of ISO 8100-2

Commented [IJ434]: China comment to assist in translation
See also N1546

Commented [SD435]: Missing from original draft

Commented [AD436]: TFHAS_74_v4

Table ~~45 a)~~ — Striking points on horizontal sliding doors, folding doors and hinged doors

Pendulum shock test	Soft pendulum		Hard pendulum	
~~Dropping~~ Falling height	0,80 m		0,50 m	
Striking point height	1,00 m ± 0,10 m	Centre of glass	1,00 m ± 0,10 m	Centre of glass
Door panel or frame > 0,15 m without glass panel Figure 14 a) and 14 g)	X			
Door panel or frame > 0,15 m with small glass panel Figure 14 b)	X	X		X
Door panel or frame > 0,15 m with more than one glass panel Figure 14 c) Tests on whichever glass panel represent the worst case	X	X		X
Door panel or frame > 0,15 m with big glass panel or full glass Figure 14 d)	X (Impact on glass)		X (Impact on glass)	
Door with glass panel or frame > 0,15 m starting or ending at about 1,00 m height Figure 14 e)	X	X		X
Door with glass panel or frame > 0,15 m starting or ending at about 1,00 m height Figure 14 f)	X (Impact on glass)		X (Impact on glass)	
~~Side frames >150 mm Figure 11 g)~~	~~X~~			
Door with vision panel (~~5.3.7.2~~4.3.7.2)	X	X		

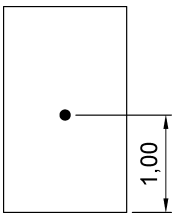
Commented [SD437]: AS per WG1 Comments N 1954

Commented [SD438]: Corrected Text, N2055 combined comments

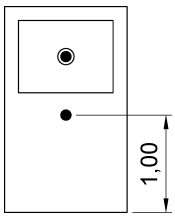
Commented [AD439]: Text must be like for figure 14 e)

Commented [SD440]: Align units/ decimal places with the table and figures in 5.4.5.3.4

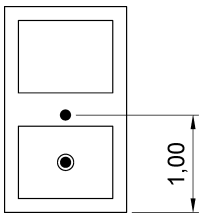
Dimensions in ~~milli~~metres



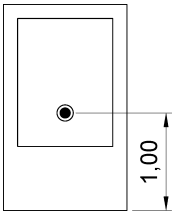
a) Door panel without glass panel



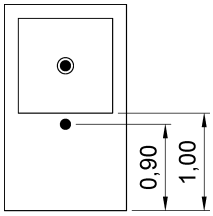
b) Door panel with glass panel



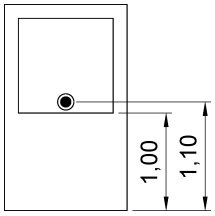
c) Door panel with more than one glass panel



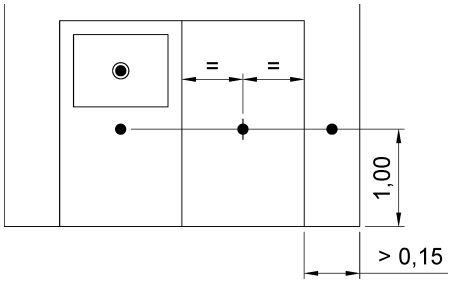
d) Door panel with glass panel or full glass



e) Door panel with glass panel above 1,00 m



f) Door panel with glass panel above 1,00 m



g) Complete landing door with door panels and side frames [example according to a) and b)]

NOTE 1 Figures 14 e) and14 f) are alternative solutions.

NOTE 2 For striking points defined by 1,00 m, the tolerance is ±0,10 m.

Key

- striking point for soft pendulum shock test
- ○ striking point for hard pendulum shock test

Figure 14 — Horizontal door panels — Pendulum shock tests — Striking points

The worst case shall be tested. If it is not possible to determine the worst case, both or all variants shall be tested.

Commented [SD441]: Align units decimal places with the tables and figures in 5.4.5.3.4 to meters

Commented [SD442]: Align units/ decimal places with the table and figures in 5.4.5.3.4

Commented [SD443]: Added to align with Figure 15

Table 5 ~~5 b)~~ — Striking points on vertical sliding doors

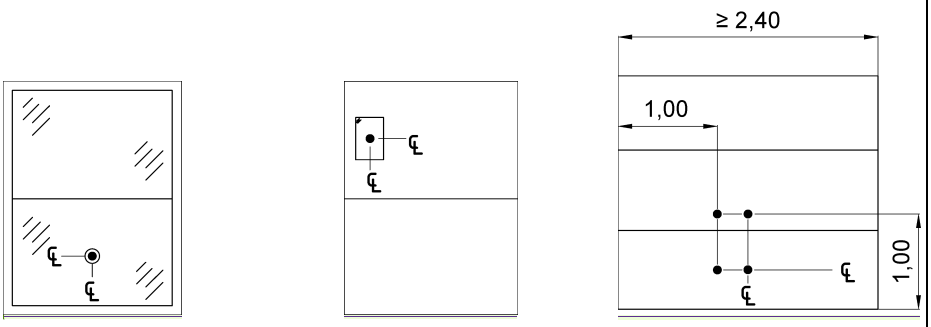
Pendulum shock test	Soft pendulum					Hard pendulum
~~Dropping~~Falling height	0,80 m					0,50 m
Striking point position	1,00 ± 0,10 m height / centre of the panel width	1,00 ± 0,10 m height / 1,00 m from one side	Centre of the lower panel(s)	Centre of the lower panel(s) height / 1,00 m from one side	Centre of glass if present	Centre of glass
1 panel below 1,00 m less than 2,40 m width Figure 15 e)	x				x	x
1 panel below 1,00 m equal to or more than 2,40 m width Figure 15 f)	x	x			x	x
More than 1 panel below 1,00 m, less than 2,40 m width Figure 15 d)	x		x		x	x
More than 1 panel below 1,00 m, equal to or more than 2,40 m width Figure 15 c)	x	x	x	x	x	x
Side frames > 0,15 m Figure- 14 g)	x					
Additionally, any panel with vision panel (~~5.3.7.24~~.3.7.2) Figure 15 b)					x	

Commented [SD444]: Combined comments N2055 replaced symbols '<>=' with words

Commented [SD445]: As Wg1 comments N1986 Added Figures to column 1 (striking point position)

Changed measurements to meters to align with tables and figures in clause 5.4.5.3.4

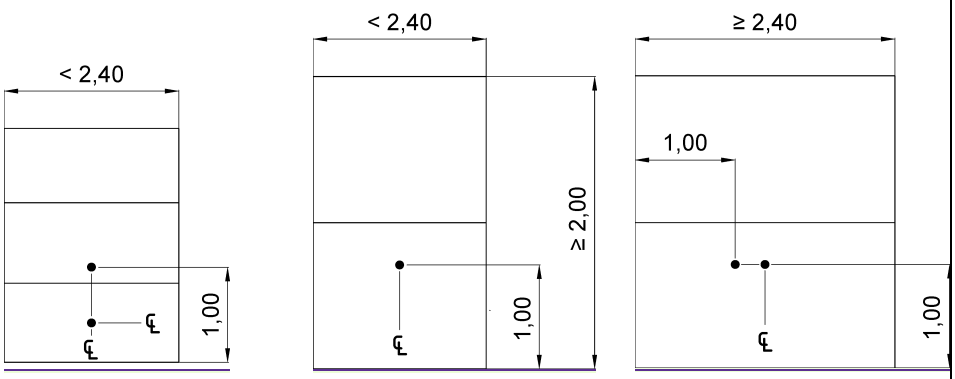
Dimensions in metres



a) ~~Additional impact~~Striking points for glass panels

b) ~~Additional impact~~Striking points for vision panels

c) more than 1 panel below 1,00 m equal to or more than 2,40 m width



d) more than 1 panel below 1,00 m less than 2,40 m width

e) 1 panel below 1,00 m less than 2,40 m width

f) 1 panel below 1,00 m equal to or more than 2,40 m width

Key

- striking point for soft pendulum shock test
- striking point for hard pendulum shock test
- ℄ Center line of panel or glass

Figure 15 — Vertical door panels —- Pendulum shock tests —- Striking points

4.3.5.2.5~~5.3.5.3.5~~ Doors/frames with glass shall use laminated glass according ISO 12543-3:2021.

4.3.5.2.6~~5.3.5.3.6~~ The fixing of the glass in doors shall ensure that the glass cannot slip out of the fixings, even when sinking.

Commented [SD446]: Combined comments N2055 replaced symbols '<>=' with words

Commented [SD447]: Combined comments N2055 replaced symbols '<>=' with words

Commented [SD448]: Updated figure WG1 comments N1986

Commented [SD449]: Align units/ decimal places with the table and figures in 5.4.3.4

Commented [AD450]: TFHAS_74_v4 comment 5.4.7.5

~~4.3.5.2.7~~~~5.3.5.3.7~~ The glass panels shall have markings giving the following information:

a) name of the supplier and trade mark;

b) type of glass;

c) thickness (e.g. 8/8/0,76 mm).

~~4.3.5.2.8~~~~5.3.5.3.8~~ Vertical sliding landing and car doors shall be provided with retainers for keeping~~devices for retaining~~ the door panel(s) in position if any of their guiding elements fails~~should the guiding element fixed to the door panel fail~~.

Retainers shall be metallic devices which are either:

a) devices separated from the guiding elements which do not need to be removed for replacement of the normal guiding elements; or

b) non-removable or integrated part of the door panel / hanger with or without integrated guiding element.

All door panels ~~Vertical sliding doors with these devices installed~~ in their complete door assembly shall withstand a pendulum shock test as specified in 4.3.5.2.4~~5.3.5.3.4~~ a) at striking points according to Table 5~~5 b)~~ and Figure 15~~ under the worst possible failure condition of the normal guiding elements~~.

~~Retainer should be understood as a mechanical means preventing the door panels from leaving their guides which may be either an additional component or part of the panel/hanger/guiding elements.~~

The test shall be performed with the door ~~panel~~assembly in the ~~normal operational~~closed position and the normal guiding means removed~~. The means simulating the normal guiding elements keeping this position shall not give any horizontal support during the test~~.

The door shall resist the pendulum shock test also with the normal guiding means installed.

~~4.3.5.2.9~~~~5.3.5.3.9~~ When the door is closing and:

a) ~~I~~if ~~there is~~ an obstacle of 30 mm diameter is placed at any position between the sill and the fast panel of a slide up to open vertical sliding door, or

b) ~~I~~if ~~there is~~ an obstacle of 45mm diameter is placed at any position between the leading edges of the panels of a bi-parting vertical sliding door,

the door shall not lock. (see also ~~5.3.5.3.3~~4.3.5.2.3)

Commented [AD451]: N2237 -044

Commented [IJ452]: See N1640

Commented [AD453]: WG1 2023-06-28

Commented [SD454]: Combined comments N2055

Commented [SD455]: Combined comments N2055

Commented [IJ456]: See N1640

4.3.6 ~~5.3.6~~ Protection in relation to door operation

4.3.6.1 ~~5.3.6.1~~ General

The door panels and their surrounding frames and additional panels~~s and their surrounds~~ shall be designed ~~in such a way as to minimize risk of damage or injury due to~~prevent jamming of a part of a person, clothing or other object.

Commented [AD457]: N2247 -185

Commented [AD458]: TFHAS_74_v4

To avoid the risk of shearing during operation, the face of automatic power-operated sliding doors, from the landing and from inside the car shall not have recesses or projections exceeding 3 mm. The edges of these shall be chamfered in the opening direction of movement.

Exception to these requirements is also made for the access to the unlocking triangle defined in 4.3.9.3~~5.3.9.3~~.

4.3.6.2 ~~5.3.6.2~~ Power-operated doors

4.3.6.2.1 ~~5.3.6.2.1~~ General

In the case of a combination of manually or power operated hinged landing door and power operated car door, the following applies:

a) the car door shall only start closing after the landing door is closed;

b) the car door ~~and~~ shall fully reopen if the landing door is ~~opened~~not closed;

c) the landing door shall be locked at the latest when the closing car door has moved 50 mm from the fully open position;

Commented [AD459]: N2247 -186

Commented [SD460]: Combined comments N2055

d) the landing door shall remain locked until the opening car door is ~~within~~ 50 mm ~~of~~from the fully open position.

Commented [AD461]: N2247 -186

NOTE crossing the entrance is impossible with a locked landing door, see ~~5.3.6.2.2.1~~4.3.6.2.2.1 and ~~5.3.6.2.3.3~~4.3.6.2.3.3 a) 4).

In the case of coupled car and landing doors operated simultaneously, the ~~following~~ requirements are valid for the joint door mechanism.

Commented [AD462]: N2247 -187

4.3.6.2.2 ~~5.3.6.2.2~~ Horizontally sliding doors

4.3.6.2.2.1 ~~5.3.6.2.2.1~~ Automatic power-operated doors

The following applies:

a) the kinetic energy of the landing and/or car door and the mechanical elements which are rigidly connected to it, calculated or measured at the average closing speed shall not exceed 10 J.

   The average closing speed of a sliding door is calculated over its whole travel, less:

   1) 25 mm at each end of the travel in the case of centrally closing doors;

   2) 50 mm at each end of the travel in the case of side closing doors;

b) a protective device shall automatically initiate re-opening of the door(s) in the event of a person crossing the entrance during the closing movement. The protective device may be rendered inoperative in the last 20 mm of door closing gap;

1) the protective device ~~(e.g. light curtain)~~ shall cover the protected zone ~~opening~~ over the vertical distance between at least 25 mm and 1 600 mm above the car door sill;

2) the protective device shall be capable of detecting obstacles with a minimum diameter of 50 mm;

~~3) to counteract persistent obstructions when closing the door, the protective device may be de-activated after a predetermined time;~~

3) ~~4)~~ in case of failure, or deactivation of the protective device, the kinetic energy of the doors shall be limited to 4 J, if the lift is kept in operation, and an acoustic signal shall operate at any time the door(s) is (are) closing.

NOTE The protective device of the car door and the landing doors can be the same.

c) the effort needed to prevent the door from closing shall not exceed 150 N, excluding the first third of the travel of the door;

d) the prevention of the door closing shall initiate a minimum re-opening of the door of 50 mm;

~~Re-opening does not imply that the door shall open fully, but some reopening shall occur to allow an obstacle to be removed.~~;

e) the effort needed to prevent a folding door from opening shall not exceed 150 N. This measurement shall be made with the door collapsed such that the adjacent outer edges of the folded panels or equivalent, e.g. door frame, are at a distance of 100 mm;

f) if a folding car door is ~~going~~ opening into a recess:

— ~~the distance between any outer edge of the door fold and the recess shall be at least 15 mm; the~~ recess shall be chamfered with a minimum of 135° (see Figure 16);

— the distance between the outer edge of the door fold and the chamfer of the recess in the open position shall be at least 25mm ~~following~~(see Figure 16).

g) if labyrinths or chicanes are used ~~(for e.g. limitation of fire transmission)~~ on the front edges of leading door panels, or on the combination of leading door edge and fixed jamb, recesses and protrusions shall not exceed 25 mm;

In the case of glass doors, the thickness of the front edge of the leading panel(s) shall not be less than 20 mm. The edges of the glass shall be ground in order not to cause injury.

h) ~~doors made from glass, with the exception of vision panels to 5.3.7.2.1 a), shall be provided with means to limit the opening force to 150 N and to stop the door in the event of an obstruction. After period of time e.g. 30 seconds, the door motor may be re-energized to open or close the door. If the 150N force limitation is still in place then the door shall be stopped again~~the effort needed to prevent the door from opening shall not exceed 150 N, measured from the fastest panel, excluding the first third of the travel of the door; the door opening shall be stopped, and door movement shall be prevented for at least 20 seconds;

Commented [AD463]: TFHAS_74_v4

Commented [IJ464]: See N1640

Commented [AD465]: N2247 -047

Commented [AD466]: TFHAS_74_v4

Commented [SD467]: Combined comments N2055

Commented [AD468]: TFHAS_74_v4

Commented [SD469]: As WG1 comments N1986 and N1960

Commented [AD470]: IR3

Commented [IJ471]: See N1538 & N1640

Commented [SD472]: As per WG1 comments N 1970

Commented [SD473]: Combines comments N2055 (161) & N2200

i) to avoid dragging of children hands, when the doors are opening automatic power-operated horizontally sliding doors made of glass of dimensions greater than stated in ~~5.3.7.2~~4.3.7.2 shall be ~~provided with means to minimize the risk,~~protected by:

1) making the glass opaque on the side exposed to the user by the use of either frosted glass or the application of frosted material to a height of minimum 1,10 m; or

2) sensing the presence of fingers ~~at least up to 1,60 m above sill and stopping the door movement in opening direction~~ according to ~~5.3.6.2.2.14~~.3.6.2.2.1 i) 1);~~,~~ or

3) limiting the gap between door panels and frame to maximum 4 mm, at least up to a minimum of 1,60 m above sill. This value due to wear may reach 5 mm.

Recesses (framed glass, etc.) shall not exceed 1 mm and shall be included in the 4 mm gap. The maximum radius on the outer edge of the frame adjacent to the door panel shall not be more than 4 mm.

j) automatic power-operated horizontally sliding car doors shall:

1) be provided with means of detecting an object 8 mm thick, 40 mm wide and 80 mm length, where the second 40 mm is 12 mm thick with 45° chamfer [see Figure 18)], during opening the door.

The object shall be detected between 0,20 m and 1,60 m above the sill.

The door movement shall be stopped in the opening direction within 50 mm after detection; or

2) have a limited gap:

— between door panels and uprights; and

— in-between door panels;

of maximum 5 mm between 25 mm and 1,60 m above the sill. This value due to wear may reach 6 mm.

k) the vertical hidden edges [see Figure 17 a)] of:

— door panels;

— uprights (car front wall);

of automatic power operated horizontally sliding car doors shall be:

— bent to at least 90° [see Figure 17 b)]; or

— be rounded to a minimum radius of 0,5 mm when the plate thickness is 2 mm or more [see Figure 17 c)]; or

— be designed according EN 81-71:2022 Figure 1 [see Figure 17 d)].

Commented [SD474]: Combined comments N2055 & N2200

Commented [AD475]: N2247

Commented [SD476]: Combined comments N2055 & N2200

Commented [SD477]: Combined comments N2055 & N2200

Commented [SD478]: As WG1 comments N1986 & N1970

Commented [SD479]: Combined comments new figure N2055 (540)

Dimensions in millimetres

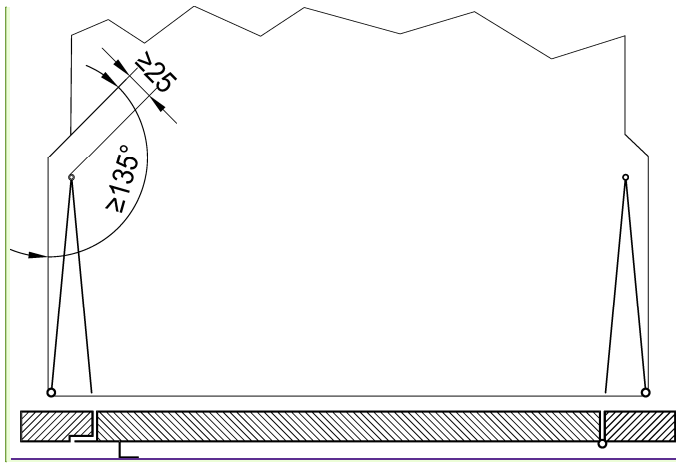
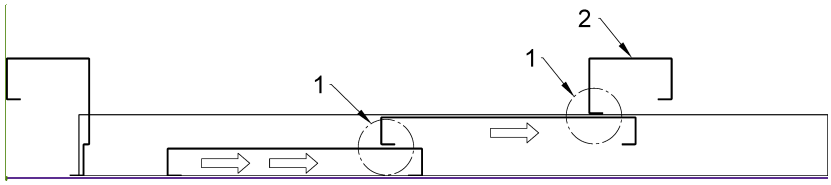


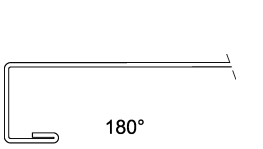
Figure 16 — Folding door recess

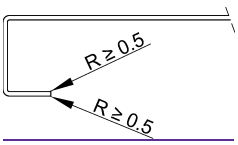
Commented [SD480]: As WG1 comments N1986 and N1960

Dimensions in millimetres

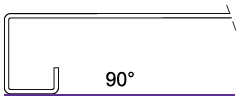


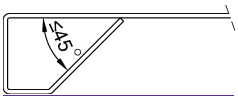
a) vertical hidden edges





c) radius





b) bending

d) closed

Key
1 vertical hidden edges
2 car front wall

Figure 17 — Door panels and uprights — vertical hidden edges

Dimensions in millimetres

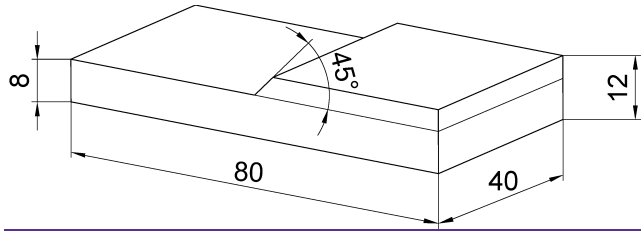


Figure 18 — Test object

4.3.6.2.2.2 ~~5.3.6.2.2.2~~ Non-automatic power-operated doors

When the closing of the door is carried out ~~under the continuous control and supervision of the user, by continuous pressure on a button or similar~~ (hold-to-run control), the average closing speed of the fastest panel shall be limited to 0,30 m/s, when the kinetic energy, calculated or measured as stated in ~~5.3.6.2.2.1~~4.3.6.2.2.1 a), exceeds 10 J.

Commented [SD481]: As WG1 comments N1986 and N1970

Commented [SD482R481]: Corrected figure (arrow position)

Commented [SD483]: As per WG1 comments & N1970

Commented [SD484]: As per WG1 comments & N1970

Added additional Radius ref to 17c as per combined comments N2055

Commented [SD485]: As per WG1 comments & N1970

Commented [SD486]: Combined comments new figure N2055 (540)

Commented [AD487]: TFHAS_74_v4

4.3.6.2.3 ~~5.3.6.2.3~~ Vertically sliding doors

Commented [IJ488]: See N1564

4.3.6.2.3.1 ~~5.3.6.2.3.1~~ General

The following applies:

a) The combination of vertical sliding car door and vertical sliding landing door shall only be used for goods passenger lifts;

b) The door closing speed for vertical slide up to open landing doors or each panel of a bi-parting landing door shall be no more than 0,30 m/s and the average closing speed for a vertical slide up to open car door shall be no more than 0,60 m/s;

c) A visual and audible warning starting at least 2 s prior to door closing, visible and audible from the car and landing shall be used during closing movement;

The sound level shall be adjustable between 45 dB(A) and 65 dB(A), or might be fixed to 80 dB(A) for industrial environments.

The sound level shall be measured in 1,00 m height at 1,00 m distance from the centre of the door at car and landing side with the door fully open.

Where the combination of hinged landing door and vertical sliding car door is used, the warning may be visible and audible only in the car.

d) A roller shutter door ~~and~~or a bi-parting ~~landing~~ door ~~is~~are considered as vertical sliding door;

Commented [AD489]: N2247

e) Assistance to passengers in the car shall always come from outside, being provided in particular by the emergency operation mentioned in ~~5.9.2.3~~4.9.2.3 and ~~5.9.3.9~~4.9.3.9.

4.3.6.2.3.2 ~~5.3.6.2.3.2~~ Automatic power operated vertically sliding doors

One of the following applies:

a) For:

— Landing and car door in parallel operation;

— The car door in case of sequence operation according ~~5.3.6.2.3.4~~4.3.6.2.3.4;

— The car door in combination with a hinged landing door.

1) the kinetic energy of the landing and/or car door and the mechanical elements which are rigidly connected to it, calculated or measured at the average closing speed shall not exceed 10 J.

The average closing speed of a sliding door is calculated over its whole travel, less:

i) 0,025 m at each end of the travel in the case of bi-parting doors;

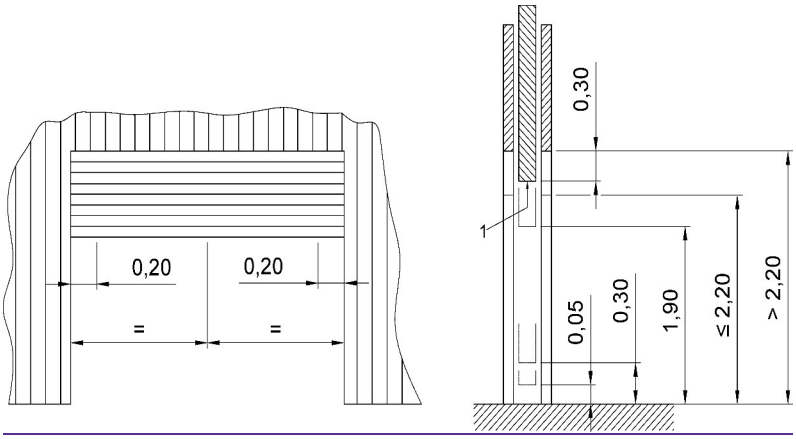
ii) 0,050 m at each end of the travel in the case of slide up to open doors.

2) the effort needed to prevent the door closing shall not exceed 150 N ~~from the floor up to a height of 1,90 m and for doors exceeding a height of 2,2 m excluding the first 0,30 m of the full height of the door:~~
~~The 150 N shall be~~, measured between the main closing edge and the opposing edge (floor) at the following points of the main closing edge (see Figure 19):

Commented [AD490]: N2247

i) at a distance of 0,20 m from each lateral border of the horizontal clear distance of the door opening and; at the centre of the clear opening;

Dimensions in ~~milli~~metres



Key

1 main closing edge of the door

Figure 19 — Points of measuring at the leaf of a lifting door

ii) and at the ~~opening~~closing vertical gaps of:

— 0,05 m;

— 0,30 m;

— and 1,90 m, or, if the clear opening height is > 2,20 m, 0,30 m below the fully open position of the door.

3) The prevention of door closing movement shall initiate a re-opening of the door.

Re-opening does not imply that the door shall open fully, but some reopening shall occur to allow an obstacle to be removed.

4) a protective device shall automatically initiate re-opening of the door(s) in the event of a person crossing the entrance during the closing movement.

i) the protective device ~~(e.g. light curtain)~~ shall cover the ~~opening~~protected zone over the vertical distance between at least 0,025 m and 1,60 m above the car door sill;

ii) the protective device shall be capable of detecting obstacles minimum of 0,050 m diameter;

— ~~to counteract persistent obstructions when closing the door, the protective device may be deactivated after a predetermined time;~~

iii) in case of failure, or deactivation of the protective device, the kinetic energy of the doors shall be limited to 4J, if the lift is kept in operation.

NOTE Protective device of the car door and the landing doors could be common.

Commented [AD491]: N2247

Commented [AD492]: N2247

Commented [AD493]: N2247
-047

Commented [SD494]: Corrected dimension combined comments N2055

Commented [AD495]: N2247

b) For:

— Landing and car door in parallel operation

— The car door in case of sequence operation according ~~5.3.6.2.3.4~~4.3.6.2.3.4

1) the prevention of door closing movement shall initiate a re-opening of the door; Re-opening does not imply that the door shall open fully, but some reopening shall occur to allow an obstacle to be removed;

2) a protective device shall detect the object defined in i) passing through the protected zone defined in ii) at any position within this zone, stop the door and initiate re-opening of the door during the closing movement:

i) the test object is a cylinder with a maximum of 0,05 m diameter, 0,30 m long with the axle parallel to the floor and perpendicular to the protected zone;

ii) The protected zone in parallel operation shall be between the car side of the car door leading panel and landing side of the landing door leading panel and up to a height of 2,00 m from the door sill [see Figure 20 b)];

iii) The protected zone in sequence operation shall be between the car side of car door leading panel and the well side of car door leading panel and up to a height of 2,00 m from the sill [see Figure 20 a)];

iv) the protective device ~~(e.g. light curtain)~~ shall detect objects anywhere in the opening over the vertical distance between at least 0,025 m and 2,00 m above the car door sill; (see Figure 20);

v) in case of failure, or deactivation of the protective device the automatic door closing shall be disabled (door re-open buttons shall remain active).

NOTE Protective device of the car door and the landing doors could be common.

c) For the car door in combination with a hinged landing door in a goods passenger lift:

1) The prevention of door closing movement shall initiate a re-opening of the door; Re-opening does not imply that the door shall open fully, but some reopening shall occur to allow an obstacle to be removed.

2) a protective device shall detect the object defined in i) entering from car side through the protected zone defined in ii) at any position within this zone, stop the door and initiate re-opening of the door during the closing movement.

i) the test object is a cylinder with a maximum of 0,05 m diameter, 0,30 m long with the axle parallel to the floor and perpendicular to the protected zone;

ii) The protected zone shall be between the car side of the leading car door panel to the well side of the hinged landing door and up to a height of 2,00 m from the door sill [see Figure 20 c)];

iii) the protective device ~~(e.g. light curtain)~~ shall detect objects anywhere in the opening over the vertical distance between at least 0,025 m and 2,00 m above the car door sill; [see Figure 20 c)];

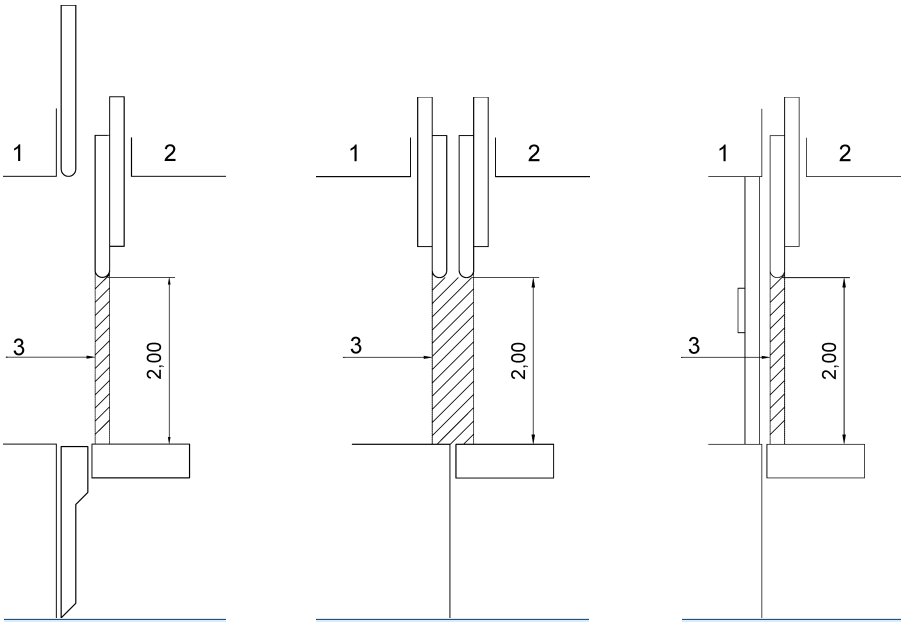
iv) in case of failure, or deactivation of the protective device the automatic door closing shall be disabled (door re-open buttons shall remain active).

NOTE Protective device of the car door and the landing doors could be common.

Commented [AD496]: N2247 -047

Commented [AD497]: N2247 -047

Dimensions in metres



a) Sequence operation | b) Parallel operation | c) Vertical car door in combination with hinged landing door

Key
1 Landing
2 Car
3 Protected zone

Figure 20 — Protected Zone — Vertically sliding doors

4.3.6.2.3.3 ~~5.3.6.2.3.3~~ Non-automatic power operated vertically sliding doors

Manual closing of power operated doors shall be operated by a hold-to-run control device. The following conditions shall be fulfilled simultaneously:

a) The actuator(s) may be equipped with a key switch or similar;

b) when the manual actuator is released, re-opening shall be initiated automatically;~~.~~

c) The closing of the door is carried out under the continuous control of the user;

d) the closing movement shall not be initiated by any controls other than the manual actuator of the hold-to-run device;

e) Re-closing shall only start if the closing command was released and is re-initiated;~~.~~

f) The requirements of ~~5.3.6.2.3.2~~4.3.6.2.3.2 apply in addition.

Commented [AD498]: The definition of user does not fit.
The target is to allocate the buttons in way to be able to monitor the door.
person making use of the services of a lift installation which includes passengers, and persons waiting at the landings

4.3.6.2.3.4 ~~5.3.6.2.3.4~~ Sequence operation for power operated vertical sliding doors.

Sequence operation is as follows:

a) The car door closes first. The landing door shall only start to close when the car door is within a distance of 0,50 m above the floor;

b) The protective device of the car door remains active until the landing door is closed;

c) A control button at the landing with the door re-open symbol according to ISO 4190-5:2006, Table C.1 No.2 shall allow to re-open the doors when the car is at the landing.

~~This type of sliding door shall only be used for goods passenger lifts.~~

~~Power closing shall only be used if the following five conditions are fulfilled at the same time:~~

~~a) the closing is carried out under the continuous control and supervision of the users, e.g. hold-to-run operation;~~

~~b) the average closing speed of the panels is limited to 0,30 m/s;~~

~~c) the car door is of construction as provided for in 5.3.1.2;~~

~~d) the car door is at least two-thirds closed before the landing door begins to close;~~

~~e) the door mechanism is protected against unintentional access.~~

~~4.3.6.3~~~~5.3.6.2.4~~ ~~Other types of doors~~

~~When using other types of doors, e.g. hinged doors, with power operation, where there is a risk of striking persons when opening or closing, precautions similar to those laid down for power-operated sliding doors shall be taken.~~

~~4.3.6.4~~4.3.6.3~~5.3.6.3~~ Reversal of closing movement

If car doors are automatic power-operated a control button inside the car shall allow to reopen the doors when the car is at the landing.

NOTE This is normally referred to as a "door re-open button".

4.3.7 ~~5.3.7 Local landing lighting and~~ "~~car~~ Car here" ~~signal lights~~indication

~~5.3.7.1 Local landing lighting~~

~~The natural or artificial lighting of the landings in the vicinity of landing doors shall be at least 50 luxlx at floor level, such that a user can see ahead when they are opening the landing door to enter the lift, even if the car light has failed (see 0.4.2).~~

~~NOTE This can be subject to national building regulations.~~

Commented [SD499]: Combined comments N2055

Commented [IJ500]: See N1564

Commented [AD501]: TFHAS_74_v4

~~5.3.7.2 "Car here" indication~~

~~4.3.7.15.3.7.2.1~~ In the case of manually operated landing doors ~~with manual opening, the user needs to know whether the car is there or not.~~

~~To this effect,~~ one of the following solutions shall be installed:

Commented [AD502]: TFHAS_74_v4

a) one or more transparent vision panels conforming to the following four conditions at the same time:

   1) the mechanical strength is as specified in ~~5.3.5.3~~4.3.5.2, The glass panel shall not detach from the door ~~breaking or damaging the glass~~ during the door pendulum shock test per ~~5.3.5.3.4~~4.3.5.2.4 a) ~~is not considered as test failure. The glass panel shall not detach from the door~~;

   2) laminated glass according ISO 12543-3:2021 of minimum thickness of 3/3/0,76 mm and marked with:

      i) the name of the supplier and trade mark;

      ii) the thickness (e.g. 3/3/0,76 mm);

   3) minimum glazed area per landing door of 0,015 m^2 with a minimum of 0,01 m^2 per vision panel;

   4) width of at least 60 mm, and at most 150 mm. The lower edge of vision panels which are wider than 80 mm shall be at least 1,00 m above floor level,

Commented [AD503]: TFHAS_74_v4 comment 5.4.7.5

b) an illuminated “car here” signal which shall light up when the car is about to stop or has stopped at the particular landing. This signal may be switched off when the car is parked and the doors are closed, but shall light again when the call button of the landing where the car is parked is activated.

~~4.3.7.25.3.7.2.2~~ The car door shall be fitted with a vision panel(s) if the landing door has a vision panel(s) as in ~~5.3.7.2.1~~ 4.3.7.1 a), unless the car door is automatic and remains in the open position when the car is stationary at the level of a landing.

When a vision panel(s) is fitted, it shall satisfy the requirements of ~~5.3.7.2.1~~4.3.7.1 a) and be positioned in the car door such that it is in visual alignment with the landing door vision panel(s) when the car is at the level of the landing.

4.3.8 ~~5.3.8~~Locking and closed landing door check

4.3.8.1 ~~5.3.8.1~~ Protection against the risk of falling

It shall not be possible in automatic ~~normal~~ operation to open a landing door (or any of the panels in the case of a multi-panel door) unless the car has stopped, or is on the point of stopping, in the unlocking zone of that door.

Commented [SD504]: Combined comments N2055 & N2175

The unlocking zone shall not extend more than 0,20 m above and below the landing level.

In the case, however, of mechanically operated car and landing doors operating simultaneously, the unlocking zone may extend to a maximum of 0,35 m above and below the landing level.

4.3.8.2 ~~5.3.8.2~~ Protection against shearing

With the exception of ~~5.12.1.4~~4.12.1.4 and ~~5.12.1.8~~4.12.1.8, it shall not be possible to start the lift, nor keep it in motion, if a landing door, or any of the panels in the case of a multi-panel door, is open.

4.3.9 ~~5.3.9~~Locking and emergency unlocking of landing and car doors

4.3.9.1~~5.3.9.1 General~~ Landing door locking devices

4~~.3.9.1.1 5.3.9.1.1~~ Each landing door shall be provided with a locking device satisfying the conditions of 4.3.8.1~~5.3.8.1~~. The locking element shall be protected to prevent unlocking with a straight object 300 mm long and 1 mm thick from the landing side.~~This device shall be protected against deliberate misuse.~~

Each component taking part in the locking of doors and in the checking of the locking forms part of the locking device.

With the exception of 4.12.1.4~~5.12.1.4~~ and 4.12.1.8~~5.12.1.8~~, the effective locking of the landing door in the closed position shall precede the movement of the car. The locking shall be ~~proved~~ checked by an electric safety device in conformity with 4.11.2~~5.11.2~~.

4.3.9.1.2~~5.3.9.1.2~~ The electric safety device shall not be activated unless the locking elements are engaged by at least 7 mm (see Figure 21).

Dimensions in millimetres

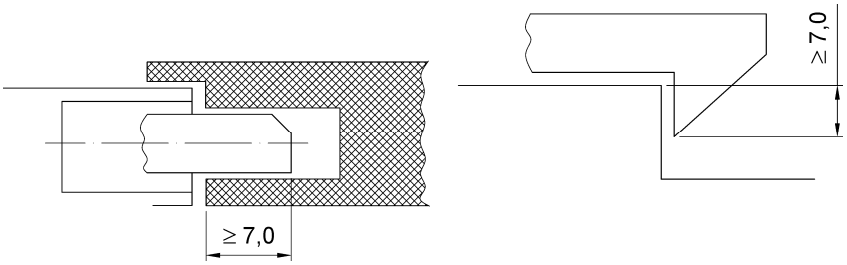


Figure 21 — Examples of locking elements

4.3.9.1.3~~5.3.9.1.3~~ The ~~element of the~~ electric safety device ~~proving~~ checking the locked condition of the door panel(s) shall be ~~positively~~ operated by the locking element without any intermediate mechanism ~~by the locking element~~.

~~**Specific case:** In the case~~ of flap type locking device or ~~of locking devices used in installations requiring special protection against risks of humidity or explosion, the connection may be only positive, provided the link between the mechanical lock and the element of the electric safety device proving the locked condition, can only be interrupted by deliberately destroying the locking device.~~

4.3.9.1.4~~5.3.9.1.4~~ For hinged doors, locking shall be effected as within a maximum distance equal to 10% of the width of the door panel~~near as possible~~ to the vertical closing edge(s) of the doors, and maintained even in the case of panels sagging.

~~**5.3.9.1.5** The locking elements and their fixings shall be resistant to shock, and made of durable material that maintains the strength property over their intended lifetime, under the environmental conditions.~~

~~NOTE Shock requirements can be found in ISO 8100-2:2019~~2023, 5.2.

4.3.9.1.5~~5.3.9.1.6~~ The engagement of the locking elements shall be achieved in such a way that a force of 300 N in the opening direction of the door does not diminish the effectiveness of locking.

Commented [SD505]: Removed header as Combined comments N2055

Commented [SD506]: Removed header as Combined comments N2055

Commented [AD507]: TFHAS_74_v4

Commented [SD508]: As agreed in WG1 comments 23/11/2020 (Annex IX AH2 comments)

Commented [AD509]: Editorial alignement

Commented [SD510]: As WG1 comments N2039 & N1988

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TFHAS_144

Commented [AD512]: TFHAS_74_v4

Commented [SD513]: Updated date ref as per WG1 comments N 1954

Commented [AD514]: TFHAS_74_v4

4.3.9.1.6~~5.3.9.1.7~~ The locking device shall resist, without permanent deformation or breakage ~~which could adversely affect safety during the test laid down in ISO 8100-2:2019, 5.2,~~ a minimum force ~~at the level of the lock and~~ in the direction of opening of the door of:

a) 1 000 N at a height of 1,50 (± 0,1) m from the sill level, in the case of sliding doors;

b) 3 000 N on the locking pin, in the case of hinged doors;

c) the force when the locking force limiter according 4.3.9.1.12~~5.3.9.1.14~~ releases the flap in the case of flap type locking device (see 4.3.9.1.12~~5.3.9.1.14~~).

4.3.9.1.7~~5.3.9.1.8~~ The locking action shall be effected and maintained by the action of gravity, permanent magnets, or springs. The springs shall act by compression, be guided and of such dimensions that, at the moment of unlocking, the coils are not compressed solid.

In the ~~event~~ case of loss of force provided by ~~the~~ permanent magnets ~~(or~~and spring~~)~~ ~~s no longer fulfilling its function~~, gravity on its own shall not cause unlocking.

~~If the locking element is maintained in position by the action of a permanent magnet, it shall not be possible to neutralize its effect by simple means (e.g. heat or shock).~~

~~5.3.9.1.9 The locking device shall be protected against the risk of an accumulation of dust, which could hinder its proper functioning.~~

4.3.9.1.8~~5.3.9.1.10~~ ~~Inspection~~ Visual inspection of the ~~working parts~~locking elements shall ~~made~~be possible directly or by use of~~be easy; for example, by using~~ a transparent cover.

4.3.9.1.9~~5.3.9.1.11~~ In the case where the lock contacts are in a box, the fixing screws for the cover shall be of the captive type, so that they remain in the holes in the cover or box when opening the cover.

4.3.9.1.10~~5.3.9.1.12~~ The locking device ~~is regarded as a safety component and~~ shall be verified according ~~to the requirements in~~ ISO 8100-2:2023, ~~5.2~~4.2.

4.3.9.1.11~~5.3.9.1.13~~ On locking devices, a data plate shall be fixed indicating:

a) the name of the manufacturer of the locking device;

b) the identification~~type examination certificate number~~ of the locking device;

~~c) the type of locking device.~~

Commented [SD515]: As agreed in WG1 comments 23/11/2020 (Annex IX AH2 comments)

Commented [SD516]: As WG1 Comments & N1988

Commented [SD517]: As agreed in WG1 comments N1954 (Annex IX AH2 comments)

Commented [SD518]: Changed brackets as combined comments N2055

Commented [SD519]: As agreed in WG1 comments N1954 (Annex IX AH2 comments)

Commented [SD520]: AS WG1 Comments & N1988

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Commented [AD523]: TFHAS_74_v4
TFHAS_105

Commented [AD524]: TFHAS_74_v4

4.3.9.1.12~~5.3.9.1.14~~ Flap type locking devices shall comply with the following:

a) Flap type locking devices shall only be used for goods passenger lifts;

b) The flap(s) shall cover the door leave(s) with the door closed over their entire width at least 15 mm in the vertical direction, but at least 10 mm more than the height of the lower door gap (see ~~5.3.1.4~~4.3.1.4);

c) In every position of the open door, the flap shall be secured against falling into the closed position by a horizontal overlap of at least 15 mm with the top of the door leaf. Stops on the floor limiting the door panel movement are not sufficient to prevent the flap from falling into the closed position;

d) It shall be prevented that the locking device is being engaged when the landing door is not fully in the closed position;

e) All components of the flap type locking device shall be connected positively, except the locking force limiter;

f) To prevent operation of the lift with a locking device deformed by excessive opening force, a locking force limiter shall be provided to prevent deformation of the flap. This device shall withstand a force of at least 3 500 N acting on the closing edge of the panel at a height of 300 +/- 100 mm above the sill level. The activation of the force limiter shall be checked by an electric safety device in conformity with 4.11.2~~5.11.2~~. This device shall be in common with the contacts of the landing doors (4.3.9.4~~5.3.9.4~~) or the landing door locks (4.3.9.1~~5.3.9.1~~). The return to automatic operation shall only be possible by manual resetting.

4.3.9.2 ~~5.3.9.2~~ Car door locking devices

If the car door needs to be locked [see ~~5.2.5.3.1~~4.2.5.3.1 c)], the locking device shall be designed to meet the requirements given in 4.3.9.1~~5.3.9.1~~.

This device shall be inaccessible from inside the car when the car door is in the closed position~~protected against deliberate misuse~~.

The locking device ~~is regarded as a safety component and~~ shall be verified according to ~~the requirements in~~ ISO 8100-2:2023, ~~5.~~24.2.

4.3.9.3 ~~5.3.9.3~~ Emergency unlocking

~~4.3.9.3.1~~~~5.3.9.3.1~~ Each of the landing doors shall be capable of being unlocked from the outside with the aid of an emergency unlocking key, which will fit the unlocking triangle, as defined in Figure ~~13~~22.

Commented [SD525]: Combined comments N2055 (Removed Header for 5.3.9.1.14 'Flap type locking device for hinged door')

Commented [SD526]: Changed decimal places N2055

Commented [SD527]: Changed decimal places

Commented [SD528]: In line with Combined comments N2055 & N2175

Commented [SD529]: As WG1 Comments & N1988

Commented [SD530]: Combined comments N2055 sentence move to be part of f)

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Commented [SD534]: Updated Figure reference as WG1 comments N1954

Dimensions in millimetres

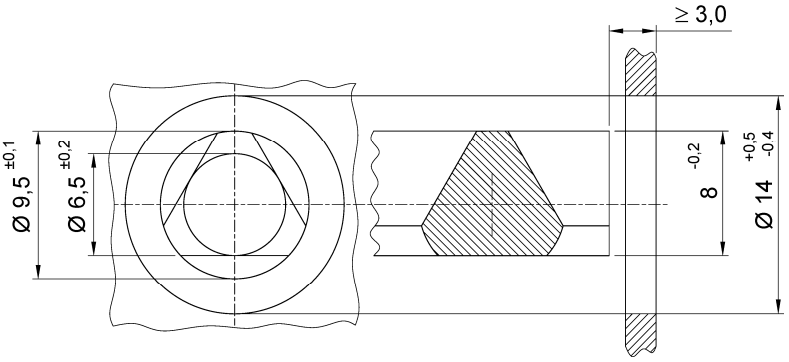


Figure 13 22 — Unlocking triangle

5.3.9.3.24.3.9.3.2 The position of the unlocking triangle can shall be on:

— the door panel, or

— the door frame, ; or or wall,

— In the case of vertical bi-parting doors, the position of the unlocking triangle can also be on the adjacent wall.

When in a vertical plane, on the door panel or frame, the position of the unlocking triangle shall not exceed 2,00 m in height above the landing.

If the unlocking triangle is on the frame and the keyhole downwards in the horizontal plane, the maximum height of the unlocking triangle hole from the landing floor shall be 2,70 m. The length of the emergency unlocking key shall be at least equal to the height of the door minus 2,00 m.

The emergency unlocking key shall be available together with the instructions according to 4.2.6.2.3 in the space where the main switch is located. The key shall have a label attached drawing attention to the danger which is involved in using this key and the need to make sure that the door is locked after it has been closed. Where the emergency unlocking key is of a length greater than 0,20 m, it is regarded as a special tool and shall be available at the installation site.

5.3.9.3.34.3.9.3.3 After an emergency unlocking, the locking device shall not be able to remain in the unlocked position with the landing door closed.

5.3.9.3.44.3.9.3.4 In the case of landing doors driven by the car door, if the landing door becomes open for whatever reason when the car is outside the unlocking zone, a device (either weight or springs) shall ensure closing and locking of the landing door.

5.3.9.3.54.3.9.3.5 If there is no access door to the pit, other than the landing door, the door lock shall be reachable safely within a height of 1,80 m and a maximum horizontal distance of 0,80 m from the pit ladder as called for inaccording to 5.2.2.4 b), or a permanently installed device shall allow a person in the pit to unlock the door.

NOTE In case of big vertical sliding doors having two locking devices, two persons might be needed to unlock the door.

Commented [IJ535]: See N1564

Commented [SD536]: As per WG1 comments N1954

Commented [AD537]: N2247

Commented [AD538]: TFHAS_116_v4 [from 7.2.2 h)], conflict with TFHAS_74 comment 5.3.9.3.2, also conflict with new 5.3.9.3.9

Commented [IJ539]: See N1537

Commented [IJ540]: Already corrected in ISO

Commented [SD541]: Combined comments N2055

~~5.3.9.3.6~~ 4.3.9.3.6 When the car is outside the unlocking zone, it shall be possible to relock the landing door without the use of a tool, including the emergency unlocking key.

~~5.3.9.3.7~~ 4.3.9.3.7 Where the manual effort to open or to close a door exceeds ~~4~~ 300 N:

a) more than 1 person is necessary for maintenance and emergency operation and this shall be stated in the instructions; or

b) additional means shall be provided which may be either mechanical or electrical and which are available on site.

If additional means are needed to exit pit, they shall be available in the pit

~~5.3.9.3.8~~ 4.3.9.3.8 For vertical sliding doors, where the emergency unlocking device is located behind a cover opened by the triangle key, this cover shall be self-closing and self-locking, and provided with a switch disabling automatic door operation when the cover is opened.

~~5.3.9.3.9~~ 4.3.9.3.9 The emergency unlocking key shall be available at the installation site in the space where the main switch is located. The key shall have a label attached, drawing attention to the danger which is involved in using this key and the need to make sure that the door is locked after it has been closed.

4.3.9.4 ~~5.3.9.4~~ Electric safety device for proving the landing door closed

~~5.3.9.4.1~~ 4.3.9.4.1 Each landing door shall be provided with an electric safety device in conformity with ~~5.11.2~~4.11.2 for proving the closed position, so that the requirements of ~~5.3.8.2~~4.3.8.2 are satisfied.

~~5.3.9.4.2~~ 4.3.9.4.2 In the case of horizontally sliding landing doors, coupled with car doors, this device may be in common with the device for proving the locked condition, provided that it is dependent upon the effective closing of the landing door.

~~5.3.9.4.3~~ 4.3.9.4.3 In the case of hinged landing doors, this device shall be placed adjacent to the closing edge of the door or on the mechanical device proving the closed condition of the door.

4.3.10 ~~5.3.10~~ Requirements common to devices for proving the locked condition and the closed condition of the landing door

~~5.3.10.1~~ 4.3.10.1 It shall not be possible, from positions normally accessible to persons, to operate the lift with a landing door open or unlocked, after one single action not forming part of the normal operating sequence.

~~5.3.10.2~~ 4.3.10.2 The means used to prove the position of a locking element shall have positive operation.

Commented [SD542]: As per WG1 Comments

Commented [SD543]: Combined comments N2055 Harmonised to 300N as clause 5.3.15.1.1

Commented [SD544]: Combined comments N2055 & N2147

Commented [AD545]: TFHAS_74_v4

Commented [IJ546]: See N1640

Commented [AD547]: Comment UNI-442, N2211 Conflict with 4.3.9.3.2

4.3.11 ~~5.3.11~~ Sliding landing doors with multiple, mechanically linked panels

~~5.3.11.1~~4.3.11.1 If a sliding landing door comprises several directly mechanically linked panels, it is permitted to:

a) place the device required in ~~5.3.9.4.1~~4.3.9.4.1 or ~~5.3.9.4.2~~4.3.9.4.2, on a single panel; and

b) lock only one panel, provided that this single locking prevents the opening of the other panel(s) by hooking the panels in the closed position in case of telescopic doors.

A back fold of the sheet of each panel of a telescopic door and hooking of the fast panel to the slow panel when the door is in the closed position, or hooks on the hanger plate realizing the same linkage, are considered as a direct mechanical linkage, and therefore does not require a device as per ~~5.3.9.4.1~~4.3.9.4.1 or ~~5.3.9.4.2~~4.3.9.4.2 on all panels. The linkage shall be ensured even in case of rupture of guiding means. Simultaneous rupture of upper and lower guiding means needs not to be taken into consideration. Compliance with the strength requirements of ~~5.3.11.3~~4.3.11.3 shall be verified with the minimum ~~possible~~ design overlapping of the hooking elements of the panels.

Commented [AD548]: TFHAS_74_v4

NOTE The hanger plate is not considered as part of the guiding means.

~~5.3.11.2~~4.3.11.2 If a sliding door comprises several indirectly mechanically linked panels (e.g. by rope, belt or chain), it is permitted to lock only one panel, provided that this single locking prevents the opening of the other panel(s), and that these are not fitted with a handle.

The closed position of the other panel(s), not locked by the locking device, shall be ~~proved~~ checked by an electric safety device in conformity with ~~5.11.2~~4.11.2.

Commented [AD549]: Editorial alignement

~~5.3.11.3~~4.3.11.3 The devices providing direct mechanical linkage between panels according to ~~5.3.11.1~~4.3.11.1, or indirect mechanical linkage according to ~~5.3.11.2~~4.3.11.2, are considered as forming part of the locking device.

They shall be capable of resisting the force of 1 000 N as per 4.3.9.1.6~~5.3.9.1.7~~ a), even if the force of 300 N mentioned in 4.3.5.2.1~~5.3.5.3.1~~ is acting simultaneously.

4.3.12 ~~5.3.12~~ Closing of automatically operated landing doors

In the case of lift landing doors participating to the fire protection of the building, they shall be closed in automatic ~~normal~~ operation, at the latest after 30 s ~~after the necessary period of time, which may be defined according to the usage of the lift,~~ in the absence of a command for the movement of the car.

Commented [SD550]: Combined comments N2055 & N2175

~~NOTE For the requirements for fire-fighting lifts and the behaviour of lifts in the event of a fire, further guidance can be found in EN 81-72:2020 and EN 81-73:2020 or in national requirements.~~

Commented [AD551]: TFHAS_74_v4

4.3.13 ~~5.3.13~~ Electric safety device for proving the car doors closed

~~5.3.13.1~~4.3.13.1 With the exception of ~~5.12.1.4~~4.12.1.4 and ~~5.12.1.8~~4.12.1.8, it shall not be possible to start the lift, nor keep it in motion, if a car door, or any of the panels in the case of a multi-panel door, is open.

~~5.3.13.2~~4.3.13.2 Each car door shall be provided with an electric safety device in conformity with 4.11.2 for proving the closed position ~~in conformity with 5.11.2~~, so that the conditions imposed by ~~5.3.13.1~~4.3.13.1 are satisfied.

Commented [AD552]: editorial

4.3.14 ~~5.3.14~~ Sliding or folding car doors with multiple, mechanically linked panels

~~5.3.14.1~~4.3.14.1 If a sliding or folding car door comprises several directly mechanically linked panels, it is permitted:

a) to place the device required in ~~5.3.13.2~~4.3.13.2;

   1) either on a single panel (the leading panel in the case of telescopic doors); or

   2) on the door driving element, if the mechanical connection between this element and the panel is direct; and

b) in the case and conditions laid down in ~~5.2.5.3.1~~4.2.5.3.1 c), to lock only one panel, provided that this single locking prevents the opening of the other panel(s) by hooking the panels in the closed position in case of telescopic or folding doors.

A back fold of the sheet of each panel of a telescopic door and hooking of the fast panel to the slow panel when the door is in the closed position, or hooks on the hanger plate realizing the same linkage are considered as a direct mechanical linkage, and therefore does not require device as required in ~~5.3.13.2~~4.3.13.2 on all panels. The linkage shall be ensured even in case of rupture of guiding means. Simultaneous rupture of upper and lower guiding means needs not to be taken into consideration. Compliance with the strength requirements of ~~5.3.11.3~~4.3.11.3 shall be verified with the minimum possible design overlapping of the hooking elements of the panels.

Commented [IJ553]: See N1537

NOTE The hanger plate is not considered as part of the guiding means.

~~5.3.14.2~~4.3.14.2 If a sliding door comprises several indirectly mechanically linked panels (e.g. by rope, belt or chain), it is permitted to place the device (~~5.3.13.2~~4.3.13.2) on a single panel, provided that:

a) it is not the driven panel; and

b) the driven panel is directly mechanically linked to the door driving element.

4.3.15 ~~5.3.15~~ Opening the car door

~~5.3.15.1~~4.3.15.1 It shall be possible, to open the mechanically coupled car and landing door(s) by hand from the landing, with a force not exceeding 300 N, when:

- the landing door is unlocked; and
- the car is stationary in the unlocking zone (4.3.8.1); and
- there is no electrical power to the door operator (e.g. main switch is off).

~~If the car is stationary, lift stops for any reason in the unlocking zone (5.3.8.1), it shall be possible with a force not greater than 300 N, to open the mechanically coupled car and landing door by hand from:~~

Commented [IJ554]: See N1564

~~a) the landing, after the landing door has been unlocked with the emergency unlocking key or being unlocked by the car door;~~

~~b) within the car.~~

~~when the door operator does not apply a closing force.~~

Commented [GE555]: INT #7

Commented [AD556]: N2132

~~5.3.15.1~~1 ~~It shall be possible, to open the mechanically coupled car and landing door(s) by hand from the landing, with a force not exceeding 300 N, when:~~

~~— the landing door is unlocked; and~~

~~— the car is stationary in the unlocking zone (5.3.8.1); and~~

~~— there is no electrical power to the door operator (e.g. main switch is off).~~

~~If the car is stationary in the unlocking zone (5.3.8.1), and the power operation of the non- mechanically coupled car and landing door is non-operational, assistance to passengers in the car shall come from outside.~~

~~5.3.15.2~~4.3.15.2In order to restrict the opening of the car door by persons inside the car, a means shall be provided such that:

a) when the car is moving, the opening of the car door shall require a force of more than 50 N; and

b) when the car is outside of the zone defined in ~~5.3.8.1~~4.3.8.1, it shall not be possible to open the car door more than 50 mm with a force of 1 000 N at the restrictor mechanism, nor shall the door open under automatic power operation.

~~5.3.15.3~~4.3.15.3It shall be possible, at least where the car is stopped within the distance defined in ~~5.6.7.5~~4.6.7.5, once the corresponding landing door has been opened, to open the car door from the landing without tools, other than the emergency unlocking key or tools being permanently available on site. This also applies to car doors fitted with locking devices ~~as~~ according to ~~5.3.9.2~~4.3.9.2.

~~5.3.15.4 In the case of lifts covered by 5.2.5.3.1 c), the opening of the car door from inside the car shall be possible only when the car is in the unlocking zone.~~

~~5.3.15.5 If the car is stationary in the unlocking zone (5.3.8.1), and the power operation of the non-mechanically coupled car and landing door is non-operational, assistance to passengers in the car shall come from outside.~~

4.4 ~~5.4~~ Car, counterweight and balancing weight

4.4.1 ~~5.4.1~~Height of car

The interior clear height of the car shall be at least 2,00 m.

4.4.2 ~~5.4.2~~ Available car area, rated load, number of passengers

4.4.2.1~~5.4.2.1~~ General case

~~4.4.2.1.1 5.4.2.1.1 General~~

~~5.4.2.1.1~~ 4.4.2.1.1 To prevent overloading of the car by persons, the available car area ~~of the car~~ shall be limited.

To this effect the relationship between rated load and maximum available car area is given in Table 6.

~~5.4.2.1.2~~4.4.2.1.2 The car area shall be measured inside the car body, from wall to wall, excluding finishes, at a height 1,00 m from the floor.

Commented [SD557]: Combined comments N2055 & N2132

Commented [AD558]: N2132

Commented [SD559]: As per WG1 comments N1954

Commented [AD560]: N2132

Commented [SD561]: WG1 Comments N1954-Deleted this clause as this is addressed on the reformulated text in 5.3.15.1.1

Commented [SD562]: Change decimal places

Commented [SD563]: Combined comments N2055 - Remove header

Commented [SD564]: Combined comments N2055 & N2190

Commented [SD565]: Combined comments N2055 & N2190

~~5.4.2.1.3~~4.4.2.4.3 Recesses and extensions in the car walls, even of height less than 1,00 m, whether protected or not by separating doors, are only permitted if their area is taken into account in the calculation of maximum available car area.

Commented [SD566]: Change decimal places

Recesses or extensions above the car floor level, which cannot accommodate a person due to equipment placed in them need not be taken into account for the calculation of the maximum available car area (e.g. niches for tip-up seats, recesses for intercoms).

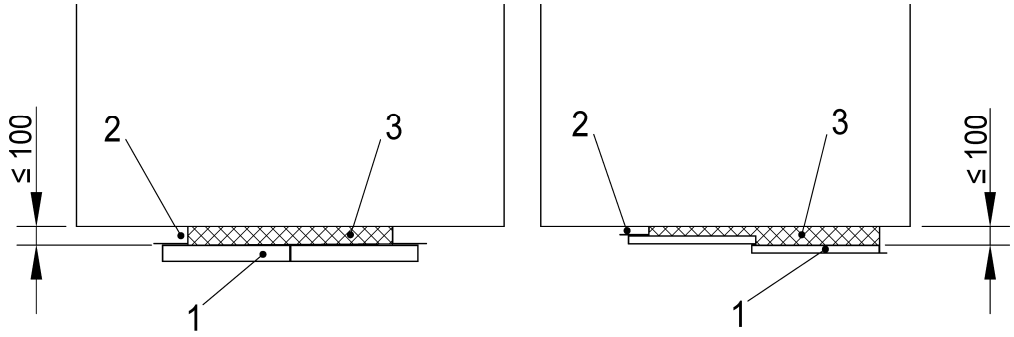
Where there is an available area between the entrance frame uprights when the doors are closed, the following applies:

a) where the area is less than or equal to 100 mm deep up to all ~~any~~ door panels (including fast and slow doors in the case of multi-panel doors), then it shall not be taken into consideration for ~~be excluded from~~ the floor area see Figure 23 a);

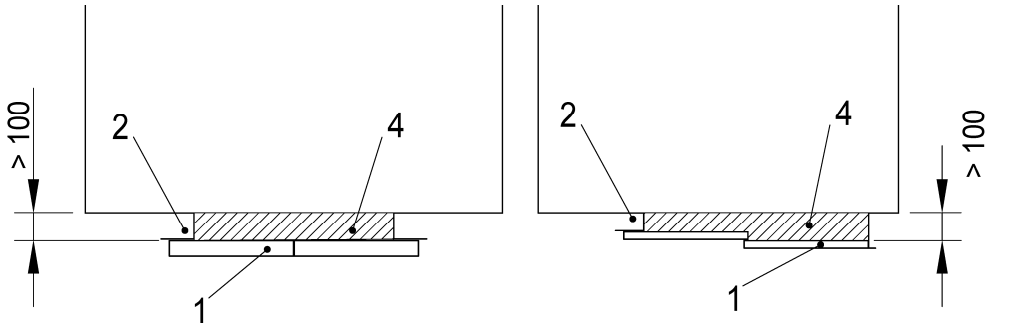
b) where the area is greater than 100 mm deep, to at least 1 door panel, the total available area shall be included in the floor area. See Figure 23 b);

Commented [SD567]: As per WG1 Comment N2020

Dimensions in millimetres



~~Figure 23 a)~~ excluded



~~Figure 23 b)~~ considered

Key

1 door panel
2 frame upright
3 excluded area
4 considered area

Figure 23 — Car floor area in recesses and extensions

Commented [SD568]: As per WG1 Comments doc N2020

Table 6 — Rated load and maximum available car area

Rated load, mass kg	Maximum available car area m^2	Rated load, mass kg	Maximum available car area m^2
100[a]	0,37	900	2,20
180[b]	0,58	975	2,35
225	0,70	1 000	2,40
300	0,90	1 050	2,50
375	1,10	1 125	2,65
400	1,17	1 200	2,80
450	1,30	1 250	2,90
525	1,45	1 275	2,95
600	1,60	1 350	3,10
630	1,66	1 425	3,25
675	1,75	1 500	3,40
750	1,90	1 600	3,56
800	2,00	2 000	4,20
825	2,05	2 500[c]	5,00

[a] Minimum for 1 person lift.
[b] Minimum for 2 persons lift.
[c] Beyond 2 500 kg, add 0,16 m^2 for each extra 100 kg.
For intermediate loads, the area is determined by linear interpolation.

~~5.4.2.1.4~~4.4.2.1.4 Overloading of the car shall be monitored by means of a device according to ~~5.12.1.2~~4.12.1.2.

4.4.2.2 ~~5.4.2.2~~ Special cases for goods passenger lifts

Commented [SD569]: Combined comments N2055 & N2190

~~5.4.2.2.1~~4.4.2.2.1 For goods passenger lifts, where the relationship between rated load and maximum available car area is according to Table 6, and where handling devices are used for loading and unloading the car, but are not transported with the load, and their weight is not included in the rated load, the following applies:

a) during loading and unloading, rated load plus the weight of handling devices shall be the base for the design of:

   1) the car, and

   2) the car sling, and

   3) the guide rails, and

   4) the mechanical device according ~~5.4.2.2.1~~4.4.2.2.1 c).

b) during running and operation of safety devices rated load shall be the base for the design of all other components;

c) a mechanical device shall be provided, which complies with the following:

   1) downward movement shall be limited to maximum 20 mm;

   2) the mechanical device shall be able to hold the car even if the machine brake is released or the down valve on a hydraulic lift is opened;

   3) the retracted position shall be checked by an electric safety device in conformity with ~~5.11.2~~4.11.2. This device shall be made inactive in the unlocking zone (~~5.3.8.1~~4.3.8.1) by ~~the~~an electric safety device ~~according~~in conformity with 4.11.2 ~~5.12.1.4~~4.12.1.4 ~~a)~~;

   4) Where the mechanical device can extend by spring(s) and/or gravity, ~~5.6.5.1~~4.6.5.1, ~~5.6.5.6~~4.6.5.6 and ~~5.6.5.7~~4.6.5.7 apply.

Commented [AD570]: N2247 -058

d) An electric circuit shall ensure the following:

   1) the mechanical device is in the extended position before the door(s) can open; and

   2) the mechanical device can only be retracted if:

      — the landing doors are closed and locked, and

      — the load control does not detect overload.

   3) This circuit shall comply with the requirements of ~~5.11.2.3~~4.11.2.3; or ~~5.11.2.4~~4.11.2.4 with SIL3, HFT1.

e) the load control according ~~5.12.1.2~~4.12.1.2 shall comply with the requirements of:

1) ~~5.11.2.3~~4.11.2.3; or (electric safety circuit)

2) ~~5.11.2.4~~4.11.2.4 with SIL3, HFT1. (SIL-rated circuit)

f) the maximum weight of handling devices shall be indicated at the landings according to Figure 24, with minimum height of 100 mm for the ~~numbers~~characters.

~~For goods passenger lifts, the requirements of 5.4.2.1 shall be applied under the following conditions, either:~~

Commented [SD571]: Combined comments N2055 & N2190

~~a) the weight of handling devices are included in the rated load; or~~

~~b) the weight of handling devices shall be considered separately from the rated load under the following conditions:~~

~~1) handling devices are used only for loading and unloading of the car and are not intended to be transported with the load;~~

~~2) for traction and positive drive lifts, the design of the car, the car sling, the car safety gear, the guide rails, the machine brake, the traction and the unintended car movement protection means shall be based on the total load of rated load plus the weight of handling devices;~~

~~3) for hydraulic lifts the design of the car, the car sling, the connection between the car and the ram (cylinder), the car safety gear, the rupture valve, the restrictor/one-way restrictor, the pawl device, the guide rails and the unintended movements protection means shall be based on the total load of rated load plus the weight of handling devices;~~

~~4) if the stroke of the car due to loading and un-loading exceeds the maximum levelling accuracy, a mechanical device shall limit any downward movement of the car, which complies with the following:~~

~~i) the levelling accuracy shall not exceed 20 mm;~~

~~ii) the mechanical device shall be activated before the doors open;~~

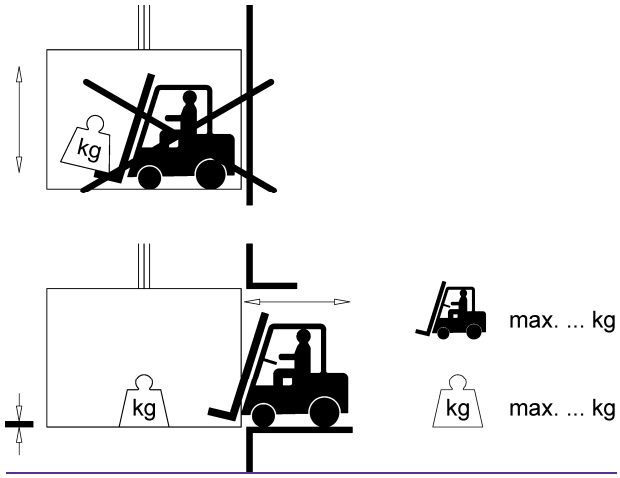
~~iii) the mechanical device shall have a sufficient strength to hold the car even if the machine brake is not engaged or the down valve on a hydraulic lift is opened;~~

~~iv) re-levelling movements shall be prevented by an electric safety device in conformity with 5.11.2 if the mechanical device is not in the active position;~~

~~v) normal operation of the lift shall be prevented by an electric safety device in conformity with 5.11.2 if the mechanical device is not in the inactive position;~~

~~5) the maximum weight of handling devices shall be indicated at the landings according to Figure 1421.~~

Commented [SD572]: Combined comments N2055 & N2190



NOTE The Forklift symbol per ISO 7010:2019, W014, and the Mass symbol per ISO 7000:2019, 1321B, are incorporated in these ~~pictograms~~signs.

Figure ~~14~~ 24 — ~~Pictogram~~ Sign at landings for loading by handling devices

~~5.4.2.2.24~~.4.2.2.2 For goods passenger lifts, ~~hydraulically driven~~,where the available car area ~~is of the car may be greater than~~exceeds the value determined from Table 6, and where the weight of handling devices used for loading and unloading the car is included in the rated load, the following applies:

a) The available car area ~~but~~ shall not exceed the value determined from Table 7 for the corresponding rated load:

Table 7 — Rated load and maximum available car area (for ~~hydraulic~~ goods passenger lifts)

Rated load, mass kg	Maximum available car area m²	Rated load, mass kg	Maximum available car area m²
400	1,68	975	3,52
450	1,84	1 000	3,60
525	2,08	1 050	3,72
600	2,32	1 125	3,90
630	2,42	1 200	4,08
675	2,56	1 250	4,20
750	2,80	1 275	4,26
800	2,96	1 350	4,44
825	3,04	1 425	4,62
900	3,28	1 500	4,80
		1 600[a]	5,04

[a] Beyond 1 600 kg, add 0,40 m² for each 100 kg extra.
For intermediate loads, the area is determined by linear interpolation.

b) during loading and unloading, a load resulting from Table 6 shall be the base for the design of:

1) the car, and

2) the car sling, and

3) the guide rails, and

4) devices according to ~~5.4.2.2.24~~.4.2.2.2 e).

c) during running and operation of safety devices rated load shall be the base for the design of all other components;

d) for hydraulic lifts, the pressure resulting from a load in the car according to Table 6 shall not exceed 1,4 times the pressure that the jack and the piping are designed for (see ~~5.9.3.24~~.9.3.2, ~~5.9.3.34~~.9.3.3);

Commented [SD573]: As per original document N1690

Commented [SD574]: In line with N1690 table 7 is now applicable to both Hydraulic and Traction lifts N1954.

Commented [SD575]: Corrected Title N2055 combined comments

e) one of the following devices shall be provided to limit downward movement of the car:

1) a mechanical device according to ~~5.4.2.2.1~~ 4.4.2.2.1 c);

2) a safety gear tripped by downward movement of the car according to ~~5.6.2.2.4~~4.6.2.2.4 limiting the downward movement to maximum 120 mm;

3) a pawl device according to ~~5.6.5~~4.6.5 limiting the downward movement to maximum 120 mm.

f) An electric circuit shall ensure the following:

1) the device according to e) is in the extended position before the door(s) can open;

2) the device according to e) can only be retracted if:

— the landing doors are closed and locked, and

— the load control does not detect overload.

3) This circuit shall comply with the requirements of ~~5.11.2.3~~4.11.2.3; or ~~5.11.2.4~~4.11.2.4 with SIL3, HFT1.

g) the load control according ~~5.12.1.2~~4.12.1.2 shall comply with the requirements of:

1) ~~5.11.2.3~~4.11.2.3; or

2) ~~5.11.2.4~~4.11.2.4 with SIL3, HFT1.

~~NOTE Example of calculations:~~

~~A hydraulic goods passenger lift is required to carry a rated load of 6 000 kg and has dimensions not less than 5,60 m deep by 3,40 m wide (i.e. 19,04 m² car area).~~

Commented [SD576]: Combined comments N2055

~~a) The maximum car area to transport a load of 6 000 kg, using Table 7:~~

~~— 1 600 kg = 5,04 m²;~~

~~— according to footnote [a] of Table 7: 6 000 kg – 1 600 kg = 4 400 kg / 100 = 44, then 44 × 0,40 m² = 17,60 m²;~~

~~— therefore, the total maximum car area for rated load is: 5,04 m² + 17,60 m² = 22,64 m².~~

~~The chosen car size of 19,04 m² is acceptable to transport 6 000 kg since it is less than the maximum allowed.~~

~~b) Calculation according to Table 6, the equivalent load to area full with passengers is:~~

~~— 5 m² = 2 500 kg;~~

~~— according to footnote [e] of Table 6, 19,04 m² – 5 m² = 14,0 m² / 0,16 m² = 88, then 88 × 100 kg = 8 800 kg;~~

~~— therefore, the total maximum load for the maximum area is 2 500 kg + 8 800 kg = 11 300 kg.~~

~~According to 5.4.2.2.4, the calculation of lift components as listed, e.g. car sling and safety gear, etc., shall be carried out for a load of 11 300 kg.~~

5.4.2.2.3 For goods passenger lifts, hydraulically driven, the available car area of a lift with balancing weight shall be such that a load in the car resulting from Table 6 shall not cause a pressure exceeding 1,4 times the pressure that the jack and the piping are designed for.

5.4.2.2.4 For goods passenger lifts, hydraulically driven, the design of the car, the car sling, the connection between the car and the ram (cylinder), the suspension means (of indirect acting lifts), the car safety gear, the rupture valve, the restrictor/one-way restrictor, the pawl device, the unintended movement device, the guide rails and the buffers shall be based on a load resulting from Table 6. The cylinder can be calculated according to the rated load given in Table 7.

5.4.2.2.5 For goods passenger lifts with traction drive the following applies:

a) Any normal starting, including re-levelling, shall be prevented by an overload device according to 5.12.1.2 which satisfied the requirements of an electric safety device according to 5.11.2. This overload device shall also be effective when the car is lifted up from the mechanical device according to 5.4.2.2.5 b) 4) i. or 5.2.2.5 c) 3).

b) When the weight of handling devices is included in the rated load.

1) The design of the car, the car sling, the car safety gear and the guide rails shall be based on a load resulting from Table 6 (5.4.2.1).

2) The design of the lift machine including its brake, the unintended movement protection means and the buffers, the traction and the safety factor of the suspension means shall be based on a load resulting from Table 7.

3) Down movements in case of overloading and loss of traction shall be limited either:

i. by a mechanical device according to 5.4.2.2.1 b) 4), or

ii. by tripping the safety gear in downward movement of the car according to 5.6.2.2.4.

c) When the weight of handling devices is not included in the rated load according to 5.4.2.2.1 b).

1) The design of the car, the car sling, the car safety gear and the guide rails shall be based on the total load of rated load from Table 6 (5.4.2.1) plus weight of handling devices.

2) The design of the lift machine including its brake, the unintended movement protection means and the buffers, the traction and the safety factor of the suspension means shall be based on a load resulting from Table 7.

3) Down movements in case of overloading and loss of traction shall be limited by a mechanical device according to 5.4.2.2.1 b) 4).

Commented [IJ577]: Correction identified by China

Commented [SD578]: Deleted reference number as WG1 comments N1954

Commented [SD579]: As per WG1 comments N1954

Commented [SD580]: Deleted in line with WG1 comment for 5.4.2.2.5 b)1) N2045

Commented [IJ581]: See N1690

Commented [SD582]: Combined comments N2055 & N2190

4.4.2.3 Number of passengers

~~5.4.2.3.1~~4.4.2.3.1 The number of passengers shall be obtained from the smaller value of the following:

a) either, the result of Formula (5) rounded down to the nearest whole number:

$$\frac{Q}{75} \quad (5)$$

where Q is the rated load; or

b) Table 8.

NOTE The average weight of a person is assumed to be 75 kg.

Commented [SGD583]: TFHAS comment on 0.3.6.

Table 8 — Number of passengers and minimum car available area

Number of passengers	Minimum available car area m^2	Number of passengers	Minimum available car area m^2
1	0,28	11	1,87
2	0,49	12	2,01
3	0,60	13	2,15
4	0,79	14	2,29
5	0,98	15	2,43
6	1,17	16	2,57
7	1,31	17	2,71
8	1,45	18	2,85
9	1,59	19	2,99
10	1,73	20[a]	3,13
[a] Beyond 20 passengers, add 0,115 m^2 for each extra passenger.			

~~5.4.2.3.2~~4.4.2.3.2 In the car, the following shall be displayed:

a) the manufacturer/installer's name;

b) the installation ~~serial~~ identification number;

c) the year of construction;

d) the rated load of the lift in kilograms;

e) the maximum number of persons, in accordance with ~~5.4.2.3.1~~4.4.2.3.1.

The notice shall be made as follows: **"... kg ... PERS**." Or by using symbols for weight and persons.

EXAMPLE: For persons:  and for load: 

NOTE 1 ~~Pictograms~~ Symbols can be before or after the number, above or below each other, and in any order.

NOTE 2 Person symbol per ISO 7000:2019, 5840. Mass symbol per ISO 7000:2019, 1321B.

Characters used for the notice shall be legible. The minimum height of the characters and ~~pictograms~~symbols for d) and e) ~~used for the notice~~ shall be:

— 10 mm for capital letters and numbers and ~~pictograms~~symbols;

— 7 mm for small letters.

~~5.4.2.3.3~~4.4.2.3.3 For goods passenger lifts, a sign ~~visible from~~ at the landing loading area ~~at all times~~ shall display the rated load with minimum height of 50mm for the ~~numbers~~characters.

4.4.3 ~~5.4.3~~ Walls, floor and roof of the car

~~5.4.3.1~~4.4.3.1 The car shall be completely enclosed by walls, floor and roof. The only permissible openings are as follows:

a) ~~entrances for the normal access of users~~car doors;

b) emergency trap doors and emergency doors;

c) ventilation apertures.

~~5.4.3.2~~4.4.3.2 The assembly comprising the car sling, guide shoes, walls, floor, ceiling and roof of the car shall have mechanical strength to ~~resist the forces which are applied in normal lift operation and the operation of safety devices~~satisfy the following sub-clauses.

~~5.4.3.2.1~~4.4.3.2.1 When safety devices are operated, the floor of the car~~, with or without the load uniformly distributed,~~ shall not incline more than 5 % from its normal position with:

— the empty car; or

— the car loaded with a uniformly distributed load.

Commented [AD584]: TFHAS_74_v4

Commented [SD585]: As per WG1 comments N1954

Commented [SD586]: As per WG1 comments N1954

Commented [GE587]: INT #21

Commented [SD588]: As per WG1 comments N1954

Commented [AD589]: TFHAS_74_v4

Commented [AD590]: 5.4.6 consistent wording

Commented [AD591]: TFHAS_74_v4

~~5.4.3.2.2~~4.4.3.2.2 Each wall of the car shall have a mechanical strength such that:

a) when a force of 300 N, being evenly distributed over an area of 5 cm² in round or square section, is applied at right angles to the wall at any point from the inside of the car towards the outside, it shall resist without:

   — any permanent deformation greater than 1 mm;

   — elastic deformation greater than 15 mm.

b) when a force of 1 000 N, being evenly distributed over an area of 100 cm² in round or square section, is applied at right angles to the wall at any point from the inside of the car towards the outside, it shall resist without permanent deformation greater than 1 mm.

NOTE These forces can be applied on the "structural" wall, excluding mirrors, decorative panels, car operating panel(s), etc.

~~5.4.3.2.3~~4.4.3.2.3 Car walls made of glass or partly glass shall be laminated glass according to ISO 12543-3:2021.

Commented [AD592]: TFHAS_74_v4 comment 5.4.7.5

When an impacting energy equivalent to a falling height of 500 mm of the hard pendulum shock device (ISO 8100-2:2023, ~~5.14~~16~~.2.1~~4.16.2.1) and an impacting energy equivalent to a falling height of 700 mm of the soft pendulum shock device (ISO 8100-2:2023, ~~5.14~~16~~.2.2~~4.16.2.2) is striking the glass wall at a point 1,00 m above the floor on the centre line of the panel or for partial glass walls at the centre of the glass element, the following shall be satisfied:

Commented [SD593]: Corrected Ref as per WG1 comments N1954

Commented [SD594]: Corrected Ref as per WG1 comments N1954

a) there shall be no cracks on the wall element;

b) there shall be no damage on the surface of the glass except chips of 2 mm maximum in diameter;

c) there shall be no loss of integrity.

The above tests shall be carried out on the inside face of the car wall.

These tests are not needed if car wall elements made of flat glass, according to Table 9, are framed on all sides.

~~The above tests shall be carried out on the inside face of the car wall.~~

Table 9 — Flat glass panels to be used in walls of the car

Type of glass	Minimum thickness mm	
	Diameter of inscribed circle of 1,00 m maximum	Diameter of inscribed circle of 2,00 m maximum
~~Laminated toughened or laminated tempered~~Laminated safety glass (ISO 12543-2:2021)	8 (4 + 4 + 0,76)	10 (5 + 5 + 0,76)
Laminated glass (ISO 12543-3:2021)	10 (5 + 5 + 0,76)	12 (6 + 6 + 0,76)

~~5.4.3.2.4~~4.4.3.2.4 The fixing of the glass in the wall shall ensure that the glass cannot slip out of the fixings during all shock conditions encountered in both directions of travel, inclusive of operation of safety devices.

~~5.4.3.2.5~~4.4.3.2.5 The glass panels shall have markings giving the following information:

a) name of the supplier and trademark;

b) type of glass;

c) thickness (e.g. 8/8/0,76 mm).

~~5.4.3.2.6~~4.4.3.2.6 ~~The car roof shall satisfy the requirements of 5.4.7~~4.4.7.

~~5.4.3.3~~4.4.3.3 Car walls with glass placed lower than 1,10 m from the floor shall have a handrail at a height between 0,90 m and 1,10 m. This handrail shall be fastened independently from the glass.

4.4.4 ~~5.4.4~~Car door, floor, wall, ceiling and decorative materials

~~The supporting structure of the car body shall be made of non-flammable materials~~The load bearing structure of the car shall meet the requirements of EN 13501-1:2018, class A or B.

The materials selected for car floor, wall, ~~and~~ ceiling and door finishes shall meet the requirements of EN 13501-1:2018 as listed:

— flooring: C_{fl}-s2;

— wall and car door: C-s2, d1;

— ceiling: C-s2, d0.

Excluded from the above requirements are:

a) Paint finishes, laminates up to 0,30 mm on the walls, ceiling and car doors

b) ~~and~~ fixtures such as operating devices, lighting and indicators ~~are excluded from the above requirements~~.

Mirrors or other glass finishes, where used within the car, shall comply with mode B or C according to ISO 29584:2015, 6.3 ~~Annex E~~, if broken.

~~In countries where EN 13501-1:2018 is not adopted, relevant national requirements for reaction to fire should apply.~~

4.4.5 ~~5.4.5~~Apron

~~5.4.5.1~~4.4.5.1 Each car sill shall be fitted with an apron, which extends at least to the full width of the clear landing entrance, which it faces. This vertical section shall be extended downwards by a chamfer whose angle with the horizontal plane shall be at least 60°. The projection of this chamfer of the horizontal plane shall be not less than 20 mm.

Any projections on the face of the apron, such as fixings, shall not exceed 5 mm. Projections and recesses exceeding 2 mm shall be chamfered at least 75° to the horizontal.

~~5.4.5.2~~4.4.5.2 The height of the vertical portion shall be at least 0,75 m.

Commented [SD595]: Corrected type N2055 combined comments

Commented [SD596]: As per WG1 comments document N1954

Commented [IJ597]: China comment to assist translation

Commented [SD598]: Corrected reference to clause 6.3 in rather than Annex E (from Reference check)

Commented [IJ599]: Changed by ISO

Commented [AD600]: Not possible according ISO rules

Commented [SD601]: WG1 comments agreed for this text to be changed to blue as it is new N2020

Commented [IJ602]: Correction identified by China

~~5.4.5.3~~4.4.5.3 When a force of 300 N, being evenly distributed over an area of 5 cm² in round or square section, is applied at right angles from the landing side to the apron at any point along the lower edge of the vertical section, the apron shall resist without:

a) permanent deformation greater than 1 mm;

b) elastic deformation greater than 35 mm.

4.4.6 ~~5.4.6~~Emergency trap doors and emergency doors

~~5.4.6.1~~4.4.6.1 Where an emergency trap door is fitted to the car roof ~~(see 0.4.2)~~, it shall have minimum clear opening dimensions of 0,40 m × 0,50 m.

NOTE When space allows, a trap door of 0,50 m × 0,70 m is preferable.

~~5.4.6.2~~4.4.6.2 Emergency doors may be used in the case of adjacent cars, provided, however, that the horizontal distance between the walls of the cars does not exceed 1,00 m ~~(see 5.2.3.3)~~.

In this case, each car shall be provided with a means of determining the position of the adjacent car. ~~to which persons can be rescued in order to allow it to be brought to a level where rescue can take place.~~

~~In the event of rescue, w~~Where the distance between car emergency doors ~~is greater than~~exceeds 0,35 m, a portable/movable bridge or a bridge integrated into the car, with handrails and a minimum width of 0,50 m ~~but with sufficient clearance to~~ fitting in the opening of the emergency door, shall be provided.

The bridge shall ~~be designed to support~~ resist a minimum force of 2 500 N at any position on an area of 0,30 m × 0,30 m without permanent deformation.

If the bridge is portable/movable it shall be stored in the building where the ~~rescue is to take place~~lift is installed. The use of the bridge shall be described in the instruction manual.

If emergency doors exist, they shall measure at least 1,80 m high and 0,40 m wide.

~~5.4.6.3~~4.4.6.3 If emergency trap doors or emergency doors are installed, they shall conform to the following:

~~5.4.6.3.1~~4.4.6.3.1 Emergency trap doors and emergency doors shall be provided with a means for manual locking.

~~5.4.6.3.2~~~~1~~4.4.6.3.2 Emergency trap doors shall have means:

a) ~~be~~ to open~~ed~~ it from outside the car without a key;

b) to open it ~~and~~ from inside the car only with a key suited to the triangle defined in ~~5.3.9.3~~4.3.9.3, if the emergency trap door is needed for maintenance purpose [see ~~5.2.6.4.3.1~~4.2.6.4.3.1 c) 2)].

Emergency trap doors shall not open towards the inside of the car.

Emergency trap doors in the open position shall not project beyond the edge of the car.

Commented [AD603]: TFHAS_74_v4

Commented [SD604]: Combined comments N2055

Commented [SD605]: Combined comments N2055 & N2147

Commented [AD606]: TFHAS_74_v4

Commented [SD607]: Combined comments N2055

Commented [SD608]: Combined comments N2055 & N2147

Commented [SD609]: Combined comments N2055

Commented [SD610]: Renumbered clause N2055

Commented [SD611]: Corrected clause number

Commented [SD612]: As WG1 comments N1986

~~5.4.6.3~~ ~~1.23~~4.4.6.3.3 Emergency doors shall be opened from outside the car without a key and from inside the car using a key suited to the triangle defined in ~~5.3.9.3~~4.3.9.3.

Emergency doors shall not open towards the outside of the car.

Emergency doors shall not be located in the path of a counterweight or a balancing weight or in front of a fixed obstacle (except for beams separating the cars) preventing passage from one car to another.

~~5.4.6.3.24~~4.4.6.3.4 The locking called for in ~~5.4.6.3.1~~4.4.6.3.1 shall be ~~proved~~ checked by ~~means of~~ an electric safety device in conformity with ~~5.11.2~~4.11.2.

In case of emergency doors, this device shall also stop the adjacent lift when unlocked.

~~Restoring~~ Return of the lift to ~~service~~ automatic operation shall only be possible after deliberate relocking.

4.4.7 ~~5.4.7~~Car roof

~~5.4.7.1~~4.4.7.1 In addition to ~~5.4.3~~4.4.3, the car roof shall fulfil the following requirements:

a) the car roof shall have ~~sufficient~~ a mechanical strength to support the maximum number of persons, as indicated in ~~5.2.5.7.1~~4.2.5.7.1.

   However, the car roof shall resist a minimum force of 2 000 N at any position on an area of 0,30 m × 0,30 m without permanent deformation.

b) the surface of the car roof where a person needs to work or move between working areas shall be non-slip.

   NOTE For guidance, see ISO 14122-2:2016, ~~Annex A~~4.2.4.6.

~~5.4.7.2~~4.4.7.2 The following protection shall be provided:

a) the car roof shall be provided with a toe board a minimum of 0,10 m high, positioned either:

   1) on the outer edge of the car roof; or

   2) between the outer edge and the position of the balustrade, where a balustrade (~~5.4.7.4~~4.4.74) is provided;

b) where the free distance in a horizontal plane, beyond and perpendicular to the outer edge of the car roof to the wall of the well exceeds 0,30 m, a balustrade shall be provided to the dimensions given in ~~5.4.7.4~~4.4.7.4.

The free distances shall be measured to the wall of the well, allowing a larger distance in recesses, the width or height of which is less than 0,30 m.

Commented [SD613]: Renumbered clause N2055

Commented [SD614]: Renumbered clause N2055

Commented [AD615]: Editorial alignement

Commented [AD616]: Consistent wording

Commented [AD617]: TFHAS_74_v4

Commented [SD618]: Combined comments N2055

~~5.4.7.3~~4.4.7.3 Where lift component(s) located between the outer edge of the car roof and the wall of the well ~~can~~ prevent the risk of falling (see Figure~~s 15 22~~ 25 ~~and 1623~~), the protection shall fulfil the following conditions simultaneously:

Commented [SD619]: WG1 comments document (N2017)

a) where the distance between the outer edge of the car roof and the well wall ~~is greater than~~exceeds 0,30 m, it shall not be possible to place a horizontal circle with a diameter greater than 0,30 m between~~: the outer edge of the car roof and the relevant component(s), between components or between the end of the balustrade and the component(s);~~

   1) the outer edge of the car roof and these lift component(s);

   2) these lift components;

   3) the end of the balustrade and these lift component(s);

   4) these lift component(s) on the car to the wall of the well;

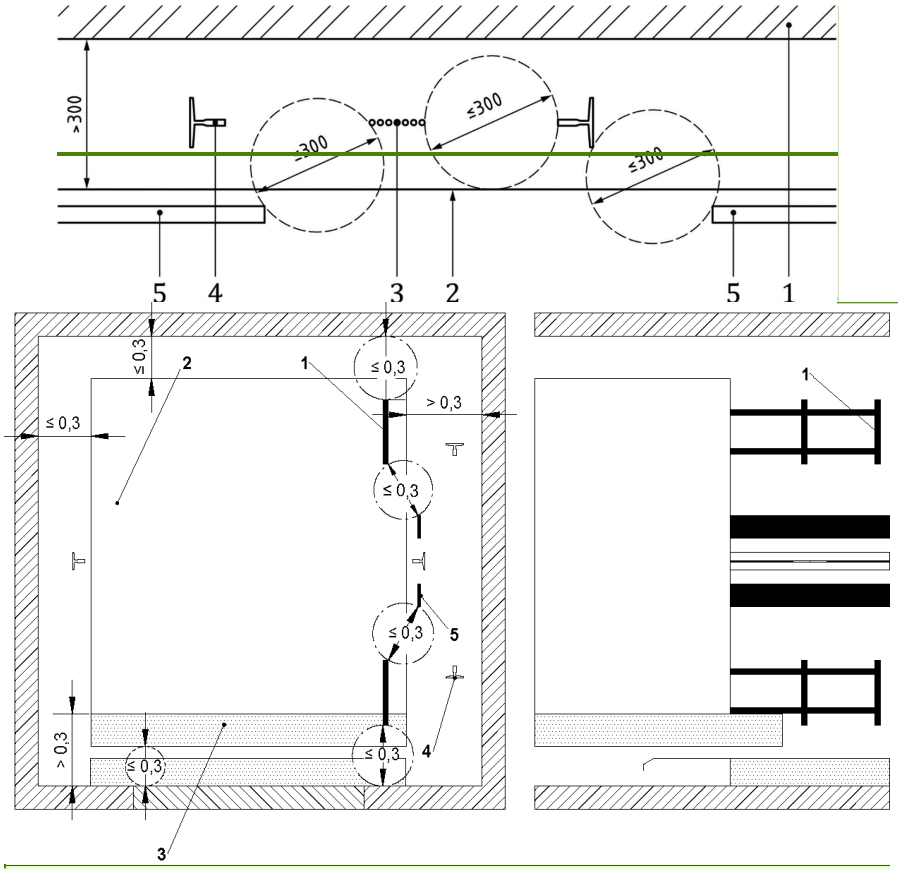
   5) these lift component(s) on the car to components in the well.

Commented [SD620]: WG1 comments (N2017)

b) when a force of 300 N is applied horizontally at right angles to any point to the component, it shall not cause the component to deflect to a point where a) is no longer fulfilled;

c) the component shall extend in height above the car roof to form the same level of protection as defined in ~~5.4.7.4~~4.4.7.4 throughout the travel of the car.

Dimensions in ~~milli~~metres



Key

1 balustrade ~~ift well wall~~
2 ~~lift~~ car roof ~~edge~~
3 door operator~~ropes, belts~~
4 guide rail~~s~~
5 suspension means~~balustrade~~

Figure ~~15~~ 25 — Example of components providing protection from falling ~~(Electric lifts)~~

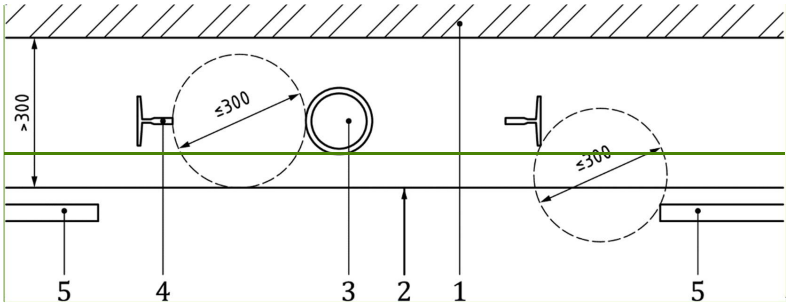
Commented [SD621]: New figure as N2017

Commented [SD622R621]: Amended Figure as combined comments N2055 (added 1 to identify balustrade on the left view)

Commented [SD623]: Update Key for new figure as N2017

~~Dimensions in millimetres~~

Commented [SD624]: WG1 Comments N2017



~~Key~~

~~1 lift well wall~~
~~2 lift car roof edge~~
~~3 ram~~
~~4 guide rails~~
~~5 balustrade~~

~~Figure 16~~ 23 ~~— Example of components providing protection from falling (Hydraulic lifts)~~

Commented [SD625]: WG1 comments (N2017)

~~5.4.7.4~~4.4.7.4 Balustrades shall fulfil the following requirements:

a) they shall consist of a handrail and an intermediate bar at half the height of the balustrade;

b) considering the free distance in a horizontal plane beyond the inner edge of the handrail of the balustrade and the well wall (see Figure ~~17~~26), its height shall be at least:

1) 0,70 m where the distance is up to 0,50 m;

2) 1,10 m where the distance exceeds 0,50 m;

c) the balustrade shall be located: ~~at a maximum distance of 0,15 m from the edges of the car roof;~~

1) at a maximum horizontal distance of 0,15 m from the parallel edge(s) of the car roof; or

2) at any horizontal distance where the area beyond the balustrade is protected from persons standing there by a deflector from the edge of the car roof to the balustrade according to ~~5.2.5.2.1.2 b)~~4.2.5.2.1.2 b);

3) in such a way, that the horizontal distance between the end(s) of the balustrade and~~:~~

— the wall of the well, or

— components in the well according to ~~5.4.7.3~~4.4.7.3;

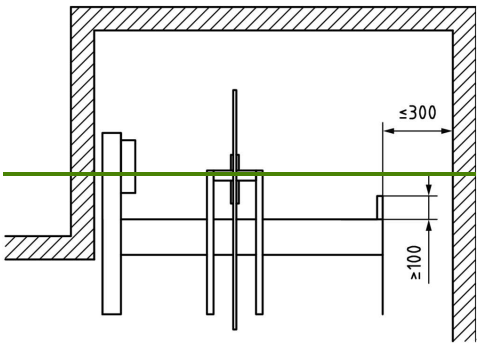
does not exceed 0,30 m.

d) the horizontal distance between the outer edge of the handrail and any part in the well (counterweight or balancing weight, switches, rails, brackets, etc.) shall be at least 0,10 m.

e) When a force of 1 000 N is applied horizontally at right angles to any point at the top of the balustrade, it shall resist without elastic deformation greater than 50 mm.

f) The horizontal distance of equipment requiring maintenance from the car roof shall not exceed 0,70m from the inside of the balustrade.

~~Dimensions in millimetres~~



~~a) No balustrade required but a toe-board 100 mm minimum high~~

Commented [SD626]: As per WG1 comments & (N2017)

Commented [AD627]: N2247

Commented [AD628]: N2247

Commented [SD629]: N2055 Correct Ref due to change to 5.2.5.2.2.2

Commented [AD630]: N2247

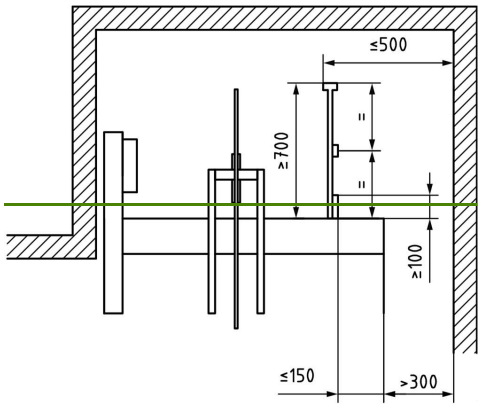
Commented [SD631]: Corrected Ref N2055 combined comments

Commented [SD632]: As per WG1 comments & (N2017)

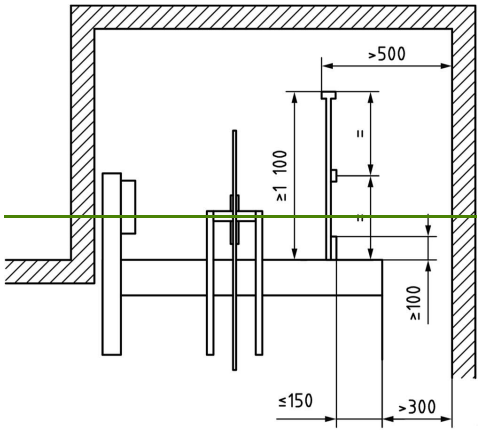
Commented [SD633]: As WG1 comments & (N2017)

Commented [SD634]: Combined comments N2055

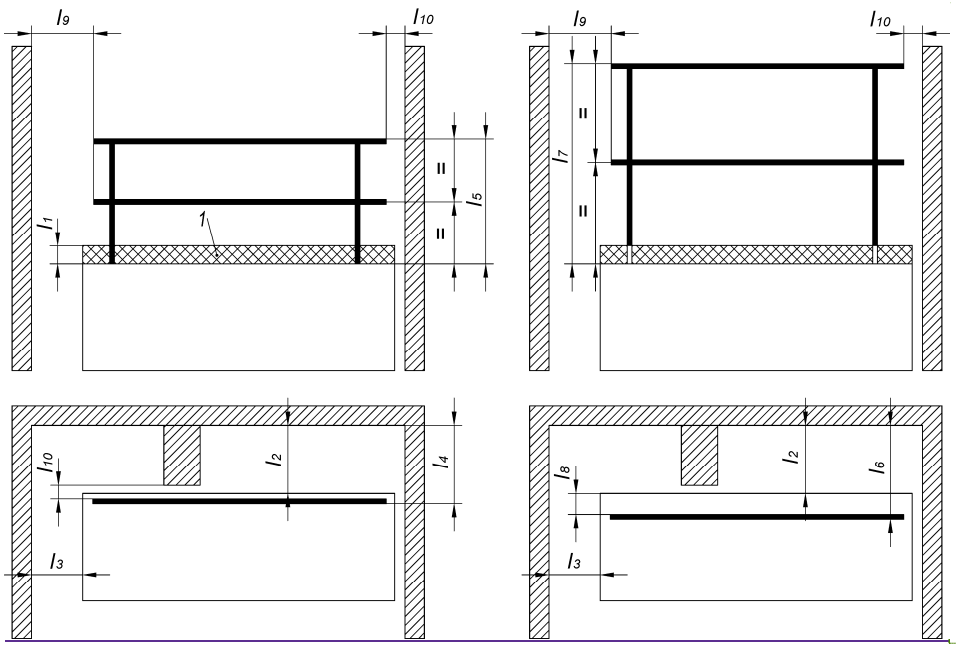
Commented [SD635]: As Per WG1 comments & (N2017)



~~b) Balustrade required, 700 mm minimum height and a toe-board 100 mm minimum height~~



~~c) Balustrade required, 1 100 mm minimum height and a toe-board 100 mm minimum height~~



Key

l_1	≥ 0,10 m (5.4.7.2 a))	l_4	≤ 0,50 m (5.4.7.4 b) 1))	l_8	≤ 0,15 m (5.4.7.4 c) 1))
l_2	≥ 0,30 m (5.4.7.2 b))	l_5	≥ 0,70 m (5.4.7.4 b) 1))	l_9	≤ 0,30 m (5.4.7.4 c) 3))
l_3	≤ 0,30 m (5.4.7.2 b))	l_6	≥ 0,50 m (5.4.7.4 b) 2))	l_{10}	≥ 0,10 m (5.4.7.4 d))
		l_7	≥ 1,10 m (5.4.7.4 b) 2))	1	toe board

Figure ~~17~~26 — Car roof balustrade ~~— Height~~

~~5.4.7.5~~4.4.7.5 Any glass used for the car roof shall be laminated safety glass according to ISO 12543-2:2021.

~~5.4.7.6~~4.4.7.6 Pulleys and/or sprockets fixed to the car shall have protection according to ~~5.5.7~~4.5.7.

4.4.8 ~~5.4.8~~Equipment on top of the car

The following shall be installed on top of the car:

a) control device in conformity with ~~5.12.1.5~~4.12.1.5 (inspection operation) operable within 0,30 m ~~horizontally~~ from a refuge space (~~5.2.5.7.1~~4.2.5.7.1);

b) stopping device in conformity with ~~5.12.1.11~~4.12.1.11, ~~in an easily~~ accessible without obstruction~~position and~~ not more than 1,00 m from the entry point for inspection or maintenance personnel.

This device may be the one located next to the inspection operation control if this is not placed more than 1,00 m from the access point;

c) socket outlet in conformity with ~~5.10.7.2~~4.10.7.2.

Commented [SD636]: New figure & key as WG1 comments and N2017

Commented [SD637R636]: Amended figure as combined comments N2055 (l_3 moved from the upper to lower layouts & l_{10} corrected to outside edge of balustrade)

Commented [SD638]: WG1 comments & (N2017)

Commented [AD639]: TFHAS_74_v4 comment 5.4.7.5

Commented [AD640]: N2247

Commented [IJ641]: See N1538

Commented [AD642]: TFHAS_74_v4 with aligned formulation "without obstruction"

4.4.9 ~~5.4.9~~Ventilation

~~5.4.9.1~~4.4.9.1 Cars shall be provided with ventilation apertures in the upper and lower parts of the car.

~~5.4.9.2~~4.4.9.2 The effective area of ventilation apertures situated in the upper part of the car shall be at least 1 % of the available car area, and the same also applies for the apertures in the lower part of the car.

~~The~~ Where the gaps around the car doors ~~may~~ are be taken into account in the calculation of the area of ventilation holes they shall not be counted for more than~~, up to~~ 50 % of the required ~~effective~~ area.

Commented [AD643]: TFHAS_74_v4

~~5.4.9.3~~4.4.9.3 Ventilation apertures shall be built or arranged in such a way that it is not possible to pass a straight rigid rod 10 mm in diameter through the car walls from the inside.

4.4.10 ~~5.4.10~~ Lighting

~~5.4.10.1~~4.4.10.1 The car shall be provided with electrical lighting that is permanently installed ensuring a light intensity of at least 100 lx on the control devices and at 1,00 m above the floor at any point not less than 100 mm from any wall.

~~NOTE Depending on the configuration of the car, the handrail, tip-up seat, etc., can generate shadow that can be ignored.~~

The light meter ~~should~~ shall be oriented towards the strongest light source when taking lux level readings.

Commented [AD644]: TFHAS_74_v4

~~5.4.10.2~~4.4.10.2 There shall be at least two ~~lamps~~ individual light sources connected in parallel.

Commented [SD645]: WG1 Comments & N1998

~~NOTE In this context, lamp is understood to mean the individual light source, e.g. bulb, fluorescent tube, etc.~~

Commented [SD646]: WG1 Comment N1998

~~5.4.10.3~~4.4.10.3 The car shall be continuously illuminated except when the car is parked and the doors are closed.

~~5.4.10.4~~4.4.10.4 There shall be emergency lights with an automatically rechargeable emergency supply, which is capable of ensuring a lighting intensity of at least 5 lx for 1 h:

a) at each alarm initiation device in the car and on the car roof;

b) in the centre of the car, 1,00 m above the floor;

c) in the centre of the car roof, 1,00 m above the floor.

The light meter shall be oriented towards the strongest light source when taking lux level readings.

Commented [AD647]: TFHAS_74_v4

This lighting shall come on automatically upon failure of the normal lighting supply.

4.4.11 ~~5.4.11~~ Counterweight and balancing weight

~~4.4.11.1 5.4.11.1 General~~

Commented [AD648]: Editorial, no single heading

4.4.11.1 The use of a balancing weight is defined in ~~5.9.2.1.1~~4.9.2.1.1, for positive drive lifts and in ~~5.9.3.1.3~~4.9.3.1.3 for hydraulic lifts.

Commented [IJ649]: See N1537

~~5.4.11.2~~4.4.11.2 If the counterweight or the balancing weight incorporates filler weights, necessary measures shall be taken to prevent their displacement. To this effect, they shall be mounted in a frame and secured within it.

~~5.4.11.3~~4.4.11.3Pulleys and/or sprockets fixed to the counterweight or to the balancing weight shall have protection according to ~~5.5.7~~4.5.7.

4.5 ~~5.5~~ Suspension means, compensation means and related protection means

~~The following environmental conditions shall be considered for the design of the components:~~

~~Temperature and Humidity:~~

- ~~for transport/storage: -10° to 60 °C, 95% non-condensing~~
- ~~for operation: + 0° to 40 °C, 95% non-condensing~~

~~If applicable additional environmental factors shall be considered to maintain the function and lifetime of the suspension means as specified by the manufacturer, e.g.~~

- ~~in case of application in firefighting lifts, water in case of special applications in dusty environments, possible additional contaminations~~
- ~~in case of transparent shaft enclosure, any additional UV resistance~~

~~In case of humid environment, additional hydrolysis resistance~~

~~4.4.12~~4.5.1 ~~5.5.1~~ Suspension means and related sheaves/drums/sprockets

~~5.5.1.1~~4.5.1.1 Cars, counterweights or balancing weights shall be suspended from one of the following suspension means:

a) ~~non-coated s~~Steel wire ropes in combination with steel/cast iron traction sheaves or drums or pulleys of hydraulic lifts;

b) ~~non-coated s~~Steel wire ropes in combination with elastomeric coated traction sheave grooves;

c) elastomeric coated steel wire ropes in combination with metallic traction sheaves;

d) elastomeric coated traction belts in combination with metallic traction sheaves;

e) elastomeric coated timing belts in combination with metallic sprockets;

f) steel chains with parallel links (Galle type) in combination with metallic sprockets; or

g) roller chains in combination with metallic sprockets.

~~4.5.1.2~~ ~~5.5.1.2~~4.5.1.2 ~~Material and construction of~~ suspension means shall comply with the following: ~~ropes and belts~~

Commented [SD650]: Combined comments N2055 & N2193

Commented [SD651]: Combined Comments N2055 & N2193

Commented [SD652]: Combined Comments N2055 & N2193

Commented [SD653]: Corrected Typo N2055 combined comments

Commented [SD654]: Combined Comments N2055 & N2193

~~steel wire ropes, or steel chains with parallel links (Galle type) or roller chains.~~

~~5.5.1.2.1~~4.5.1.2.1 ~~Non-coated~~ The Steel wire ropes ~~applied with steel/cast iron/ elastomeric coated traction sheaves or drums~~ shall correspond to the following requirements:

a) the nominal diameter of the ropes shall be at least ~~8~~ 4 mm; and;

b) the ~~tensile strength of the wires and the other~~ rope characteristics: ~~(construction, extension, ovality, flexibility, tests, etc.)~~

1) shall be as specified in EN 12385-5:2021, ~~or~~ ISO 4344:2022; or

2) the requirements in Table 10 shall be applied:

~~a) the characteristics, excluding diameter tolerances, may deviate from EN 12385-5; in this case following requirements have to be applied:~~

~~1) ropes with diameter d ≥ 6 mm shall have a wire rope core (IWRC);~~

~~2) ropes with diameter 4 mm ≤ d < 6 mm shall have a wire rope core (IWRC) or wire strand core (WSC);~~

~~3) the number of outer strands shall be at least 6;~~

~~4) traction sheave grooves shall be hardened if the tensile strength of outer wires exceeds 1770 N/mm^2.~~

Table 10 — Steel wire rope diameters and constructions

Diameter	Construction	Tensile grade and groove surface
4 <= d< 6 mm	6 outer strands; WSC (Wire Strand Core)	- higher than 1770 and up to 1960 N/mm^2 with hardened metallic sheaves - higher than 1960 N/mm^2 with elastomeric coated traction sheave grooves
6 <= d< 8 mm	6-8 outer strands; IWRC (full-steel core)	higher than 1770 and up to1960 N/mm^2 with hardened metallic sheaves
d ≥ 8 mm	EN 12385-5:2021 ISO 4344:2022	

~~5.5.1.2.2 Non-coated ropes applied with elastomeric coated traction sheave grooves shall correspond to the following requirements:~~

~~a) the nominal diameter of the ropes shall be 4 mm ≤ d ≤ 8 mm;~~

~~b) if the tensile strength of the wires and/or other characteristics (construction, extension, ovality, flexibility, tests, etc.), excluding diameter tolerances, are not in compliance with EN 12385-5 following requirements have to be applied:~~

~~1) ropes with diameter 6 mm ≤ d ≤ 8 mm shall have a wire rope core (IWRC);~~

~~2) ropes with diameter 4 mm ≤ d < 6 mm shall have a wire rope core (IWRC) or wire strand core (WSC);~~

~~3) the number of outer stands shall be at least 6;~~

Commented [SD655]: Combined Comments N2055 & N2193

Commented [AD656]: N2247

Commented [SD657]: N1965

Commented [SD658]: Combined Comments N2055 & N2193

Commented [IJ659]: Added by ISO

Commented [SD663]: As per WG1 Comments N 1650 & N1979

Commented [SD660]: Combined Comments N2055 & N2193

Commented [SD661]: Combined Comments N2055 & N2193

Commented [SD662]: Combined comments N2055 changed symbol from > to ≥

Commented [SD664]: Now integrated into 5.5.1.2.1 WG1 Comments N1979

~~5.5.1.2.32~~ ~~4.5.1.2.2~~ Elastomeric coated steel wire ropes shall correspond to the following requirements:

a) all load bearing members shall be made from steel wires;

b) the tensile strength of the steel wires shall be as specified by the instructions;

c) steel wires shall have a Zinc coating or an equivalent protection against corrosion~~.~~; the mass of the coating shall be as specified by the instructions;

d) the load bearing member shall have a minimum diameter of 4 mm; the wires shall have a minimum diameter of 0,2 mm;

e) elastomeric coating material shall be as specified by the instructions;

f) the elastomeric coated rope construction shall be as specified by the instructions ; only the steel wire rope shall be considered as load bearing member of the elastomeric coated rope;

g) the elastomeric coating shall protect the elastomeric coated rope from environmental influences and shall prevent any direct contact of the steel wire rope to the traction sheave and deflection pulley(s);

h) the tolerance of the outside diameter including coating shall be ± 2% when loaded at ~~0 to~~ 10 % ~~MBF~~ of its minimum breaking force;

i) the above requirements shall be verified according to ISO 8100-2:2023, ~~5.13~~13~~.1~~4.13.1.~~.~~

Commented [SD665]: Renumbered due to deletion of 5.5.1.2.2

Commented [SD666]: Combined Comments N2055 & N2193

Commented [SD667]: Combined Comments N2055 & N2193

Commented [SD668]: Combined comments added the word “diameter” N2055

Commented [SD669]: Combined Comments N2055 & N2193

Commented [SD670]: Combined Comments N2055 & N2193

Commented [SD671]: Combined Comments N2055 & N2193

Commented [SD672]: Corrected Ref as per WG1 comments N1954

Commented [SD673]: Corrected Reference N2055 combined comments

~~5.5.1.2.43~~4.5.1.2.3 Elastomeric coated traction belts shall correspond to the following requirements:

a) ~~requirements according to~~ ~~5.5.1.2.32~~4.5.1.2.2 a) to c);

b) the load bearing members shall have a minimum diameter of 1,3 mm in a non-tensioned condition and be made from wires with a minimum diameter of 0,15 mm;

c) the load bearing members shall be– arranged in such a way that their combination of lay directions ensures low rotation behaviour;

d) only the steel wire ropes or strands shall be considered as load bearing members of the belt;

e) the elastomeric coating shall protect the load bearing members from environmental influences and shall prevent any direct contact of the load bearing member to the traction sheave and deflection pulley(s) ;

f) when the belt is loaded up to 10% of the ~~minimum breaking force~~minimum breaking force~~MBF~~ of the belt, the following tolerances apply:

— ± 5% of nominal width, and

— ± 5% of nominal thickness.

g) the above requirements shall be verified according to ISO 8100-2:2023, 5.14.1.

~~5.5.1.2.45~~4.5.1.2.4 Elastomeric coated timing belts shall correspond to the following requirements:

a) ~~requirements according to~~ ~~5.5.1.2.43~~4.5.1.2.3- a) to f);

b) the number of teeth shall be at least ~~97~~, when the belt is in wrap contact with the sprocket pulley;

c) the elastomeric coated timing belt and the sprocket pulley(s)shall be selected to match to application specifications;

d) the above requirements shall be verified according to ISO 8100-2:2023, 5.14.1.

NOTE typical profile systems are shown in ISO 13050:2022 or ISO 17396:2017 ;

~~5.5.1.34~~4.5.1.3 The minimum number of suspension means ~~of ropes or chains~~ shall be two.

For hydraulic lifts this shall be a minimum of two per indirect acting jack, and two for the connection between car and any balancing weight.

NOTE Where reeving is used, the number to take into account is that of the ropes or chains, and not the falls.

~~5.5.1.44~~4.5.1.4 Suspension means~~Ropes or chains~~ shall be independent.

Commented [SD674]: Renumbered to align to a change in clause numbers

Commented [SD675]: Renumbered to align to a change in clause numbers

Commented [SD676]: Combined Comments N2055 & N2193

Commented [SD677]: Alignment of MBF

Commented [AD678]: N2205, last page, N2222 comment GS-063

Commented [SD679]: Renumbered to align to a change in clause numbers

Commented [SD680]: Renumbered to align to a change in clause numbers

Commented [SD681]: Combined Comments N2055 & N2193

Commented [AD682]: N2205, last page, N2222 comment GS-063

~~5.5.1.5~~4.5.1.5 Elastomeric coated traction sheaves shall comply with the following requirements:

a) the traction sheave body shall be made of steel or cast iron;

b) the elastomeric coating shall be secured by positive mechanical connection or adhesively bonded to the sheave body; the maximum thickness of the elastomeric coating shall be 50% of the steel wire rope diameter;

c) the groove shape of the coating shall be semi-circular without undercut;

d) the difference of the running radius for all grooves shall not exceed 0,1% at any point of the circumference;

~~e) the design shall prevent steel wire ropes from jumping out of traction sheave grooves;~~

e) the geometry of the metallic sheave body shall be designed to ensure the traction requirements according to ~~5.5.3~~4.5.3 in case of coating loss;

f) any hazardous rotation of the coating layer on the sheave body shall be prevented, even in case of any bonding failure;

g) the elastomeric coating and its mechanical or securely adhesive bonding to the sheave body shall be as specified by the instructions and shall be verified to meet the requirements according to ISO 8100-2:2023, ~~5.13.2~~4.13.2.

~~5.5.1.6~~4.5.1.6 Traction sheaves for elastomeric coated suspension means shall comply with the following requirements:

a) the traction sheave body shall be made from steel, cast iron or aluminium;

b) the geometry of the traction sheave shall be designed to prevent the suspension means running off the sheave in lateral direction;

c) the contact surface roughness of the traction ~~contact surface between~~ sheave ~~and suspension means~~ shall be specified by the suspension means instructions;

Commented [SD683]: As per WG1 comments N1954– will need to realign sub clause references 'e)' has been deleted

Commented [SD684]: Corrected reference N2055 combined comments

Commented [SD685]: Combined Comments N2055 & N2193

Commented [SD686]: Updated to ISO 8100-2

Commented [SD687]: Combined comments N2055

4.5.2 ~~5.5.2~~ Minimum diameter ratio, safety factor, suspension means terminations ~~Sheave, pulley, drum and rope/load bearing member diameter or thickness ratios, rope/chain and their terminations~~

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Commented [SD688]: Combined Comments N2055 & N2193

~~4.4.12.1 terminations~~

4.5.2.1 ~~5.5.2.1~~ Bending diameter definition for load bearing members

Commented [SD689]: Combined Comments N2055 & N2193

The minimum ratio between the pitch diameter of sheaves, pulleys, drums or sprockets and the nominal diameter of suspension means shall be according to Table 11.

For elastomeric coated traction belts and elastomeric coated ropes, the diameter of the load bearing member shall be taken as the nominal diameter to be used in Table 11.~~For coated suspension means, the diameter of the load bearing member is defined by the diameter of the circular metallic load bearing member used in the element.~~

~~For non-coated steel wire ropes this diameter is equivalent to the nominal steel wire rope diameter.~~

~~The minimum ratio between the pitch diameter of sheaves, pulleys, drums or sprocket wheels and the nominal diameter of the load bearing member shall be according to Table11~~

Commented [SD690]: Combined Comments N2055 & N2193

Commented [SD691]: Combined comments N2055

Commented [SD692]: Combined comments N2055

Table 11 — Minimum diameter ratio D/d

Suspension means	Minimum diameter ratio for suspension means D/d
Steel wire ropes acc. EN 12385-5:2021 with safety factor calculation according ISO 8100-2:2023, ~~5.12~~4.12 and discard based on ISO 4344:2022	40
Steel wire ropes with lifetime testing	30
Steel wire ropes with coated traction sheave	40
Elastomeric coated traction belts	40
Elastomeric coated ropes	24

~~The ratio between the pitch diameter of sheaves, pulleys or drums and the nominal diameter of the suspension ropes shall be at least 40, regardless of the number of strands of the suspension ropes.~~

~~4.4.12.2~~4.5.2.2 ~~5.5.2.2~~ Safety factor of the suspension means

~~5.5.2.2.1~~4.5.2.2.1 ~~——~~The safety factor is the ratio between the ~~MBF~~minimum breaking force of one suspension means, in newtons, and the maximum force in this suspension means, in newtons, when the car is stationary at the lowest landing, with its rated load.

Commented [SD693]: Combined comments N2055

Commented [SD694]: Combined comments N2055

For positive and hydraulic drives, the safety factor of balancing weight suspension means shall be calculated as above, in relation to the suspension means force due to the weight of the balancing weight.

Commented [SD695]: Combined comments N2055

Commented [SD696]: Combined comments N2055

~~5.5.2.2.2~~4.5.2.2.2 The safety factor ~~of the non-coated suspension means~~for steel wire ropes or chains shall not be less than:

a) 12 in the case of traction drive with three ropes or more;

b) 16 in the case of traction drive with two ropes;

c) 12 in the case of drum drive and hydraulic lifts with ropes;

d) 10 in the case of chains;~~.~~

e) the safety factor calculated according to ISO 8100-2:2023, ~~5.12~~4.12, in case of traction drive with steel or cast-iron traction sheaves, and steel wire ropes according to EN 12385-5:2021 or ISO 4344:2022.

~~In addition, the safety factor of suspension ropes for traction lifts shall not be less than that calculated according to ISO 8100-2:2019, 5.12.~~

~~The safety factor is the ratio between the minimum breaking load of one rope, in newtons, and the maximum force in this rope, in newtons, when the car is stationary at the lowest landing, with its rated load.~~

~~For positive and hydraulic drives, the safety factor of balancing weight ropes or chains shall be calculated as above, in relation to the rope/chain force due to the weight of the balancing weight.~~

~~5.5.2.2.~~~~23~~4.5.2.2.3 ~~The minimum~~ safety factor of elastomeric coated suspension means ~~shall not be less than~~shall not be less than:

a) 12 in case of the ~~residual breaking force (~~RBF~~)~~ is equal or higher than 60% of the ~~minimum breaking force (MBF)~~minimum breaking force and traction drive with three suspension means or more;

b) 12 in case of the ~~residual breaking force (~~RBF~~)~~ is equal or higher than 80% of the ~~minimum breaking force (~~minimum braking force~~MBF)~~ and traction drive with two suspension means;

c) 16 in case of the ~~residual breaking force (~~RBF~~)~~ is equal or higher than 60% of the ~~minimum breaking force (MBF)~~minimum breaking force and traction drive with two ~~o~~ suspension means.

~~The residual breaking force (RBF) is the force the suspension means can withstand at the end of the specified lifetime. It is specified in percentage of the initial minimum breaking force (MBF).~~

~~5.5.2.2.3~~~~4~~ ~~4.5.2.2.4~~ ~~The minimum safety factor of steel wire ropes less than 6 mm: The safety factor of non-coated alternative suspension means shall not be less than 5.5.2.2.1 a) and 5.5.2.2.1 b).~~

~~— 12 in the case of traction drive with three ropes or more;~~

~~— 16 in the case of traction drive with two ropes.~~

4.5.2.2.5 ~~5.5.2.2.4~~5 ~~—~~Fatigue lifetime

4.5.2.2.5.1 ~~5.5.2.2.4~~5.1 General provisions

~~For non-coated ropes with D/d < 40, or d < 6 mm, or running on elastomeric coated grooves and for elastomeric coated ropes and belts t~~The methods for fatigue lifetime testing and monitoring according to Table 12 shall be followed.

Commented [SD697]: Combined comments N2055 & N2193

Commented [SD698]: Combined comments N2055

Commented [SD699]: Combined comments N2055

Commented [SD700]: Combined comments N2055 & N2193 moved to General

Commented [SD701]: Combined comments N2055 & N2193

Commented [AD702]: same as 4.5.2.2.2

Commented [SD703]: Combined Comments N2055 & N2193

Commented [SD704]: As agreed in WG1 comments N1954

Commented [SD705]: Combined Comments N2055 & N2193

Commented [SD706]: Combined comments N2055 & N2193

Table 12 — Methods for fatigue lifetime testing and monitoring

	Bending test to prove fatigue lifetime limit ISO 8100-2:2023, ~~5.13.5~~4.13.5	Bending counter 4.5.2.2.5.2, 4.5.2.2.5.3	Suspension means physical strength monitoring* 4.5.2.2.5.2, 4.5.2.2.5.4	Diameter reduction check with special gauge 4.5.2.2.5.5	Visual inspection with discarding criteria acc. ISO4344:2022	Visual inspection with discarding criteria acc. ISO 8100-2:2023, ~~5.16~~4.14
Steel wire ropes acc. EN 12385-5:2021 d ≥ 6mm D/d ≥ 40					x	
Steel wire ropes 6 mm ≤ d ≤ 8 mm 30 ≤ D/d < 40	x	x~~a~~			x	
Steel wire ropes 4 mm ≤ d < 6mm D/d ≥ 30	x	x		x	x	
Steel wire ropes 4 mm ≤ d < 6 mm Coated traction sheave, D/d ≥ 4~~0~~	x			x	x	
Elastomeric coated suspension means, RBF ≥ 80% ~~MBF~~ minimum breaking force ~~Elastomeric coated suspension means,~~ ~~RBF ≥ 80% MBF~~	x ~~x~~	x	x			x ~~x~~
Elastomeric coated suspension means, RBF ≥ 60% to 80% ~~MBF~~ minimum breaking force	x		x			x

~~a Applicable only if traction sheave D/d < 40~~

Commented [SD707]: Deleted as per WG1 comments N2020

Commented [SD708]: Updated ref as per WG1 comments N1954

Commented [SD709]: Combined comments N2055 & N2193

Commented [SD710]: As WG1 Comments N1986

Commented [SD711]: Combined Comments N2055 & N2193

Commented [SD712]: Changed RBL to RBF as WG1 N2045

Commented [SD713]: Changed MBL to MBF as WG1 N2045

Commented [SD714]: Changed RBL to RBF as WG1 N2045

Commented [SD715]: Changed MBL to MBF as WG1 N2045

Commented [SD716]: Changed RBL to RBF as WG1 N2045

Commented [SD717]: Combined comments added '≥' N2055

Commented [SD718]: Changed MBL to MBF as WG1 N2045

Commented [SD719]: Combined comments N2055 & N2193

4.5.2.2.5.2 ~~5.5.2.2.~~5.2 ~~General~~ discarding monitoring means operational requirements

The b~~B~~ending fatigue counters or the physical strength monitoring ~~systems~~ shall comply with the following requirements:

a) When the monitoring means becomes inoperative or indicates discard condition has been reached, the lift shall stop at the next requested landing and open the doors. After minimum 20 seconds, the doors shall be closed and further automatic operation shall be prevented and door re-open button shall remain active.

b) ~~If the lift is in firefighting operation, inspection operation, earthquake or evacuation operation mode at the moment the discard condition was reached, this mode shall continue until it is terminated. Then further normal operation shall be prevented.~~Once the lift has been taken out of automatic operation because the discard condition was reached, it shall only be allowed to move the car under inspection or emergency electrical operation.

c) Once the lift has been taken out of automatic operation because the discard condition was reached, it shall only be allowed to move the car under inspection or emergency operations ~~or~~ or emergency electrical operation.

d) An indicator shall provide notification when the monitoring means has taken the lift out of automatic operation.

e) The monitoring means shall maintain the critical data (see ~~5.5.2.2~~5.3.14.5.2.2.5.3.1 & ~~5.5.2.2.5~~4.14.5.2.2.5.4.1) for verification of discard status through power loss conditions.

f) The critical data (see ~~5.5.2.2~~5.3.14.5.2.2.5.3.1 & ~~5.5.2.2.5~~4.14.5.2.2.5.4.1) shall not be lost in case of monitoring means failure

g) The monitoring means shall be provided with a device for resetting after replacement of the suspension means; the resetting device shall be accessible ~~to authorized persons~~ only by use of a key.

h) The monitoring means may be a part of the control system or a separate monitoring device.

~~4.5.2.2.5.3 5.5.2.2.~~45.3 ~~Bending fatigue counter~~

4.5.2.2.5.3.1 General

~~5.5.2.2.~~5.3.1 Bending fatigue counter, ~~when~~where provided, shall be based ~~either on:~~ ~~option a) (see Figure 27a) or the simplified option b) (see Figure 27b):~~ one of following options:

a) ~~Every start shall be counted as a full trip~~ Every direction change shall be counted ~~as a full trip~~. [see Figure 27 a)] ~~Start and stop floor's location can be taken into consideration to differentiate bent sections of suspension means.~~; or

b) ~~Every direction change shall be counted as a full trip~~ Every start shall be counted ~~as a full trip (simplified option):~~ [see Figure 27 b)].

~~c) For every section of the suspension means simple bending/reverse bending is counted~~

When the maximum number of ~~bends (simple and reverse)~~ allowed trips N_{lift} is reached, the monitoring means shall indicate the discard condition. Releveling trips can be excluded from the counter.

Commented [SD720]: Combined comments N2055 & N2193

Commented [SD721]: As WG1 comments N1986

Commented [AD722]: N2247

Commented [SD723]: Combined comments N2055 & N2175

Commented [SD724]: Combined comments N2055 & N2175

Commented [SD725]: Combined comments N2055 & N2175

Commented [SD726]: Combined comments N2055 & N2175

Commented [SD727]: Combined comments N2055 & N2147

Commented [SD728]: Combined comments N2055 & N2175

Commented [SD729]: Combined comments N2055 & N2193

Commented [SD730]: As WG1 comments N1986

Commented [SD731]: Combined comments N2055 & N2193

Commented [SD732]: As per Wg1 Comments N 1986

Commented [AD733]: TFHAS_74_v4

Commented [SD734]: Combined comments N2055 & N2193

Commented [SD735]: Combined comments N2055 & N2193

Commented [SD736]: Combined comments N2055 & N2193

Commented [SD737]: Added reference to Figure 27a)

Commented [SD738]: Added reference to 27b)

Commented [SD739]: Combined comments N2055 & N2193

Commented [SD740]: As WG1 comments (& N2010)

Commented [SD741]: As WG1 comments (& N2010)

Commented [SD742]: Combined comments N2055 & N2193

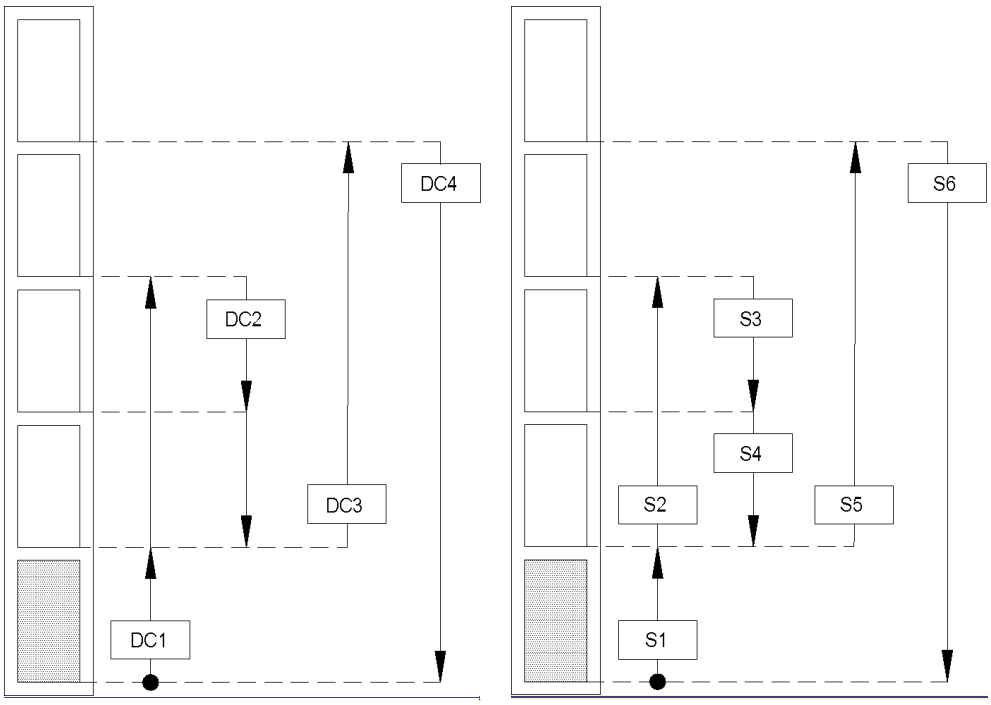


Figure 27a) Option a)direction change counting:

Figure 27b) Option b)start counting:

Key

DC1…n	direction change 1…n	a) 4 full trips are considered for the bending fatigue counter
S1…n	start 1…n	b) 6 full trips are considered for the bending fatigue counter

Figure 27 — Example for the number of full trips to be considered based on option a) or b).

Commented [SD743]: As WG1 comments (& N2010)

NOTE: Full trip is defined understood as a trip from the lowest landing floor to the highest landing.floor

Based on the sheave and pulley arrangement the number of simple bending and reverse bending experienced by the most stressed suspension means section during one full trip of the lift shall be considered.

To determine the stress of the most stressed section the different stresses caused by the different bending's shall be accumulated. It shall be differentiated between:

Simple bending:

~~Bending sequence for~~ For one simple bend (Nns_{SB}~~im~~ = 1) of a~~n alternative~~ suspension or compensation means the sequence is:

straight – bend – straight  ~~= Nsim = 1 or~~ when the means is running over one sheave or pulley; or

bend – straight – bend  ~~= Nsim = 1~~ when the movement of the means is starting from a bend situation on a sheave or pulley and is stopping in a bend situation on a sheave or pulley with the same bending direction; or

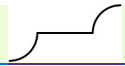
a half simple bend (n_{SB} ~~=~~ ½)

straight – bend  , or bend – straight 

before or after a full simple or full reversed bending

Reverse bending:

~~Bending sequence for~~ For one reverse bend (Nn_{rRB}~~ev~~ = 1) of a~~n alternative~~ suspension ~~or compensation~~ means the sequence is:.

bend – straight – reverse bend  ~~= Nrev =~~ , or  ~~= Nrev = 1~~ when the direction of bending of the means is changing during movement on to the next sheave or pulley.

Commented [SD744]: Combined comments N2055 & N2193

Commented [SD745]: Combined comments N2055 & N2193

Commented [SD746]: Combined comments N2055 & N2193

Commented [SD747]: Combined comments N2055 & N2193

Figure 28 shows two examples for counting of simple and reverse bends

Commented [SD748]: As WG1 comments (& N2010)

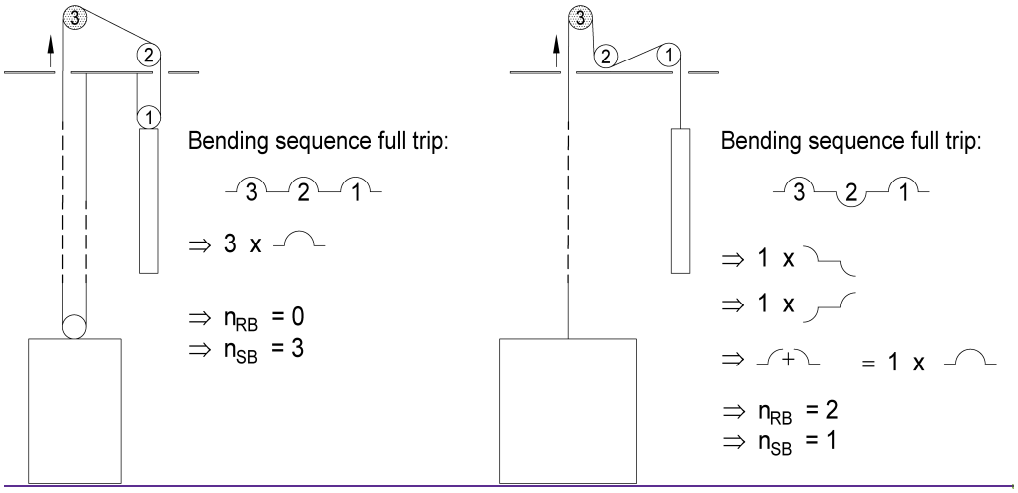


Figure 28 — Examples of full trip bending sequences and the resulting number of simple bends n_{SB} and reverse bends n_{RB} to be considered for the most stressed suspension means section

Commented [SD749]: As WG1 comments (& N2010)

The maximum allowed number of trips for the lift application shall be:

$N_{lift} = N / 1.5$, or

$N_{lift} = N - 600\,000$,

whichever is smaller, where

$N = 1 / ((n_{SB}/N_{SB}) + (n_{RB}/N_{RB}))$

N_{lift} maximum number of allowed trips for the lift application

N calculated number of trips

n_{SB} number of simple bends experienced by the most stressed suspension means section during one full trip ~~(lowest landing to top landing)~~ of the lift

Commented [SD750]: Combined comments N2055 & N2193

n_{RB} number reverse bends experienced by the most stressed suspension means section during one full trip ~~(lowest landing to top landing)~~ of the lift

Commented [SD751]: Combined comments N2055 & N2193

N_{SB} tested number of simple bends according to ISO 8100-2:2023, ~~5.13.5~~4.13.5

N_{RB} tested number of reverse bends according to ISO 8100-2:2023, ~~5.13.5~~4.13.5

If different sheaves are used in the lift system, either the sheave ~~–~~with the smallest D/d ratio shall be considered, or~~unless individual N_{SB} and N_{SR} values for each D/d ratio are known.~~ individual N_{SB1}, N_{SB2}, ... And N_{RB1}, N_{RB2}, values for each D/d ratio shall be combined using the Palmgren-Miner rule:

$$N = 1 / ((n_{SB1}/N_{SB1}) + (n_{SB2}/N_{SB2}) + \ldots\ldots + (n_{RB1}/N_{RB1}) + (n_{RB2}/N_{RB2}) + \ldots\ldots)$$

For timing belts and elastomeric coated traction belts, regardless of the distance mentioned in ISO 8100-2:2023, ~~5.12.2.3~~4.12.2.3 between the sheaves and ~~also~~ for travelling sheaves, reverse bends shall always be considered, unless the belt is twisted to prevent a reverse bending.

~~4~~.5.2.2.5.3.2 ~~5.5.2.2.5.3.2~~ Critical data of bending fatigue counter

N_{lift}, N and the actual number of full trips counted on option a) or option b) shall be considered as critical data according to the general discarding monitoring means operational requirements stated in clause ~~5.5.2.2.4.2~~4.5.2.2.4.2 e) and f).

4.5.2.2.5.4 ~~5.5.2.2.4~~5.4 Suspension means physical strength monitoring

~~4~~.5.2.2.5.4.1 ~~5.5.2.2.5~~.4.1 General

The physical strength monitoring systems, where provided, shall be applied to each suspension ~~member~~ means or the entire suspension system of the lift.

The monitoring system shall comply with the following:

a) ~~Measure~~ the physical parameter(s) of the installed elastomeric coated suspension means shall be measured in order to ~~that~~ correlate~~s~~ to strength degradation as the coated suspension means fatigues;.

b) ~~B~~based on the physical measurement(s), the device shall ensure the determination of the RBF before any suspension means is reduced to its limit (60% or 80 % as per Table 12). ~~calculate the RBL for each coated suspension means or the suspension system.~~

~~a) The device shall ensure the determination of the residual breaking force (RBF) with a statistical confidence level of not less than 95%.~~

~~a) Calculate the 95% confidence factor considering all error conditions applicable to the monitoring methodology.~~

c) continuously measure the entire suspension means or for those methods that rely on car position the system shall keep a record of all suspension sections and their respective degradation;.

d) detection of RBF shall be based on Table 12 combination of required monitoring and visual discharging;

~~a) The monitoring system determines, that the suspension means have degraded to an RBL of 60% MBL shall be able to identify the reduction of the breaking force in the weakest section.~~

e) ~~R~~remove the lift from service when the monitoring system determines, that the suspension means have degraded to the applicable ~~RBL~~RBF according to Table 12.

To correlate the measured physical parameter(s) to residual strength, the coated suspension means shall be fatigued according to the method described in ISO 8100-2:2023~~EN 81-50~~, ~~5.13.5~~4.13.5. ~~The number of coated suspension means required for testing shall be sufficient to support the 95% confidence factor required.~~

Commented [SD752]: As WG1 comments (& N2010)

Commented [SD753]: Combined comments N2055 & N2193

Commented [SD754]: As per WG1 comments N1986 & N1964

Commented [SD755]: Combined comments N2055 & N2193

Commented [SD756]: Combined comments N2055 & N2193

Commented [SD757]: Combined comments N2055 & N2193

Commented [SD758]: Combined comments N2055 & N2193

Commented [SD759]: Combined comments N2055 & N2193

Commented [SD760]: Changed RBL to RBF as WG1 N2045

Commented [SD761]: Combined comments N2055 & N2193

4.5.2.2.5.4.2 ~~5.5.2.2.5.4.2~~ Critical data of physical strength monitoring device

Physical parameters on which the RBF assessment done by the physical strength monitoring device is based shall be considered as critical data according to the general discarding monitoring means operational requirements stated in clause ~~5.5.2.2.5.2~~4.5.2.2.5.2 e) and f).

The critical data relevant for physical strength monitoring device are the:

— initial physical parameter value corresponding to ~~MBF~~minimum breaking force;

— last stored physical parameter value(s) based on the monitoring method;

— physical parameter for the discharging limit as per Table 12.

4.5.2.2.5.5 ~~5.5.2.2.45.5~~ Diameter reduction of ~~non-coated~~ steel wire ropes d<6mm

The gauge applied to measure the diameter reduction shall be verified with a test according to ISO 8100-2:2023, ~~5.13.5~~4.13.5. The tests shall prove that at a diameter reduction of 6% related to the nominal diameter the residual breaking force (RBF) is not less than 80% of the ~~minimum~~ breaking force (~~MBF~~minimum breaking force).

4.5.2.3~~5.5.2.3~~ Connection between suspension means and terminations

~~5.5.2.3.14~~4.5.2.3.1 The junction between the suspension means ~~rope~~ and its ~~the rope~~ termination, ~~designed for its specific application of the suspension means and~~ shall be~~according to 5.5.2.3.1, shall be~~ able to resist at least 80 % of the ~~minimum breaking~~ ~~MBF~~minimum breaking force ~~load~~ of the suspension means~~rope~~.

~~5.5.2.3.124~~.5.2.3.2 The ends of the ~~non-coated~~ steel wire ropes shall be fixed to the car, counterweight or balancing weight, or suspension points of the dead parts of reeved ropes by one of the following means: ~~of~~

a) ~~self-tightening~~ asymmetric wedge ~~type~~ sockets, ~~(e.g.~~ according to EN 13411-6:2004+A1:2008; ~~or EN 13411-7),~~

b) symmetric wedge sockets, according to EN 13411-7:2021~~)~~;

c) ferrule secured eyes ~~(e.g.~~ according to EN 13411-3:2022,~~)~~, ~~or~~ in case an eyebolt is used to connect these terminations to fixing plates, it shall be made of a single piece and without a collar;

~~a)~~d)swage terminals ~~(e.g.~~ according to EN 13411-8:2011~~)~~.

~~NOTE~~ Steel wire r~~R~~ope terminations according to EN 13411-3:2022, EN 13411-6:2004+A1:2008, EN 13411-7:2021 and EN 13411-8:2011 and their connection parts shall ~~can be assumed to~~ achieve at least 80 % of the ~~minimum braking load~~~~MBF~~minimum breaking force of the rope.

~~5.5.2.3.2.14~~.5.2.3.2.1 The eyebolt connecting the termination as per ~~5.5.2.3.1~~4.5.2.3.1 to the car, counterweight or balancing weight, or suspension points of the dead parts of reeved ropes, shall be designed in order to pass the following requirements, ensuring that after the fatigue tensile test, the eyebolt shall sustain a force of at least 80% of the ~~MBF~~minimum breaking force of the ropes, and shall be tested according to EN 13411-6: 2004+A1:2008 clause 6.2.5.

Commented [SD762]: Combined comments N2055 & N2193

Commented [SD763]: Combined comments N2055 & N2193

Commented [SD764]: As WG1 comments N1986

Commented [SD765]: Combined comments N2055 & N2193

Commented [SD766]: Alignment of MBF

Commented [SD767]: Combined comments N2055 & N2193

Commented [SD768]: Alignment of MBF

Commented [SD769]: As WG1 comments and N1965

Commented [SD770]: Combined comments N2055 & N2193

Commented [SD771]: Alignment of MBF

Commented [SD772]: As WG1 comments N2045

Commented [SD773]: Combined comments N2055 & N2193

~~5.5.2.3.~~23~~4~~.5.2.3.3 The ends of elastomeric coated ropes and traction belts shall be fixed with terminations according to the following requirements:

a) terminations shall be made of metal and of self-tightening wedge style sockets and shall be able to resist at least 80% of the ~~minimum breaking load~~MBFminimum breaking force of the suspension ~~member~~means;

b) the socket shall comply with requirements specified in EN 13411-6:2004+A1:2008, clause 5 or EN 13411-7:2021, clause 5 with the following deviation~~s~~:

— the clamping length between the socket body and the wedge, being in contact with the live portion of the suspension means, shall be defined by the instructions for the elastomeric coated ropes and belts;

— ~~the temperature properties of the material shall consider the environmental conditions defined in 5.54.5;~~

c) to allow checking the correct matching of the interacting component parts, the socket body and the wedge shall be marked with:

1) the type designation of the elastomeric coated rope/belt intended for application with the termination;

2) the highest permissible ~~minimum breaking force~~ (~~MBF~~minimum breaking force~~)~~ of the elastomeric coated rope/belt shall be marked permanently on the socket;

d) for ~~belt terminations and~~ coated suspension means ~~ropes~~ not applying a U-bolt wire rope grip the wedge shall be protected against falling out of the socket in case of a slack suspension situation.

~~5.5.2.3.~~34~~4~~.5.2.3.4 The ends of elastomeric coated timing belts shall be fixed with terminations either according to ~~5.5.2.3.2~~4.5.2.3.2 or shall be clamped with positive secured terminations according to the following requirements:

a) at least ~~9~~7 teeth shall be clamped;

b) the termination shall be capable to carry at least 80% of ~~the minimum breaking force~~MBF~~minimum breaking load~~;

c) the fatigue cycles shall be tested according to ISO 8100-2:2023, ~~5.13.3~~4.13.3;

~~5.5.2.3.~~5~~.2~~44.5.2.3.5 The fixing of the ropes on drums shall be carried out using a system of blocking with wedges, or using at least two clamps.

~~5.5.2.~~43.64.5.2.3.6 The ends of each chain shall be fixed to the car, counterweight or balancing weight, or suspension points of the dead parts of reeved chains. The junction between the chain and the chain termination shall be able to resist at least 80 % of the ~~minimum breaking load~~minimum breaking force~~MBF~~ of the chain.

Commented [SD774]: Combined comments N2055 & N2193

Commented [SD775]: Combined comments N2055

Commented [SD776]: Corrected ref N2055 combined comments

Commented [SD777]: As WG1 comments 1986

Commented [SD778]: Combined comments N2055 & N2193

Commented [SD779]: Combined comments N2055 & N2193

Commented [SD780]: Combined comments N2055 & N2193

Commented [SD781]: As WG1 comments 1986

Commented [SD782]: Alignment with use of MBF

Commented [SD783]: As per WG1 comments N1954

Commented [SD784]: Combined comments N2055 & N2193

Commented [SD785]: Combined comments N2055 & N2193

Commented [SD786]: Combined comments N2055

~~4.4.13~~4.5.3 ~~5.5.3~~ Suspension means~~Rope~~ traction/transmission

~~NOTE Examples of design considerations are given in **ISO 8100-2:2019, 5.11**.~~

~~5.5.3.1~~ **4.5.3.1** Rope traction shall be such that the following three conditions are fulfilled:

~~a)~~ ~~**5.5.3.1.1**~~ **4.5.3.1.1** ~~C~~The car shall be maintained at floor level without slip when loaded to 125 %, as per ~~5.4.2.1~~4.4.2.1 or ~~5.4.2.2~~4.4.2.2;~~a) the car shall be maintained at floor level without slip when loaded to 125 %, as per 5.4.2.1 or 5.4.2.2;~~

a) steel wire ropes shall be calculated according to ISO 8100-2:2023, ~~5.11.2.2.1~~4.11.2.2.1;

b) elastomeric coated ropes and traction belts shall be calculated according to ISO 8100-2:2023, ~~5.11.2.2.1~~4.11.2.2.1, using friction factors which shall be evaluated according to ISO 8100-2:2023, ~~5.13.6.2~~4.13.6.2;

c) steel wire ropes with elastomeric coated traction sheave grooves shall be calculated according to ISO 8100-2:2023, ~~5.11.2~~4.11.2 using friction factors which shall be evaluated according to ISO 8100-2:2023, ~~5.13.6.1~~4.13.6.1;

d) timing belts and sprockets are capable to transfer torques as per ISO 8100-2:2023, ~~5.13.6.3~~4.13.6.3.

~~b)~~ ~~**5.5.3.2**~~**4.5.3.1.2** ~~it~~when the braking system is activated according to ~~5.9.2.2.1.1~~4.9.2.2.1.1, the car, whether empty or with rated load, shall be decelerated to a speed which is lower or equal than the speed for which the buffers are designed, including reduced stroke buffer~~. It shall be ensured that any emergency braking causes the car, whether empty or with rated load, to decelerate to a speed which is lower than or equal to the speed for which the buffers are designed, including reduced stroke buffer;~~;

a) steel wire ropes shall be calculated according to ISO 8100-2:2023, ~~5.11.2.2.2~~4.11.2.2.2 with dynamic friction coefficient according to ISO 8100-2:2023, ~~5.11.2.3.2~~4.11.2.3.2;

b) elastomeric coated ropes and traction belts shall be calculated according to ISO 8100-2:2023, ~~5.11.2.2.2~~4.11.2.2.2, using friction factors which shall be evaluated according to ISO 8100-2:2023, ~~5.13.6.2~~4.13.6.2;

c) steel wire ropes with elastomeric coated traction sheave grooves shall be calculated according to ISO 8100-2:2023, ~~5.11.2~~4.11.2 using friction factors which shall be evaluated according to ISO 8100-2:2023, ~~5.13.6.1~~4.13.6.1;

d) timing belts and sprockets are capable to transfer torques as per ISO 8100-2:2023, ~~5.13.6.3~~4.13.6.3.

Commented [SD787]: Combined comments N2055 & N2193

Commented [AD788]: TFHAS_74_v4

Commented [SD789]: Combined comments N2055 & N2193

c) ~~5.5.3.3~~4.5.3.1.3 ~~it~~ It shall not be possible to raise the empty car, or the counterweight, to a dangerous position if either the car or the counterweight is stalled~~; either~~:

~~1) the ropes shall slip on the traction sheave; or~~

~~2) the machine shall be stopped by an electric safety device in conformity with 5.11.2.~~

a) Steel ropes shall slip on the traction sheave and are calculated according to ISO 8100-2:2023, ~~5.11.2.3.2~~4.11.2.3.2?, or the machine shall be stopped by an electric safety device in conformity with ~~5.11.2~~4.11.2. The return to automatic operation shall only be possible by manual resetting;

b) Elastomeric coated ropes and traction belts, the machine shall be stopped by an electric safety device in conformity with ~~5.11.2~~4.11.2; The return to automatic operation shall only be possible by manual resetting;

c) Steel ropes with elastomeric coated traction sheave grooves shall slip on the traction sheave and are calculated according to ISO 8100-2:2023, ~~5.11.2.3.2~~4.11.2.3.2?, or the machine shall be stopped by an electric safety device in conformity with ~~5.11.2~~4.11.2; The return to automatic operation shall only be possible by manual resetting;

d) Timing belts and sprockets, lifting of the car or counterweight shall be prevented by stopping the lift machine by an electric safety device in conformity with ~~5.11.2~~4.11.2; The return to automatic operation shall only be possible by manual resetting.

~~NOTE~~ NOTE 1 Examples of design considerations are given in ISO 8100-2:~~2019~~2023., ~~5.11~~4.11.

NOTE 2 Some lifting of the car or counterweight is acceptable, provided there is no risk of crushing at the extremes of travel, or falling back of the car, or counterweight causing impact forces on the means of suspension, and excessive retardation of the car.

~~5.5.3.2 The traction of non-coated steel wire ropes with elastomeric coated traction sheaves shall be calculated according to EN 81-50, 5.11.2 using friction factors which shall be evaluated according to EN 81-50, 5.13.6.1.~~

~~5.5.3.3 The traction of elastomeric coated ropes and traction belts shall be calculated according to EN 81-50, 5.11.2, excluding stalled condition, using friction factors which shall be evaluated according to EN 81-50, 5.13.6.1. The verification of slip and emergency stop resistance shall be verified by testing according EN 81-50, 5.13.8.~~

~~5.5.3.4 The power transmission between the timing belt and the sprocket shall be such that the following 3 conditions are fulfilled:~~

~~a) the car shall be maintained at floor level without slip when loaded to 125 % as per 5.4.2.1 or 5.4.2.2;~~

~~b) it shall be ensured that any emergency braking causes the car, whether empty or with rated load, to decelerate to a speed which is lower or equal than the speed for which the buffers are designed, including reduced stroke buffer;~~

~~c) lifting of the car or counterweight shall be prevented by stopping the lift machine by an electric safety device in conformity with 5.11.2.~~

~~Sprocket tooth contact shall be evaluated according to EN 81-50, 5.13.6.3~~

~~NOTE Some lifting of the car or counterweight is acceptable, provided there is no risk of crushing at the extremes of travel, or falling back of the car, or counterweight causing impact forces on the means of suspension, and excessive retardation of the car.~~

~~5.5.3.5 For elastomeric coated suspension means lifting of the car or counterweight shall be prevented by stopping the lift machine by an electric safety device in conformity with 5.11.2.~~

Commented [SD790]: As per WG1 comments N1954

Commented [SD791]: Combined comments N2055 & N2193

Commented [SD792]: Combined comments N2055 & N2193

4.4.144.5.4 5.5.4 Winding up of ropes for positive drive lifts

5.5.4.14.5.4.1 The drum, which can be used in the conditions laid down in 5.9.2.1.1 4.9.2.1.1 b), shall be helically grooved and the grooves shall be suited to the ropes used.

5.5.4.24.5.4.2 When the car rests on its fully compressed buffers, one and a half turns of rope shall remain in the grooves of the drum.

5.5.4.34.5.4.3 There shall only be one layer of rope wound on the drum.

5.5.4.44.5.4.4 The angle of deflection (fleet angle) of the ropes in relation to the grooves shall not exceed 4°.

Commented [SD793]: N2055 combined comments

4.4.154.5.5 5.5.5 Distribution of load between the suspension means ropes or the chains

5.5.5.14.5.5.1 Force equalization

Commented [AD794]: WG1 N2191

5.5.5.1.1 An automatic device shall be provided for equalizing the tension of:

a) suspension means ropes or chains, at least at one of their ends.

a)b)5.5.5.1.12 For chains or elastomeric coated timing beltschains engaging with sprockets, the at both of their ends fixed to the car as well as the ends fixed to the balancing/counter weight shall be provided with such equalization devices.

Commented [SD795]: As Per WG1 Comments N1954

5.5.5.1.23 For chains or elastomeric coated timing belts in the case of multiple return sprockets on the same shaft, these sprockets shall be able to rotate independently.

Commented [SD796]: Combined comments N2055 & N2193

Commented [AD797]: WG1 N2191

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

5.5.5.34.5.5.3 Protection in the case of abnormal extension, slack rope or slack suspension means chain shall be provided as follows:

a) in the case of two suspension means rope or two chain suspension of the car, an electric safety device in conformity with 5.11.2 shall cause the machine to stop in case of the abnormal relative extension of one suspension meansrope or chain shall be checked by an electric safety device in conformity with 4.11.2;

Commented [SD798]: Combined comments N2055 & N2193

Commented [AD799]: TFHAS_74_v4, comment 5.6.2.2.3

b) for positive drive lifts and hydraulic lifts, if the risk of slack suspension means rope (or chain) exists, an electric safety device in conformity with 5.11.2 shall cause the machine to stop when the slack suspension means shall be checked by occursan electric safety device in conformity with 4.11.2.

Commented [AD800]: TFHAS_74_v4, comment 5.6.2.2.3

After stopping, normal automatic operation shall be prevented.

Commented [SD801]: Combined comments N2055 & N2175 deleted this line

For hydraulic lifts with two or more jacks, this requirement applies for each suspension set.

Commented [SD802R801]: N2193 undeleted this line

5.5.5.44.5.5.4 The devices for adjusting the length of suspension means ropes or chains shall be made in such a way that these devices cannot work themselves loose after adjustment.

4.5.5.5 For chains or elastomeric coated timing belts in the case of multiple return sprockets on the same shaft, these sprockets shall be able to rotate independently.

Commented [AD803]: WG1 N2191

~~4.4.16~~4.5.6 ~~5.5.6~~ Compensation means

~~5.5.6.1~~4.5.6.1 Compensation for the weight of the suspension means~~ropes~~ in order to ensure adequate traction or hoisting motor power shall be provided in accordance with the following conditions:

~~5.5.6.1 a) compensation ropes shall comply with requirements in 5.5.1, 5.5.2 and 5.5.5 excluding requirements on sheave diameter and safety factor;~~

a) for rated speeds not exceeding 3,00 m/s, ~~means such as~~where required, chains, ~~ropes or~~ belts or steel wire ropes ~~may~~ shall be ~~used~~provided;

b) for rated speeds exceeding 3,00 m/s, ~~compensation~~ steel wire ropes ~~or belts~~ shall be provided;

c) for lifts whose rated speed exceeds 3,50 m/s there shall be, ~~in addition,~~ an anti-rebound device;

The operation of the anti-rebound device shall ~~initiate the stopping of the lift machine~~be checked by ~~means of~~ an electric safety device in conformity with ~~5.11.2~~4.11.2;

d) for rated speeds exceeding 1,75 m/s, compensation means without tensioning shall be guided at the vicinity of the loop.

~~5.5.6.2~~4.5.6.2 Whenever steel wire ropes are used as compensation means~~ropes are used~~, the following shall apply:

a) compensating ropes shall be as specified in EN 12385-5:2021 or ISO 4344:2022; they shall comply with the following requirements:

1) for the design of the steel wire ropes ~~5.5.1.2.1~~4.5.1.2.1;

2) for the terminations and junctions to the terminations ~~5.5.2.3.1~~4.5.2.3.1, ~~5.5.2.3.2~~4.5.2.3.2, ~~5.5.2.3.2.1~~4.5.2.3.2.1.

b) tensioning pulleys shall be used;

c) the ratio between the pitch diameter of the tensioning pulleys and the nominal diameter of the ~~load bearing member~~steel wire ropes ~~compensating ropes~~ shall be at least 30;

d) tensioning pulleys shall have protection according to ~~5.5.7~~4.5.7;

e) the tension shall be provided by gravity;

f) the tension shall be checked by an electric safety device in conformity with ~~5.11.2~~4.11.2.

~~5.5.6.3~~4.5.6.3 Compensation means~~, e.g. steel wire ropes, chains, belts~~ and their terminations and junction in-between, shall be capable of withstanding, with a safety factor of 5, any static forces to which the means is subjected.

The maximum suspended weight of compensation means, with car or counterweight at the top of its travel, and one-half total weight of tension sheave assembly, where used, shall be included.

Commented [SD804]: Combined comments N2055 and N2193

Commented [AD805]: TFHAS_74_v4

Commented [SD806]: Combined comments N2055 & N2193

Commented [AD807]: TFHAS_74_v4, 5.6.2.2.3

Commented [AD808]: Editorial alignment

Commented [SD809]: Combined comments N2055 & N2193

Commented [SD810]: Combined comments N2055 & N2193

Commented [AD811]: TFHAS_74_v4

~~4.4.17~~4.5.7 ~~5.5.7~~ Protection for sheaves, pulleys and sprockets

~~5.5.7.14~~.5.7.1 For sheaves, pulleys and sprockets, overspeed governors, tension weight pulleys, provisions shall be made according to Table 13 to avoid:

a) body injury; including nip guards shall resist minimum 300 N force;

b) the ropes/ belts/chains leaving the pulleys/sprockets, if slack;

c) the introduction of objects between ropes/ belts/chains and pulleys/sprockets.

Table 13 — Protection for sheaves, pulleys and sprockets

Location of sheaves, pulleys and sprockets			~~Risk~~ Items according to ~~5.5.7.1~~4.5.7.1		
			a	b	c
At the car	on the roof		x	x	x
	under the floor			x	x
On the counterweight/balancing weight				x	x
In machine and pulley rooms			x[a]	x	x[b]
In the well	Headroom	above car	x[2a)]	x	
		beside car	x	x	
	Between pit and headroom			x	x[b]
	Pit		x[2a)]	x	x
Jack	Extending upwards		x[a]	x	
	Extending downwards			x	x[b]
	With mechanical synchronizing means		x	x	x

x ~~The risk shall be taken into account~~Protection shall be provided.

[a] Protection shall be nip guards as a minimum, preventing accidental access to areas where ropes/ belts/chains enter or leave the sheaves, pulleys or sprockets (nip guards, See Figure ~~18~~25~~2~~29, retainers see Figure 30).

[b] Required only if the ropes/belts/chains are entering the traction sheave or the pulley/sprocket horizontally or at any angle above the horizontal, up to a maximum of 90°.

Commented [SD812]: Combined comments N2055 & N2193

Commented [AD813]: TFHAS_74_v4

Commented [SD814]: Combined comments N2055 & N2193

Commented [SD815]: Change from '2' to 'a' as WG1 Comments 1969

Commented [SD816]: Delete Bracket N2055 combined comments

Commented [IJ817]: See N1538

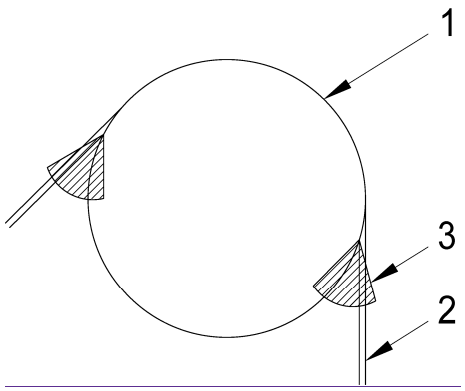
Commented [SD818]: Change from '2' to 'a' as WG1 Comments 1969

Commented [SD819]: Combined comments N2055 - delete bracket

Commented [IJ820]: See N1538

Commented [AD821]: TFHAS_74_v4

Commented [SD822]: Combined comments N2055 & N2193



Key

1 ~~Pulley~~ pulley, sprocket

2 ~~rope, belt~~suspension / compensation means or overspeed governor rope

3 nip guard

Commented [SD823]: Combined comments N2055 & N2193

Figure ~~18~~ ~~25~~29 — Example of nip guard

~~5.5.7.2~~4.5.7.2 The devices used shall be constructed so that the rotating parts are visible by partial cover, transparent cover or perforated cover in accordance with ISO 13857:2019, Table 4, and do not hinder examination and maintenance operation. ~~If they are perforated, the gaps shall comply with ISO 13857:2019, Table 4.~~

Commented [AD824]: TFHAS_74_v4

The dismantling shall be necessary only in the following cases:

a) replacement of a rope/belt/chain;

b) replacement of a pulley/sprocket;

c) re-cutting of the grooves.

~~The devices for preventing the ropes/belts/chains from leaving the grooves or contact surface of pulleys or sprockets shall include one retainer at maximum 15° from near the points where the ropes/belts/chains enter and leave the pulleys/sprockets according to 5.4.2.2.1 b) 4), and at least one intermediate retainer if more than 60° of the angle of wrap is arranged below the horizontal axis of the pulley and the total angle of wrap is more than 120° (see Figure 1926).~~

~~In addition pulleys for flat belts shall be provided with axial retainers to prevent leaving of the pulley.~~

Commented [IJ825]: See N17xx

~~Where the angle of wrap is equal to or less than 30o only one retainer is required positioned centrally between the entry and exit point of the rope/belt/chain onto the pulley/sprocket.~~

Commented [GE826]: INT #6

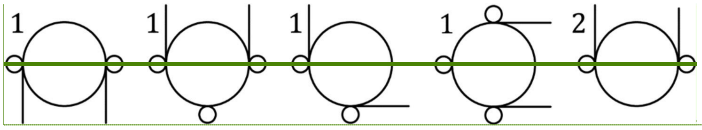
Retainers to prevent the ropes/belts/chains from leaving the grooves or contact surface of pulleys or sprockets shall be provided.

The retainers shall be located at maximum 15° from the points where the ropes/belts/chains enter and leave the pulleys/sprockets. ~~(~~see Figure 30 a).

Where the angle of wrap is equal to, or less than, 30° one retainer positioned centrally is sufficient. ~~(~~see Figure 30 b).

If more than 60° of the angle of wrap is arranged below the horizontal axis of the pulley and the total angle of wrap is more than 120° at least one intermediate retainer shall be provided. ~~(~~see Figure 30 c). This does not apply for double wrap solutions. ~~(~~see Figure 30 d).

Pulleys for flat belts shall be provided with axial retainers to prevent the belt from leaving of the pulley.



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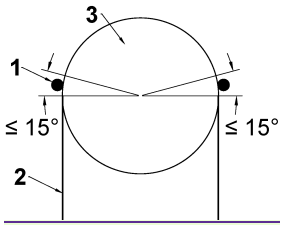
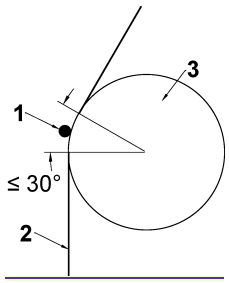
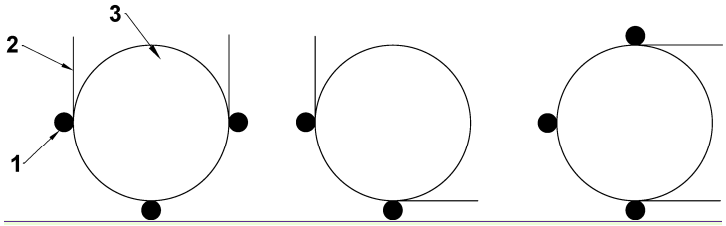


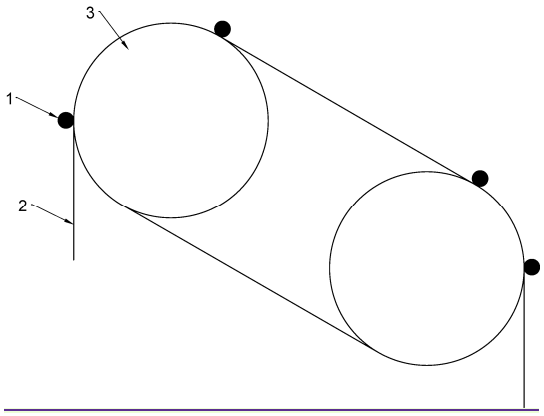
~~Figure 30~~ a) 15° tolerance



~~Figure 30~~ b) angle of wrap less than 30°



~~Figure 30~~ c) retainer below the pulley axis



~~Figure 30~~ d) double wrap

Key

1 ~~in conformance with 5.5.7.2~~ Retainer

2 ~~not in conformance with 5.5.7.2~~ rope, belt, chain

3 pulley, sprocket

Figure ~~19~~30 — Examples of arrangements of rope retainers

Commented [SD830]: Updated key WG1 comments N1986

~~4.4.18~~4.5.8 ~~5.5.8~~ Traction sheaves, pulleys and sprockets in the well

~~Traction~~ Where traction sheaves, pulleys and sprockets ~~may be~~are installed in the well above the lowest landing level ~~under the following conditions~~:

a) there shall be retaining devices to prevent diverter pulleys/sprockets from falling in the event of a mechanical failure. These devices shall be able to support the weight of the pulley/sprockets and the suspended loads; and

b) ~~if~~ where traction sheaves, pulleys/sprockets are placed in the vertical projection of the car, then clearances in the headroom shall be according to ~~5.2.5.7~~4.2.5.7.

4.5.9 ~~5.5.9~~ Marking for suspension and compensation means

~~5.5.9.1~~4.5.9.1 Suspension/compensation means shall be marked directly on the coating, or on a tag with the following information:

- manufacturer's name and address;
- ~~verification report number according to ISO81002:2023, 5.13.8~~4.13.8, and;
- ~~type or trade name~~identification of the product.
- ~~Product identification, e.g. ident number, type name~~
- ~~Traceability information, e.g. batch number, production date~~
- ~~Minimum breaking load [kN]~~
- ~~Number of the certificate according to EN 81-50, 5.13.9~~, if required, or of the certificate based on EN ~~12385-5.~~

~~5.5.9.2~~4.5.9.2 Steel wire ropes according to EN 12385-5:2021 or ISO 4344:2022 shall be marked on a tag as per EN 12385-1:2002+A1:2008, 7.3.2:

- manufacturer's name and address;
- ~~Certificate number~~identification of the product.

~~5.5.9.3~~4.5.9.3 For steel wire ropes a tag shall be fixed to the end termination after installation of the suspension/compensation means:

Any tag shall be fixed to the end termination after installation of the suspension/compensation means.

4.5.9.4 Termination socket and wedge shall be marked according ~~5.5.2.3~~4.5.2.3.3 c).

4.5.9.5 Traction sheave, sprocket or traction drive shall be marked with following information:

- manufacturer's name and address ~~Manufacturer identification; e.g. trademark, address~~
- identification of the product ~~Product identification; e.g. ident number, type name~~
- The designation and type of applicable suspension means;
- Hardness and roughness information if required according to ISO 8100-2:2023, ~~5.13.9~~4.13.8.

This marking can be done via directly marking on sheave, sprocket or a permanently-installed data tag delivered with the traction sheave, sprocket or traction drive.

Commented [AD831]: TFHAS_74_v4

Commented [SD832]: WG1 comments N2045 modified the text of N2019

Commented [SD833]: Renumbered due to updated numbering in ISO 8100-2

Commented [AD834]: Aligned with other markings as required by EU-C3 (TFHAS)

Commented [AD835]: Aligned with other markings as required by EU-C3 (TFHAS)

Commented [SD836]: Deleted '8' N2055 combined comments

Commented [SD837]: Combined comments N2055 & N2193

Commented [SD838]: Combined comments N2055 & N2193

Commented [AD839]: Aligned with other markings as required by EU-C3 (TFHAS)

Commented [SD840]: Combined comments N2055 & N2193

Commented [SD841]: WG1 comments N2045 modified the text of N2019

Commented [SD842]: Combined comments N2055 & N2193

Commented [AD843]: Aligned with other markings as required by EU-C3 (TFHAS)

Commented [SD844]: Renumbered due to updated numbering in ISO 8100-2

Commented [SD845]: Combined comments N2055 & N2193

Commented [SD846]: WG1 comments N2045 modified the text of 5.5.9. (N2019) this did not include this text it maybe intended for this to be deleted. To be reviewed

~~4.5~~4.6~~5.6~~ Precautions against free fall, excessive speed, unintended car movement and creeping of the car

Commented [SGD847]: Whole chapter checked and corrected where necessary for the use of terms device and means.
In addition to HAS comment on 5.6.2.1.4.2 means could be used as general term covering both devices and means (combination of devices and/or methods).

~~4.5.1~~4.6.1 ~~5.6.1~~ General provisions

~~5.6.1.1~~4.6.1.1 Devices, or combinations of devices and their actuation shall be provided to prevent the car from:

a) free fall;

b) excessive speed, either downward~~s~~, or up and down in the case of traction lifts;

c) unintended movement, with open doors;

d) in the case of hydraulic lifts, creeping from a landing level.

~~5.6.1.2~~4.6.1.2 For traction and positive drive lifts, the protection means in Table 14 shall be provided.

Table 14 — Protection means for traction and positive drive lifts

Hazardous situation	Protection means	Tripping means
Free fall and excessive speed in down direction of car	Safety gear (~~5.6.2.1~~4.6.2.1)	Overspeed governor (~~5.6.2.2.1~~4.6.2.2.1)
Free fall of counterweight or balancing weight in the case of ~~5.2.5.4~~4.2.5.4	Safety gear (~~5.6.2.1~~4.6.2.1)	Overspeed governor (~~5.6.2.2.1~~4.6.2.2.1), or for rated speeds not exceeding 1,00 m/s: — tripping by breakage of suspension means (~~5.6.2.2.2~~4.6.2.2.2); or — tripping by safety rope (~~5.6.2.2.3~~4.6.2.2.3).
Excessive speed in up direction (traction lifts only)	Ascending car overspeed protection means (~~5.6.6~~4.6.6)	Included in ~~5.6.6~~4.6.6
Unintended car movement with open doors	Protection against unintended car movement (~~5.6.7~~4.6.7)	Included in ~~5.6.7~~4.6.7

~~5.6.1.3~~4.6.1.3 For hydraulic lifts, protection against unintended car movement according to ~~5.6.7~~4.6.7 and relevelling according to ~~5.12.1.1.4~~4.12.1.1.4 shall be provided. In addition, devices, or combinations of devices and their actuation, shall be provided in accordance with Table 15. ~~In addition, protection against unintended movement according to 5.6.7 shall be provided.~~

Where the landing doors are not driven by the car door (~~5.3.9.3.4~~4.3.9.3.4), an electrical anti-creep system (~~5.12.1.10~~4.12.1.10) as precaution against creeping (see Table 15) shall not be applied.

Commented [SD848]: As per WG1 comments N2020

Table 15 — Protection means for hydraulic lifts

	Type of lifts	Alternative combinations to be selected	Precautions against creeping in addition to re-levelling (~~5.12.1.14~~4.12.1.4)		
			Tripping of safety gear (~~5.6.2.14~~4.6.2.1) by downward movement of the car (~~5.6.2.2.44~~4.6.2.2.4)	Pawl device (~~5.6.54~~4.6.5)	Electrical anti-creep system (~~5.12.1.104~~4.12.1.10)
Precautions against free fall or descent with excessive speed	Direct acting lifts	Safety gear (~~5.6.2.14~~4.6.2.1), tripped by overspeed governor (~~5.6.2.2.14~~4.6.2.2.1)	X	X	X
		Rupture valve (~~5.6.34~~4.6.3)		X	X
		Restrictor (~~5.6.44~~4.6.4)		X	
	Indirect acting lifts	Safety gear (~~5.6.2.14~~4.6.2.1), tripped by overspeed governor (~~5.6.2.2.14~~4.6.2.2.1)	X	X	X
		Rupture valve (~~5.6.34~~4.6.3) plus safety gear (~~5.6.2.14~~4.6.2.1) tripped by breakage of suspension means (~~5.6.2.2.24~~4.6.2.2.2) or by safety rope (~~5.6.2.2.34~~4.6.2.2.3)	X	X	X
		Restrictor (~~5.6.44~~4.6.4) plus safety gear (~~5.6.2.14~~4.6.2.1) tripped by breakage of suspension means (~~5.6.2.2.24~~4.6.2.2.2) or by safety rope (~~5.6.2.2.34~~4.6.2.2.3)	X	X	

~~4.5.24~~4.6.2 ~~5.6.2~~ Safety gear and its tripping means

~~4.5.2.14~~4.6.2.1~~5.6.2.1~~ Safety gear

~~4.5.2.1.14~~4.6.2.1.1 ~~5.6.2.1.1~~ General provisions

~~5.6.2.1.1.14~~4.6.2.1.1.1 The safety gear shall be capable of operating in the downward direction and stopping a car carrying the rated load, or a counterweight or balancing weight at the tripping speed of the overspeed governor, or if the suspension devices break, by gripping the guide rails, and of holding the car, counterweight or balancing weight there.

A safety gear which has the additional function of operating in the upward direction may be used in accordance with ~~5.6.64~~4.6.6.

~~5.6.2.1.1.24~~4.6.2.1.1.2 The safety gear ~~is regarded as a safety component and~~ shall be verified according to ~~the requirements in~~ ISO 8100-2:2023, ~~5.34~~4.3.

Commented [IJ849]: Already changed by ISO

Commented [SD850]: Combined Comments N2055

Commented [SGD851]: TFHAS_105-v2

~~5.6.2.1.1.3~~4.6.2.1.1.3 A data plate shall be fixed on safety gear, indicating:

a) the name of the manufacturer of the safety gear;

~~b) the type examination certificate number;~~

~~c)~~b) ~~the type~~identification of the safety gear;

~~d)~~c) if adjustable, the safety gear shall be marked with:

1) the permissible load range; or

2) the adjustment parameter, if the relationship with the load range is specified in the instruction manual.

~~4.5.2.1.2~~4.6.2.1.2 ~~5.6.2.1.2~~ Conditions of use for different types of safety gear

~~5.6.2.1.2.1~~4.6.2.1.2.1 The car safety gear:

a) shall be of the progressive type; or

b) may be of the instantaneous type, if the rated speed of the lift does not exceed 0,63 m/s.

For hydraulic lifts, instantaneous type safety gears other than of the captive roller type (which are not tripped by an overspeed governor) shall only be used if the tripping speed of the rupture valve, or the maximum speed of the restrictor (or one-way restrictor), does not exceed 0,80 m/s.

~~5.6.2.1.2.2~~4.6.2.1.2.2 If the car or counterweight or balancing weight carries several safety gears, they shall all be of the progressive type.

~~5.6.2.1.2.3~~4.6.2.1.2.3 The safety gear of the counterweight or balancing weight shall be of the progressive type, if the rated speed exceeds 1,00 m/s. Otherwise, the safety gear may be of the instantaneous type.

~~4.5.2.1.3~~4.6.2.1.3 ~~5.6.2.1.3~~ Retardation

For progressive safety gear, the average retardation in the case of free fall of the car with rated load, or the counterweight or the balancing weight, shall lie between 0,2 g_n and 1,0 g_n.

~~4.5.2.1.4~~4.6.2.1.4 Release

~~5.6.2.1.4.1~~4.6.2.1.4.1 The release and automatic reset of a safety gear on the car, counterweight or balancing weight shall only be possible by raising the car, counterweight or balancing weight.

~~5.6.2.1.4.2~~4.6.2.1.4.2 The release of the safety gear shall be possible at all load conditions up to the rated load:

a) by means defined for emergency operation~~s~~ (~~5.9.2.3~~4.9.2.3 or ~~5.9.3.9~~4.9.3.9); or

b) in application of procedures available on site (~~7.2.2~~6.2.2).

~~5.6.2.1.4.3~~4.6.2.1.4.3 After the release of the safety gear, ~~it shall require the intervention of a competent maintenance person competent in maintenance procedures~~ to the return of the lift to ~~service~~ automatic operation shall require intentional reset by means on site (see ~~7.2.2 d)~~6.2.4 g)). A power cycle by itself shall not provide this reset.

Commented [AD852]: TFHAS_74_v4, EU-C3, 5.3.9.1.13

Commented [SD853]: Combined comments N2055 & N2147

Commented [IJ854]: See N1538

Commented [AD855]: Consistent wording

~~NOTE The activation of the main switch is not sufficient by itself to allow the lift to be returned to service.~~

Commented [SGD856]: TFHAS

~~4.5.2.1.5~~4.6.2.1.5 ~~5.6.2.1.5~~ Electrical checking

~~When the~~ The ~~car safety gear is~~ inactive position ~~engaged~~of the car safety gear shall be checked by~~,~~ an electric safety device in conformity with ~~5.11.2~~4.11.2, mounted on the car. This device~~,~~ shall operate ~~initiate the stopping of the machine~~ before or at the moment of safety gear operation.

Commented [AD857]: TFHAS_74_v4 comment 5.6.2.2.3

~~4.5.2.1.6~~4.6.2.1.6 ~~5.6.2.1.6~~ Constructional conditions

~~5.6.2.1.6.1~~4.6.2.1.6.1 Jaws or blocks of safety gears shall not be used as guide shoes.

~~5.6.2.1.6.2~~4.6.2.1.6.2 If the safety gear is adjustable, the final setting shall be sealed in such a way to prevent re-adjustment without breaking the seal.

~~5.6.2.1.6.3~~4.6.2.1.6.3 Accidental tripping of the safety gear shall be prevented ~~as far as possible, e.g. by sufficient clearance to guide rails to allow horizontal movements of guide shoes~~by a clearance to guide rails (see 7.2.3 g)).

Commented [SGD858]: TFHAS

~~5.6.2.1.6.4~~4.6.2.1.6.4 Safety gears shall not be tripped by ~~devices~~means, which operate electrically, hydraulically or pneumatically.

~~5.6.2.1.6.5~~4.6.2.1.6.5 When a safety gear is tripped, either by the breakage of the suspension means or by a safety rope, ~~it shall be it shall be considered that assumed that the safety gear is tripped at a speed corresponding to~~ the tripping speed ~~of an appropriate~~shall not exceed those required for overspeed governor~~s according to~~5.6.2.2.1.14.6.2.2.1.1.

Commented [IJ859]: See N1537 and WG1 Comments

Commented [SGD860]: TFHAS

~~4.5.2.2~~4.6.2.2~~5.6.2.2~~ Means of tripping the safety gear

~~4.5.2.2.1~~4.6.2.2.1 ~~5.6.2.2.1~~ Tripping by overspeed governor

~~4.5.2.2.1.1~~4.6.2.2.1.1 ~~5.6.2.2.1.1~~ General provisions

The following shall be satisfied:

a) tripping of the overspeed governor for the safety gear shall occur at a speed at least equal to 115 % of the rated speed, and less than:

   1) 0,80 m/s for instantaneous safety gears, except for the captive roller type; or

   2) 1,00 m/s for car safety gears of the captive roller type; or

   3) 1,50 m/s for counterweight or balancing weight safety gears of the captive roller type; or

   4) 1,50 m/s for progressive safety gear used for rated speeds not exceeding 1,00 m/s; or

   5) The value according Formula (6) for progressive safety gear used for rated speeds exceeding 1,00 m/s. ~~[see Formula (6)]~~:

Commented [SD861]: As per WG1 comments Annex V N1954

Commented [SD862R861]:

$$= 1{,}25 \cdot v + \left(\frac{0{,}25}{v}\right) \qquad (6)$$

where

v is expressed in metres per second

~~for progressive safety gear used for rated speeds exceeding 1,0 m/s;~~

~~For lifts where the rated speed exceeds 1,0 m/s, it is recommended to choose a tripping speed as close as possible to the value required in 4~~5).

~~For lifts with low rated speed, it is recommended to choose a tripping speed as close as possible to the lower limit indicated in a);~~

b) overspeed governors using only traction to produce the tripping force shall have grooves which:

— have been submitted to an additional hardening process; or

— have an undercut in accordance with ISO 8100-2:2023, ~~5.11.2.3.1~~4.11.2.3.1;

c) the direction of rotation, corresponding to the operation of the safety gear, shall be marked on the overspeed governor;

d) the tensile force in the overspeed governor rope produced by the governor, when tripped, shall be at least the greater of the following two values:

— twice that necessary to engage the safety gear; or

— 300 N.

~~4.5.2.2.1.2~~4.6.2.2.1.2 ~~5.6.2.2.1.2~~ **Response time**

~~In order to ensure tripping of the overspeed governor before a dangerous speed can be reached (see ISO 8100-2:2019, 5.3.2.3.1), T~~the maximum distance between tripping points on the overspeed governor shall not exceed 250 mm related to the movement of the overspeed governor rope.

~~4.5.2.2.1.3~~4.6.2.2.1.3 ~~5.6.2.2.1.3~~ **Overspeed governor ropes**

The rope of an overspeed governor shall satisfy the following conditions:

a) the overspeed governor shall be driven by a wire rope as specified in EN 12385-5:2021 or ISO 4344:2022;

b) the ~~minimum breaking load~~minimum breaking force~~MBF~~ of the rope shall be related by a safety factor of at least 8 to the tensile force produced in the rope of the overspeed governor when tripped, taking into account a friction factor μ_{max} equal to 0,2 for traction type overspeed governor;

c) the ratio between the pitch diameter of the pulleys for the overspeed governor rope and the nominal rope diameter shall be at least 30;

d) the overspeed governor rope shall be tensioned by a pulley with a tensioning weight. This pulley or its tensioning weight shall be guided;

e) the overspeed governor may be a part of the tensioning device provided that its tripping values are not altered by the movement of the tensioning device;

f) during the engagement of the safety gear, the overspeed governor rope and its terminations shall remain intact~~, even in the case of a braking distance greater than normal~~;

Commented [SD863]: As per WG1 comments Annex V N1954

Commented [SD864R863]:

Commented [SD865]: Due to renumbering of the above changes from WG1 comments N1945 Annex V

Commented [SGD866]: TFHAS

Commented [IJ867]: Already corrected by ISO

Commented [SD868]: Combined comments N2055

Commented [SD869]: New revision

Commented [SD870]: Added revision

Commented [SD871]: Combined comments N2055

Commented [SGD872]: TFHAS

~~g) g) the overspeed governor rope shall be easily detachable from the safety gear.~~

~~4.5.2.2.1.4~~4.6.2.2.1.4 ~~5.6.2.2.1.4~~ Accessibility

If ~~T~~the overspeed governor is located in the well it shall ~~meet the following conditions~~:

~~a) the overspeed governor shall be accessible and reachable for inspection and maintenance;~~

a) ~~if located in the well, the overspeed governor shall~~either be accessible and reachable through an inspection door according to ~~5.2.3~~4.2.3 from outside the well; or

b) ~~the requirement in b) does not apply if~~ the following three conditions are fulfilled:

1) the tripping of the overspeed governor according to ~~5.6.2.2.1.5~~4.6.2.2.1.5 is effected by means of a remote control, except cableless, from outside the well, whereby an involuntary tripping is not effected and the actuation device is ~~not~~ accessible ~~to unauthorized persons~~ only by use of a key;

2) the overspeed governor is accessible from the roof of the car or from the pit for inspection and maintenance; and

3) the overspeed governor returns after tripping automatically into the normal position, as the car, counterweight or balancing weight is moved in the upward direction.

However, the electrical parts may return into the normal position by remote control from the outside of the well. This shall not influence the normal function of the overspeed governor.

~~4.5.2.2.1.5~~4.6.2.2.1.5 ~~5.6.2.2.1.5~~ Possibility of tripping the overspeed governor

During checks or tests, it shall be possible to operate the safety gear at a lower speed than that indicated in ~~5.6.2.2.1.1~~4.6.2.2.1.1 a), by tripping the overspeed governor ~~in a safe way~~manually.

If the overspeed governor is adjustable, the final setting shall be sealed in such a way to prevent re-adjustment without breaking the seal.

~~4.5.2.2.1.6~~4.6.2.2.1.6 ~~5.6.2.2.1.6~~ Electrical checking

The following shall be met:

a) the overspeed governor or another device shall, by means of an electric safety device in conformity with ~~5.11.2~~4.11.2, initiate the stopping of the lift machine before the car speed, either up or down, reaches the tripping speed of the governor~~;~~.

However, for rated speeds not exceeding 1,00 m/s, this device may operate at the latest at the moment when the tripping speed of the overspeed governor is reached;

b) if, after release of the safety gear (~~5.6.2.1.4~~4.6.2.1.4), the overspeed governor does not automatically reset itself, an electric safety device in conformity with ~~5.11.2~~4.11.2 shall prevent the starting of the lift while the overspeed governor is not in the reset position~~. This device shall, however, be made inoperative in the case provided for in 5.12.1.6.1 d) 2)~~;

c) the breakage or excessive rope stretch of the overspeed governor rope shall ~~cause the motor to stop~~be checked by ~~means of~~ an electric safety device in conformity with ~~5.11.2~~4.11.2.

Commented [SGD873]: TFHAS, move to guide of application.

Commented [SGD874]: TFHAS

Commented [AD875]: TFHAS_74_v4

Commented [SD876]: Combined comments N2055

Commented [SGD877]: TFHAS

Commented [IJ878]: See N1537
Agreed to delete last sentence

Commented [AD879]: TFHAS_74_v4 comment 5.6.2.2.1.6

4.6.2.2.1.7 ~~5.6.2.2.1.7~~ Verification

The overspeed governor ~~is regarded as a safety component and~~ shall be verified according to ~~the requirements in~~ ISO 8100-2:2023, ~~5.4~~4.4.

4.6.2.2.1.8 ~~5.6.2.2.1.8~~ Marking

A data plate shall be fixed on the overspeed governor, indicating:

a) the name of the manufacturer of the overspeed governor;

~~b) the type examination certificate number;~~

~~c)~~b) ~~the type~~ identification of the overspeed governor;

~~d)~~c) the actual tripping speed for which it has been adjusted.

~~4.5.2.2.2~~4.6.2.2.2 ~~5.6.2.2.2~~ Tripping by breakage of suspension means

When the safety gear is tripped by the breakage of the suspension means, the following applies:

a) the tensile force exerted by the actuating mechanism shall be at least the greater of the following two values:

   1) twice that necessary to engage the safety gear; or

   2) 300 N;

b) when springs are used for the tripping of the safety gear, they shall be of the guided compression type;

c) it shall be possible for a test of the safety gear, and its actuating mechanism, to be made without the need to enter the well during the test;

   To this end, a means shall be provided so that it is possible, while the car/counterweight is descending ~~(under normal operation)~~, to activate the safety gear by a loss of tension in the suspension ~~rope~~means.

   Where the means provided is mechanical, the force required to operate it shall not exceed 400 N.

   ~~After these tests, it shall be checked that no distortion or deterioration which could impair the use of the lift has occurred.~~

   NOTE It is acceptable for the equipment to operate the means to be stored within the well and moved outside when a test is performed.

Commented [SD880]: Combined Comments N2055

Commented [SGD881]: TFHAS_105-v2
In addition: compile a list of Mechanical Safety Devices (previously called safety components) as an informative annex xyz.
See comment on 6.2.
No list needed. ISO 8100-2 describes also tests for other components.

Commented [SD882]: Combined comments N2055

Commented [AD883]: TFHAS_74_v4, EU-C3, 5.3.9.1.13

Commented [IJ884]: WG1 comment

Commented [SD885]: Combined comments N2055 & N2175

Commented [SD886]: As per Wg1 comments N1954

Commented [SGD887]: Why is this deleted? Check N1954.

Commented [SGD888]: TFHAS

Commented [IJ889]: WG1 Comment

~~4.5.2.2.3~~4.6.2.2.3 ~~5.6.2.2.3~~ Tripping by safety rope

When the safety gear is tripped by a safety rope, the following applies:

a) the tensile force exerted by the safety rope shall be at least the greater of the following two values:

   1) twice that necessary to engage the safety gear; or

   2) 300 N;

b) the safety rope shall be in conformity with ~~5.6.2.2.1.3~~4.6.2.2.1.3;

c) the rope shall be tensioned by gravity or by springs that do not affect the safe function, if broken;

d) during the engagement of the safety gear, the safety rope and its terminations shall remain intact~~, even in the case of a braking distance greater than normal~~;

e) the breakage or slackening of the safety rope shall ~~cause the machine to stop~~ be checked by ~~means of~~ an electric safety device according ~~(5.11.2~~4.11.2~~)~~;

f) pulleys used for carrying the safety rope shall be mounted independently of any shaft or pulley assembly that carries the suspension means~~ropes or chains~~;

g) protection devices shall be provided in accordance with ~~5.5.7.1~~4.5.7.1.

Commented [SGD890]: TFHAS

Commented [SGD891]: TFHAS decisions not clear. Text aligned to other electric safety devices. Other sentences to be verified.

Commented [SD892]: Combined comments N2055

~~4.5.2.2.4~~4.6.2.2.4 ~~5.6.2.2.4~~ Tripping by downward movement of the car

~~4.5.2.2.4.1~~4.6.2.2.4.1 ~~5.6.2.2.4.1~~ Tripping by rope

Tripping by rope of the safety gear shall be actuated under the following conditions:

a) after a normal stop, a rope which satisfies ~~5.6.2.2.1.3~~4.6.2.2.1.3, attached to the safety gear, shall be blocked with a force defined in ~~5.6.2.2.3~~4.6.2.2.3 a) (for example, the overspeed governor rope);

b) the rope blocking mechanism shall be released during normal movement of the car;

c) the rope blocking mechanism shall be actuated by guided compression spring(s) and/or by gravity;

d) movement of the car for emergency ~~rescue~~ operations in the up direction shall be possible ~~in all circumstances~~;

e) ~~an electric device which complies with the requirements of as per~~ 5.11.2.2~~, associated with the rope blocking mechanism shall cause stopping of the machine at the latest at the moment of blocking of the rope, and shall prevent any further normal downward movement of the car;~~ the retracted position of the rope blocking mechanism shall be checked by an electric safety device in conformity with ~~5.11.2~~4.11.2. This device shall be made inactive in the unlocking zone (~~5.3.8.1~~4.3.8.1) by ~~the~~an electric safety device according ~~5.12.1.4~~4.12.1.4 ~~a)~~4.11.2;

f) precautions shall be taken to avoid involuntary tripping of the safety gear by the rope in case of disconnection of the electric power supply during a downward movement of the car;

g) the design of the system of rope and rope blocking mechanism shall be such that no damage is possible during the engagement of the safety gear;

h) the design of the system of rope and rope blocking mechanism shall be such that no damage is possible by an upward movement of the car.

Commented [IJ893]: See N1537

Commented [SGD894]: TFHAS

Commented [AD895]: N2247 -058

Commented [SD896]: Combined comments N2055 & N2190

~~4.5.2.2.4.2~~4.6.2.2.4.2 ~~5.6.2.2.4.2~~ Tripping by lever

Tripping by lever of the safety gear shall be actuated under the following conditions:

a) after the normal stopping of the car, a lever attached to the safety gear shall be extended into a position to engage with fixed stops, which are located at each landing;

b) the lever shall be retracted during the normal movement of the car;

c) the movement of the lever to the extended position shall be effected by guided compression spring(s) and/or by gravity;

d) movement of the car for emergency operation~~s~~ in the up direction shall be possible ~~in all circumstances~~;

e) precautions shall be taken to avoid involuntary tripping of the safety gear by the lever, in case of the disconnection of the electric power supply during a downward movement of the car;

f) the design of the lever and stops system shall be such that no damage is possible:

   1) during the engagement of the safety gear, even in the case of longer braking distances;

   2) by an upward movement of the car~~.~~;

g) an electric device shall prevent any normal movement of the car when the tripping lever is not in its extended position after normal stopping, the car doors shall be closed and the lift shall be taken out of operation;

h) ~~an electric safety device, in conformity with 5.11.2, shall prevent any normal down movement of the car when the tripping lever is not in the retracted position.~~ the retracted position of the tripping lever shall be checked by an electric safety device in conformity with ~~5.11.2~~4.11.2. This device shall be made inactive in the unlocking zone (~~5.3.8.1~~4.3.8.1) by ~~the~~an electric safety device according ~~5.12.1.4~~4.12.1.4 ~~a)~~4.11.2.

Commented [SGD897]: TFHAS

Commented [SD898]: Combined comments N2055 &N2190

Commented [AD899]: N2247 -058

~~4.5.3~~4.6.3 ~~5.6.3~~ Rupture valve

~~5.6.3.1~~4.6.3.1 The rupture valve shall close automatically when the flow exceeds a pre-set amount. It shall be capable of stopping the car in downward movement, and of maintaining it stationary. The rupture valve shall be tripped at the latest when the speed reaches a value equal to rated speed downward~~s~~, v_d, plus 0,30 m/s.

Commented [AD900]: TFHAS_106_v4

The rupture valve shall be selected so that the average retardation, a, lies between 0,2 g_n and 1,0 g_n.

Commented [SD901]: Consistency in units N1986

Retardation of more than 2,5 g_n shall not last longer than 0,04 s.

The average retardation, a, can be evaluated by Formula (7):

$$a = \frac{Q_{max} \cdot r}{6 \cdot A \cdot n \cdot t_d} \quad (7)$$

where

a is the average retardation;

Commented [SGD902]: TFHAS

A is the area of jack where pressure is acting, expressed in square centimetres;

N is the number of parallel acting jacks with one rupture valve;

Q_{max} is the maximum flow, expressed in litres per minute;

R is the reeving factor;

t_d is the braking time, expressed in seconds.

~~5.6.3.2~~4.6.3.2 The rupture valve shall be accessible for adjustment and inspection directly from the car roof, or from the pit.

~~5.6.3.3~~4.6.3.3 The rupture valve shall be:

a) integral with the cylinder;

b) directly and rigidly flange-mounted;

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

d) connected directly to the cylinder by threading.

The rupture valve shall be provided with a thread ending with a shoulder. The shoulder shall butt up against the cylinder.

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

~~5.6.3.4~~4.6.3.4 On lifts with several jacks, operating in parallel, one common rupture valve may be used. Otherwise, the rupture valves shall be interconnected to cause simultaneous closing, in order to prevent the floor of the car from inclining by more than 5 % from its normal position.

~~5.6.3.5~~4.6.3.5 The housing of the rupture valve shall be calculated as the cylinder ~~according to 5.9.3.2.1.1~~4.9.3.2.1.1.

Commented [SD903]: As per WG1 Comments N1954

~~5.6.3.6~~4.6.3.6 If the closing speed of the rupture valve is controlled by a restricting device, a filter shall be located ~~as near as possible before~~adjacent to this device.

Commented [SGD904]: TFHAS

~~5.6.3.7~~4.6.3.7 There shall be, in the machinery space, a means which can be manually operated from outside of the well, allowing to reach the tripping flow of the rupture valve without overloading the car. The means shall be safeguarded against unintentional operation. It shall not neutralize the safety devices adjacent to the jack.

~~5.6.3.8~~4.6.3.8 The rupture valve ~~is regarded as a safety component and~~ shall be verified according to ~~the requirements in~~ ISO 8100-2:2023, ~~5.9~~4.9.

Commented [SGD905]: TFHAS_105-v2

~~5.6.3.9~~4.6.3.9 A data plate shall be fixed on the rupture valve, indicating:

a) the name of the manufacturer of the rupture valve;

b) the identification of the rupture valve~~type examination certificate number~~;

Commented [AD906]: TFHAS_74_v4, EU-C3, 5.3.9.1.13

c) the tripping flow for which it has been adjusted.

~~4.5.4~~4.6.4 ~~5.6.4~~ Restrictors

~~5.6.4.1~~4.6.4.1 In the case of a major leakage in the hydraulic system, the restrictor shall prevent the speed of the car with rated load in downward movement exceeding the rated speed downward~~s~~, v_d, by more than 0,30 m/s.

~~5.6.4.2~~4.6.4.2 The restrictor shall be accessible for inspection directly from the car roof or from the pit.

~~5.6.4.3~~4.6.4.3 The restrictor shall be:

a) integral with the cylinder;

b) directly and rigidly flange-mounted;

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

d) connected directly to the cylinder by threading.

The restrictor shall be provided with a thread ending with a shoulder. This shall butt up against the cylinder.

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

~~5.6.4.4~~4.6.4.4 The housing of the restrictor shall be calculated as the cylinder~~. according to 5.9.3.2.1.1~~4.9.3.2.1.1.

Commented [SD907]: As per WG1 comments N2045

~~5.6.4.5~~4.6.4.5 In the machinery space, there shall be a means which can be manually operated from outside of the well, allowing to reach the tripping flow of restrictor without overloading the car. The means shall be safeguarded against unintentional operation. In no case shall it neutralize the safety devices adjacent to the jack.

~~5.6.4.6~~4.6.4.6 Only the one-way restrictor where mechanical moving parts are used ~~is regarded as a safety component and~~ shall be verified according to ~~the requirements in~~ ISO 8100-2:2023, ~~5.9~~4.9.

Commented [SGD908]: TFHAS_105-v2

~~5.6.4.7~~4.6.4.7 A data plate shall be fixed on the one-way restrictor where mechanical moving parts are used (~~5.6.4.6~~4.6.4.6), indicating:

a) the name of the manufacturer of the one-way restrictor;

b) the identification of the one-way restrictor~~type examination certificate number~~;

c) the tripping flow for which it has been adjusted.

~~4.5.5~~4.6.5 ~~5.6.5~~ Pawl device

~~5.6.5.1~~4.6.5.1 The pawl device shall operate only in the downward direction, and be capable of stopping the car, with ~~a~~ rated load ~~according to Table 6 (5.4.2.1)~~, and maintaining it stationary on fixed stops:

a) for lifts provided with a restrictor or one-way restrictor: from a speed of v_d + 0,30 m/s; or

b) for all other lifts: from a speed equal to 115 % of the downward~~s~~ rated speed, v_d.

~~5.6.5.2~~4.6.5.2 At least one electrically retractable pawl shall be provided, designed in its extended position to stop the downward~~s~~ moving car against fixed supports.

~~5.6.5.3~~4.6.5.3 For each landing, supports shall be provided ~~and arranged at two levels :~~

~~a) to prevent the car from sinking below the landing level by more than 0,12 m; and~~

~~b) to stop the car at~~ the lower end of the unlocking zone.

~~5.6.5.4~~4.6.5.4 The movement of the pawl(s) to the extended position shall be effected by guided compression spring(s) and/or gravity.

~~5.6.5.5~~4.6.5.5 The supply to the electric retraction device shall be interrupted when the lift machine is stopped.

~~5.6.5.6~~4.6.5.6 The design of the pawl(s) and supports shall be such that, whatever the position of the pawl, the car cannot be stopped or any damage caused during the upward movement.

~~5.6.5.7~~4.6.5.7 Buffers of the following types shall be incorporated in the pawl device or in the fixed supports: ~~A buffering system shall be incorporated in the pawl device (or in the fixed supports).~~

~~5.6.5.7.1 Buffers shall be of the following types:~~

a) energy accumulation; or

b) energy dissipation.

~~5.6.5.7.2~~ The requirements of ~~5.8.2~~4.8.2 apply by analogy.

~~In addition, the buffer shall maintain the car stationary at a distance not exceeding 0,12 m below any~~ landingloading ~~level when carrying the rated load.~~

~~5.6.5.8~~4.6.5.8 When several pawls are provided, precautions shall be taken to ensure that all pawls engage on their respective supports, even in the case of disconnection of the electrical power supply during a downward movement of the car.

Commented [AD909]: TFHAS_74_v4, EU-C3, 5.3.9.1.13

Commented [SD910]: Combined comments N2055 & N2190

Commented [IJ911]: China comment
The clause cannot be clearly understood. Some experts think: the real meaning of 5.6.5.3 should be "for each landing supports shall be provided arranged at closer level from the landing between a) and b)?
Q1: is the understanding correct?
Q2: what is the real meaning of 5.6.5.3
Answer 1
No, the requirement is for two stops in the position shown.
5.6.5.3 a) is intended to hold the car at the floor level. The 0,12m corresponds to the maximum allowed travel of the lift whilst compressing the buffer as required by 5.6.5.7.2.
If there is then a cause which prevents this from engaging with the pawl device, a second stop shall be engaged as positioned according to 5.6.5.3 b) However, there is some incosistancy with the requirement in case of an unlocking zone which is ≤ 0,12m
This will be reviewed by WG1 at its meeting on the 7th June

Commented [SD912]: Combined comments N2055

Commented [AD913]: TFHAS_74_v4 comment 5.6.2.2.3

Commented [SD914]: Combined comments N2055

Commented [IJ915]: See N1537

~~5.6.5.9~~4.6.5.9 ~~An electric safety device which complies with the requirements of 5.11.2 shall prevent any downward movement of the car when a pawl is not in the retracted position.~~The retracted position of the pawl shall be checked by an electric safety device in conformity with ~~5.11.2~~4.11.2. This device shall be made inactive in the unlocking zone (~~5.3.8.1~~4.3.8.1) by ~~the~~an electric safety device according ~~5.12.1.4~~4.12.1.4 ~~a)~~4.11.2.

~~5.6.5.9.1~~ The pawl device shall be checked electrically in the extended position when the car stops.

~~5.6.5.9.2~~ If the pawl device is not in the extended position:

a) an electric device, which complies with the requirements of ~~5.11.2.2~~4.11.2.2, shall prevent the opening of the doors and automatic operation ~~any normal movement of the car~~;

b) the pawl device shall be fully retracted and the car shall be sent to the lowest level served by the lift; and

c) the doors shall open to allow persons to leave the car and the lift shall be taken out of operation.

Return of the lift to ~~normal~~ automatic operation shall require ~~the intervention of a competent maintenance person (competent in maintenance procedures)~~intentional reset by means on site (see 6.2.4 g)~~7.2.2 d)~~). A power cycle by itself shall not provide this reset.

~~5.6.5.10~~4.6.5.10 If energy dissipation buffers [~~5.6.5.7~~4.6.5.7~~.1~~ b)] are used, ~~an electric safety device in conformity with 5.11.2 shall immediately initiate stopping of the machine if the car is travelling downwards and prevent starting of the machine in downward motion, when the buffer is not in its normal extended position. The power supply shall be interrupted according to~~ the normal extended position of the buffer shall be proved by an electric safety device in conformity with ~~5.11.2~~4.11.2. This electric safety device shall act only on the equipment controlling the supply to the lift machine in accordance with the requirements of ~~5.9.3.4.3~~4.9.3.4.3.

~~4.5.6~~4.6.6 ~~5.6.6~~ Ascending car overspeed protection means

~~5.6.6.1~~4.6.6.1 The means, comprising speed monitoring and speed reducing elements, shall detect overspeed of the ascending car (see ~~5.6.6.10~~4.6.6.10) and cause the car to stop, or at least reduce its speed to that for which the counterweight buffer is designed. The means shall be active in:

a) ~~normal~~ automatic operation;

~~b) manual rescue operation, unless there is a direct visual observation of the machine or the speed is limited by other means to less than 115 % of the rated speed.~~

b) ~~automatic rescue operation~~emergency operation and emergency electrical operation unless there is a direct visual observation of the lift machine or the speed is limited by other means to less than 115 % of the rated speed.

Commented [SD916]: Combined comments N2055 & N2190

Commented [AD917]: N2247 -058

Commented [SD918]: Combined comments N2055 Deleted clause number and combined into single clause

Commented [SD919]: Combined comments N2055 Deleted clause number and combined into single clause

Commented [SD920]: Combined comments N2055 & N2175

Commented [SD921]: Combined comments N2055 & N2175

Commented [AD922]: Consistent wording

Commented [IJ923]: See N1538

Commented [SD924]: Combined comments N2055 (due to change to clause 5.6.5.7)

Commented [AD925]: TFHAS_74_v4 comment 5.6.2.2.3

Commented [SD926]: As WG1 comments N2039 & N1991

Commented [SD927]: Combined comments N2055 & N2175

Commented [SD928]: Combined comments N2055 comment 332 (deleted the old 5.6.6.1 b) and added new clause 5.9.2.3.6)

Commented [IJ929]: See N1544

Commented [AD930]: TFHAS_74_v4 comment 5.6.2.2.3

Commented [SD931]: Combined comments N2055 & N2175

~~5.6.6.2~~4.6.6.2 The means shall be capable of performing as required in ~~5.6.6.1~~4.6.6.1 without assistance from any lift component that controls the speed or retardation, or stops the car during ~~normal~~ automatic operation, unless there is built-in redundancy and correct operation is self-monitored.

~~In the case of using the machine brake, self-monitoring can include verification of correct lifting or dropping of the mechanism or verification of the braking force. If a failure is detected, the next normal start of the lift shall be prevented.~~

In the case of using the machine brake, self-monitoring shall comply with ~~5.9.2.2.2.8~~4.9.2.2.2.8 b) and ~~5.9.2.2.2.3~~4.9.2.2.2.3 g).

The effectiveness of Sself-monitoring ~~is subject to type examination~~shall be verified according to ISO 8100-2:2023, ~~5.7.3.2.5~~4.7.3.2.5.

A mechanical linkage to the car, whether or not such linkage is used for any other purpose, may be used to assist in this performance.

~~5.6.6.3~~4.6.6.3 The means shall not allow a retardation of the empty car in excess of $1{,}0\ g_n$ during the stopping phase.

~~5.6.6.4~~4.6.6.4 The means shall act on:

a) the car;

b) the counterweight;

c) ~~the rope system according to EN 12385-5 (suspension or compensation~~compensating)the suspension or compensation steel wire ropes;

d) the traction sheave; or

e) the same shaft as the traction sheave, provided that the shaft is only statically supported in two points.

~~5.6.6.5~~4.6.6.5 The means shall operate an electric safety device in conformity with ~~5.11.2~~4.11.2 if it is engaged.

~~5.6.6.6~~4.6.6.6 The release of the means shall not require access ~~of a person entering~~to the well.

~~5.6.6.7~~4.6.6.7 ~~After the release of~~ When the means has been activated or the self-monitoring has indicated a failure of the stopping element of the means, the ~~reset of the lift~~return of the lift to ~~service~~automatic operation~~, return of the lift to normal operation~~ shall require ~~the intervention of a competent maintenance person competent in maintenance procedures~~intentional reset by means on site (see 6.2.4 g)~~7.2.2 d)~~). A power cycle by itself shall not provide this reset.

~~5.6.6.8~~4.6.6.8 After its release, the means shall be in a condition to operate.

~~5.6.6.9~~4.6.6.9 If any part of the means requires ~~external~~ energy other than guided compression springs to operate, the absence of energy shall cause the lift to stop and keep it stopped. ~~This does not apply for guided compression springs.~~

Commented [SD932]: Combined comments N2055 & N2175

Commented [SD933]: As WG1 comments N2045

Commented [SGD934]: Modification based on China-EU JWG and not on TFHAS proposal.

Commented [SGD935]: TFHAS
In ISO 8100-2: copy 5.8.3.2.5 to new 5.7.3.2.5.

Commented [AD936R935]: done

Commented [SD937]: Combined comments N2055

Commented [IJ938]: To be aligned with 5.6.7.10

Commented [SD939]: Reverted to original text as per WG1 comments N2045

Commented [IJ940]: See N1538

Commented [SD941]: As per WG1 comments N1954

Commented [SGD942]: TFHAS
Return to service/return to automatic operation (see 5.6.5.9)
ok

Commented [SD943]: As per WG1 comments N1954

~~5.6.6.10~~4.6.6.10The speed monitoring element of the lift, which causes the ascending car overspeed protection means to actuate, shall be, either:

a) an overspeed governor conforming to the requirements of ~~5.6.2.2.1~~4.6.2.2.1; or

b) a device conforming to;

1) ~~5.6.2.2.1.1~~4.6.2.2.1.1 a) or ~~5.6.2.2.1.6~~4.6.2.2.1.6 regarding the tripping speed;

2) ~~5.6.2.2.1.2~~4.6.2.2.1.2 regarding the response time;

3) ~~5.6.2.2.1.4~~4.6.2.2.1.4 regarding accessibility;

4) ~~5.6.2.2.1.5~~4.6.2.2.1.5 regarding the possibility of tripping;

5) ~~5.6.2.2.1.6~~4.6.2.2.16 b) regarding the electrical checking~~.~~;

And where equivalence to ~~5.6.2.2.1.3~~4.6.2.2.1.3 a), ~~5.6.2.2.1.3~~4.6.2.2.1.3 b), ~~5.6.2.2.1.3~~4.6.2.2.1.3 e), ~~5.6.2.2.1.5~~4.6.2.2.1.5 (for sealing) and ~~5.6.2.2.1.6~~4.6.2.2.1.6 c) regarding those aspects is assured at the same time.

~~5.6.6.11~~4.6.6.11The ascending car overspeed protection means ~~is regarded as a safety component and~~ shall be verified according to ~~the requirements in~~ ISO 8100-2:2023, ~~5.7~~4.7.

Commented [SGD944]: TFHAS_105-v2

~~5.6.6.12~~4.6.6.12A data plate shall be fixed on the ascending car overspeed protection means, indicating:

a) the name of the manufacturer;

b) the ~~type examination certificate number~~identification of the ascending car overspeed protection means;

Commented [AD945]: TFHAS_74_v4, EU-C3, 5.3.9.1.13

c) the actual tripping speed for which it has been adjusted~~;~~.

~~d) the type of ascending car overspeed protection means.~~

Commented [AD946]: TFHAS_74_v4, EU-C3, 5.3.9.1.13

~~4.5.7~~4.6.7 ~~5.6.7~~ Protection against unintended car movement

~~5.6.7.1~~4.6.7.1 Lifts shall be provided with a means to prevent or stop unintended car movement away from the landing, with the landing door not in the locked position and the car door not in the closed position, as a result of any single failure of the lift machine or drive control system on which the safe movement of the car depends.

Excluded are failures of the:

a) suspension means~~ropes or chains~~;

b) the traction sheave, drum, or sprockets of the lift machine;

c) flexible hoses;

d) steel piping; and

e) cylinder.

A failure of the traction sheave includes a sudden loss of traction.

No detection of the unintended car movement needs to be provided in lifts without levelling, re-levelling and preliminary operations with doors open according to ~~5.12.1.4~~4.12.1.4, if the stopping element is ~~a~~ the machine brake complying with ~~5.6.7.3~~4.6.7.3 and ~~5.6.7.4~~4.6.7.4.

Any slip due to the traction conditions at unintended movement stopping shall be taken into account for calculation and or verification of the stopping distance.

~~5.6.7.2~~4.6.7.2 The means shall detect unintended movement of the car, cause the car to stop, and keep it stopped.

~~5.6.7.3~~4.6.7.3 The means shall be capable of performing as required in ~~5.6.7.2~~4.6.7.2 without assistance from any lift component that~~-~~, controls the speed or retardation, stops the car or keeps it stopped during ~~normal~~automatic -operation, unless there is built-in redundancy and correct operation is self-monitored.

~~NOTE Machine brakes according to 5.9.2.2.2 is considered to have built-in redundancy.~~

In the case of using the machine brake, self-monitoring shall comply with ~~5.9.2.2.2~~,~~8~~4.9.2.2.2.8 b) and ~~5.9.2.2.2.3~~4.9.2.2.2.3 g) ~~can include verification of correct lifting or dropping of the mechanism or verification of the braking force~~.

In the case of using two electrically commanded hydraulic valves operating in series for slowing and stopping in automatic ~~normal~~ operation, self-monitoring implies separate verification of correct opening or closing of each valve under the empty car static pressure.

~~If a failure is detected, car and landing doors shall be closed and the normal start of the lift shall be prevented.~~

The effectiveness of self-monitoring shall be tested according to ISO 8100-2:2023, ~~5.7.3.2.5~~4.8.3.2.5.

~~Self-monitoring is subject to type examination.~~

Commented [AD947]: TFHAS_74_v4 comment 5.6.2.2.3

Commented [SD948]: N1976

Commented [IJ949]: Re-worded by ISO editor

Commented [SD950]: Combined comments N2055

Commented [SD951]: Combined comments N2055 & N2175

Commented [SD952]: Combined comments N2055

Commented [SD953]: Updated ref due to changes in N2192

Commented [SD954]: Combined comments N2055 & N2175

Commented [SD955]: Combined comments N2055

Commented [SGD956]: TFHAS
In ISO 8100-2: copy 5.8.3.2.5 to new 5.7.3.2.5.
AD: done

~~5.6.7.4~~4.6.7.4 The stopping element of the means shall act on:

a) the car;

b) the counterweight;

c) ~~the rope system according to EN 12385-5 (suspension or compensation~~compensating)the suspension or compensation steel wire ropes;

Commented [SD957]: Combined comments N2055

d) the traction sheave;

e) the same shaft as the traction sheave, provided that the shaft is only statically supported in two points; or

f) the hydraulic system (including the motor/pump in up direction by isolation of the electrical supply).

The stopping element of the means, or the means keeping the car stopped may be the same as those used for:

— preventing overspeed in down direction;

— preventing ascending car overspeed (~~5.6.6~~4.6.6).

The stopping elements of the means may be different for the downward direction and for the upward direction.

~~5.6.7.5~~4.6.7.5 The means shall stop the car in a distance under the following conditions (see Figure ~~20~~31):

a) the stopping distance shall not exceed 1,20 m from the landing where the unintended car movement has been detected;

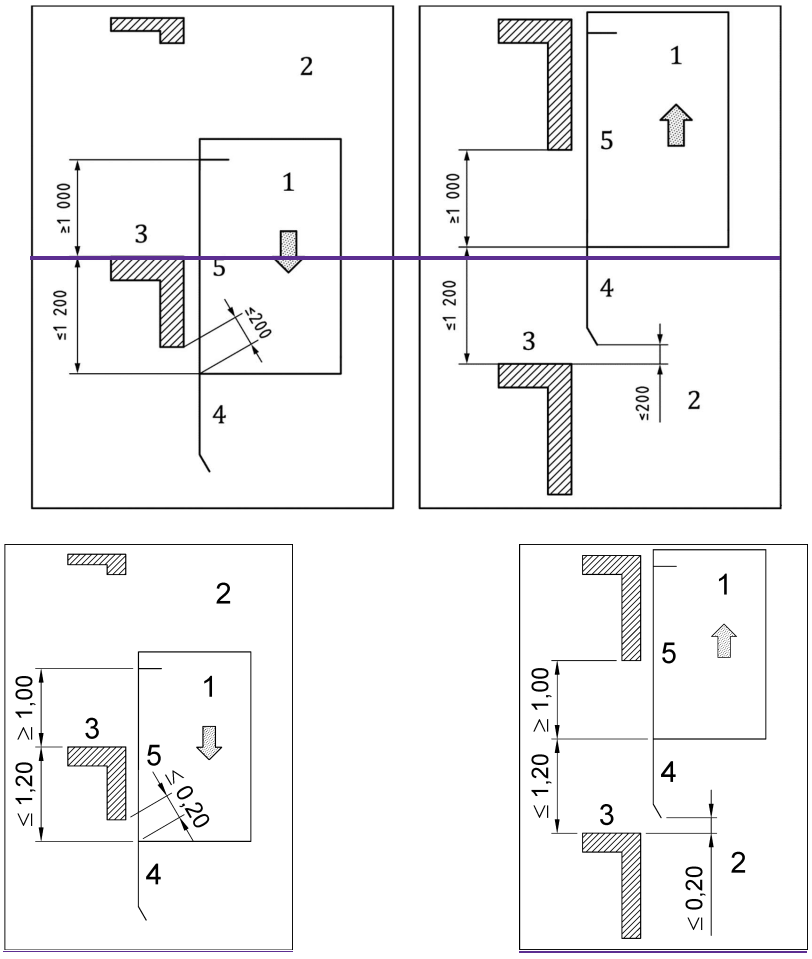
b) the vertical distance between the landing sill and the lowest part of the car apron shall not exceed 0,20 m;

c) ~~in case of enclosures according to 5.2.5.2.3,~~ the distance between the car sill and ~~the lowest part of~~ the wall of the well ~~well wall~~ facing the car entrance shall not exceed 0,20 m;

d) the vertical distance from the car sill to the landing door lintel, or from the landing sill to the car door lintel shall not be less than 1,00 m.

These values shall be obtained with any load in the car, up to 100 % of the rated load, moving away from a standstill position at landing level.

Dimensions in ~~milli~~metres



a) Downward movement

b) Upward movement

Key

1 Car
2 well
3 landing
4 car apron
5 car entrance

Figure 2031 — Unintended car movement — Downwards and upwards movement

~~5.6.7.6~~4.6.7.6 During the stopping phase, the stopping element of the means shall not allow a retardation of the car in excess of~~:~~

— 1,0 g_n for unintended movements in the upward direction with an empty car;

— the values accepted for devices protecting against free fall in the downward direction.

~~5.6.7.7~~4.6.7.7 The unintended movement of the car shall be detected by an electric safety device in conformity with ~~5.11.2~~4.11.2 at the latest when the car leaves the unlocking zone (~~5.3.8.1~~4.3.8.1).

~~5.6.7.8~~4.6.7.8 The means shall operate an electric safety device in conformity with ~~5.11.2~~4.11.2 if it is engaged.

NOTE This can be common to the switching device of ~~5.6.7.7~~4.6.7.7.

~~5.6.7.9~~4.6.7.9 When the means has been activated or the self-monitoring has indicated a failure of the stopping element of the means, ~~its release, or~~ ~~the reset of the lift~~the return of the lift to ~~service~~automatic operation~~,~~ shall require ~~the intervention of a competent maintenance person~~ ~~competent in maintenance procedures~~intentional reset by means on site (see 6.2.4 g)~~7.2.2 d)~~). A power cycle by itself shall not provide this reset.

~~5.6.7.10~~4.6.7.10 The release of the means shall not require access to the well. ~~persons to enter the well in order to access to the car or the counterweight or balancing weight.~~

~~5.6.7.11~~4.6.7.11 After its release, the means shall be in condition to operate.

~~5.6.7.12~~4.6.7.12 If any part of the means requires ~~external~~ energy other than guided compression springs to operate, the absence of energy shall cause the lift to stop and keep it stopped. ~~This does not apply for guided compression springs.~~

~~5.6.7.13~~4.6.7.13 The unintended car movement with open doors protection means ~~is regarded as a safety component and~~ shall be verified according to ~~the requirements in~~ ISO 8100-2:2023, ~~5.8~~4.8.

~~5.6.7.14~~4.6.7.14 A data plate shall be fixed on the unintended movement protection means, either for the complete system or subsystems in accordance with ISO 8100-2:2023, ~~5.8.1~~4.8.1, indicating:

a) the name of the manufacturer of the unintended movement protection means;

~~b) the type examination certificate number;~~

~~c)~~b) ~~the type~~identification of the unintended movement protection means.

Commented [IJ958]: See N1538

Commented [IJ959]: See N1538

Commented [SD960]: As per WG1 comments N1954

Commented [SGD961]: TFHAS
Return to service ?
Aligned according 5.6.6.7

Commented [IJ962]: As aligned with 5.6.6.6

Commented [SD963]: As per WG1 comments N2045

Commented [SD964]: As per WG1 comments N2045 under comment on clause 5.6.6 (text changes for 5.6.6.9 & 5.6.7.12)

Commented [SGD965]: TFHAS_105-v2

Commented [AD966]: TFHAS_74_v4, EU-C3, 5.3.9.1.13

~~4.6~~4.7 ~~5.7~~ Guide rails

~~4.6.1~~4.7.1 ~~5.7.1~~ Guiding of the car, counterweight or balancing weight

~~5.7.1.1~~4.7.1.1 The car, counterweight or balancing weight shall each be guided by at least two ~~rigid~~ steel guide rails.

~~5.7.1.2~~4.7.1.2 Guide rails for the car, and for the counterweight or balancing weight with safety gear shall be in accordance with ISO 8100-33:2022~~The guide rails shall be made of drawn steel, or the rubbing surfaces shall be machined~~.

~~5.7.1.3~~4.7.1.3 Guide rails for counterweights or balancing weights without safety gear shall be in accordance with ISO 8100-33:2022, or shall ~~may~~ be made of formed sheet metal ~~sheet~~. ~~They shall be protected against corrosion.~~

~~5.7.1.4~~4.7.1.4 The fixing of the guide rails to their brackets and to the building shall permit compensation, either automatically or by simple adjustment, of effects due to normal settling of the building or shrinkage of concrete.

A rotation of the attachments by which the guide rails can be released shall be prevented.

~~5.7.1.5~~4.7.1.5 For guide rail fixings containing non-metallic elements, the failure of these elements shall be taken into account for calculation of permissible deflections.

~~4.6.2~~4.7.2 ~~5.7.2~~ Permissible stresses and deflections

~~4.6.2.1~~4.7.2.1~~5.7.2.1~~ General provisions

~~5.7.2.1.1~~4.7.2.1.1 The guide rails, their joints and attachments shall withstand the ~~loads and~~ forces imposed on them in order to ensure a safe operation of the lift.

The aspects of safe operation of the lift concerning guide rails are:

a) guidance of the car, counterweight or balancing weight shall be assured;

b) deflections shall be limited to such an extent that, due to them:

   1) unintended unlocking of the doors shall not occur;

   2) operation of the safety devices shall not be affected; and

   3) collision of moving parts with other parts shall not be possible.

~~5.7.2.1.2~~4.7.2.1.2 The combination of deflections of guide rails and deflections of brackets, play in the guide shoes, ~~and~~ straightness of the guide rails and deflection of the building structure shall be taken into account in order to ensure safe operation of the lift. ~~See 0.4.2 negotiations and E.2~~

~~4.6.2.2~~4.7.2.2~~5.7.2.2~~ Load cases

The following load cases shall be considered:

— ~~normal operation —~~ running;
— ~~normal operation —~~ loading and unloading;
— safety device operation.

Commented [SD967]: As per WG1 comments N1954

Commented [AD968]: N2247

Commented [AD969]: editorial

Commented [AD970]: loads are forces and not masses

Commented [IJ971]: See N1556

Commented [SGD972]: TFHAS comment on 5.7.4.6

Commented [SD973]: Combined comments N2055 & N2175

NOTE ~~1~~ For each load case, a combination of forces can act on the guide rails (see ~~5.7.2.3.1~~4.7.2.3.1).

~~NOTE 2 Depending on the fixation of the guide rails (standing or hanging), the worst case is considered relevant for the safety device providing the force to the rail.~~

Commented [SD974]: As combined comments N2055

~~4.6.2.3~~4.7.2.3~~5.7.2.3~~ Forces on guide rails

~~5.7.2.3.1~~4.7.2.3.1 The following forces on guide rails shall be taken into account for calculation of permissible stresses and deflections of guide rails:

a) horizontal forces from guide shoes due to:

1) masses of the car and its rated load, compensation means, travelling cables, etc. or the counterweight/balancing weight, taking into consideration their suspension points and dynamic impact factors; and

2) wind loads in case of lifts outside a building with partially enclosed well;

b) vertical forces from:

1) braking forces of safety devices ~~gears and pawl devices fixed~~ on guide rails;

Commented [IJ975]: See N1555

2) auxiliary parts fixed on the guide rail;

3) weight of guide rail, and

4) push through forces of rail clips;

c) torques due to auxiliary equipment including dynamic impact factors.

~~5.7.2.3.2~~4.7.2.3.2 The acting point, *P*, of the masses of the empty car and components supported by the car, such as ram, part of travelling cable, compensation means ~~compensating ropes/chains~~ (if any) shall be the mass centre of gravity of them.

~~5.7.2.3.3~~4.7.2.3.3 The guiding forces of a counterweight~~, M_{cwt}~~ or balancing weight~~, M_{bwt}~~ shall be evaluated taking into account:

Commented [AD976]: M is a mass, not a force, this is not necessary here, formulae are explained elswhere

— the acting point of the mass;
— the suspension; and
— the forces due to compensation means ~~compensating ropes/chains~~ (if any), tensioned or not.

On a counterweight or balancing weight, centrally guided and suspended, an eccentricity of the acting point of the mass from the centre of gravity of the horizontal cross area of the counterweight or balancing weight of at least 5 % of the width and 10 % of the depth shall be taken into consideration.

Commented [SD977]: Undeleted text as per WG1 comments N1954

~~5.7.2.3.4~~4.7.2.3.4 In load cases ~~"normal use"~~ "running" and "safety device operation", the rated load, *Q*, of the car shall be evenly distributed over those three quarters of the car area ~~being in the most unfavourable position~~resulting in the highest horizontal forces.

~~However, i~~If different load distribution conditions are ~~intended after negotiations (0.4.2), additional~~resulting from the intended use, calculations shall be ~~made on the basis of this condition, and the worst case shall be considered~~based on these load distributions.

The braking force of safety devices shall be equally distributed on guide rails.

NOTE It is assumed that the safety devices operate simultaneously on the guide rails.

~~5.7.2.3.5~~4.7.2.3.5 The vertical force, F_v, of the car, counterweight or balancing weight resulting in compression or tension force shall be evaluated accordingly by using Formulae (8) to (11):

$$F_v = \frac{k_1 \cdot g_n \cdot M_{total}}{n} + N \quad (8)$$

Where N is:

For car, counterweight or balancing weight rails resting on the pit floor

$$N = (M_g \cdot g_n) + F_p \quad (9)$$

For car, counterweight or balancing weight rails freely hanging (~~no fixing point~~not resting on the pit floor, supported only by the brackets)

$$N = \frac{1}{3} \cdot \left((M_g \cdot g_n) + F_p\right) \quad (10)$$

~~For travel heights not exceeding 40 m and for buildings older than 10 years~~Push through force

$$F_p = n_b \cdot F_r \quad (11)$$

where

- M_{total} is the sum of *P* and *Q* for the car, or M_{cwt} for the counterweight, or M_{bwt} for the balancing weight, in kilograms;
- F_r is the push through force of all clips per bracket, in newtons;
- g_n is the standard acceleration of free fall (9,81 m/s^2);
- k_1 is the impact factor according to Table 17 (k_1 = 0 in the case of no safety device acting on guide rail);
- M_{bwt} is the mass of the balancing weight, in kilograms;
- M_{cwt} is the mass of the counterweight weight, in kilograms;
- M_g is the mass of one line of guide rails, in kilograms;
- n is the number of guide rail lines;
- n_b is the number of brackets for a guide rail line;
- P are the masses of the empty car and components supported by the car, i.e. part of the travelling cable, compensation means (if any), etc., in kilograms;
- Q is the rated load, in kilograms.

Commented [SD978]: Combined comments N2055 & N2175 (note the comments list (N2055) amended the text in N2175 for this clause 5.7.2.3.4)

Commented [SGD979]: TFHAS

Commented [SGD980]: TFHAS

Commented [SD982]: N2081

Commented [SD981]: Combined comments N2055

Commented [SD983]: N2055 & N 2201

Commented [SD984]: Combined comments N2055 & N 2201

Commented [IJ985]: See N1555 and 1557

For travel heights not exceeding 40 m and for buildings older than 10 years F_p may be taken as 0.

NOTE F_p depends on the way the guide rail is supported, the number of fixations, brackets and clip design. For small travels the effect of the settling of the building (not made of timber) is small and can be absorbed by the elasticity of the brackets. In this case the use of non-sliding clips is of common practice.

~~In the case of guides which are fixed in top of the well (hanging guides) the calculations shall include the tension from the hanging guide mass and safety gear application, and the forces which might be applied from other safety devices (such as upwards overspeed protection), and the push through forces from building shrinkage, some of which might be positive and/or negative.~~

~~$$F_v = \frac{k_1 \cdot g_n \cdot (P+Q)}{n} + (M_g \cdot g_n) + F_p$$ for the car (8)~~

~~$$F_v = \frac{k_1 \cdot g_n \cdot M_{cwt}}{n} + (M_g \cdot g_n) + F_p$$ for the counterweight (9)~~

~~$$F_v = \frac{k_1 \cdot g_n \cdot M_{bwt}}{n} + (M_g \cdot g_n) + F_p$$ for the balancing weight (10)~~

~~$$F_p = n_b \cdot F_r$$ in case of guide rails supported on the pit or hanging (fixed at the top of the well) (11)~~

~~$$F_p = \frac{1}{3} n_b \cdot F_r$$ in case of freely hanging guide rails (no fixing point) (12)~~

~~where~~

- ~~F_p is the push through forces of all brackets at one guide rail line (due to normal settling of the building or shrinkage of concrete), in newtons;~~
- ~~F_r is the push through force of all clips per bracket, in newtons;~~
- ~~g_n is the standard acceleration of free fall (9,81 m/s²);~~
- ~~k_1 is the impact factor according to Table 14 16 (k_1 = 0 in the case of no safety device acting on guide rail);~~
- ~~M_g is the mass of one line of guide rails, in kilograms;~~
- ~~nN is the number of guide rails lines;~~
- ~~n_b is the number of brackets for a guide rail line;~~
- ~~P are the masses of the empty car and components supported by the car, i.e. part of the travelling cable, compensation means compensating ropes/chains (if any), etc., in kilograms;~~
- ~~Q is the rated load, in kilograms;~~

~~NOTE F_p depends on the way the guide rail is supported, the number of fixations, brackets and clip design. For small travels, the effect of the settling of the building (not made of timber) is small and can be absorbed by the elasticity of the brackets. In this case, the use of non-sliding clips is common practice.~~

~~For travel heights not exceeding 40 m the force, Fp, may be ignored in the formula.~~ The design shall allow for adequate clearances above and/or below the guide rails depending on the fixation to allow for the shrinkage of the building.

Commented [SD986]: N2081

Commented [SD987]: Def of Fp has been deleted

Commented [SD988]: Combined comments N2055

Commented [IJ989]: See N1555 and 1557

Commented [AD990]: N2081

~~5.7.2.3.6~~4.7.2.3.6 While loading or unloading a car, a vertical force on the sill, F_s, is assumed to act centrally on the sill of the car entrance. The amount of the force applied on the sill shall be as Formulae (12) to (14):

$$F_S = 0{,}40 \cdot g_n \cdot Q \quad \text{for passenger lifts} \tag{12}$$

$$F_S = 0{,}60 \cdot g_n \cdot Q \quad \text{for goods passenger lifts} \tag{13}$$

$$F_S = 0{,}85 \cdot g_n \cdot Q \quad \text{for goods passenger lifts ~~in the case of heavy handling devices~~, if the weight of ~~the~~ handling devices is not included in the rated load} \tag{14}$$

NOTE 0,85 is based on the assumption of 0,6 × Q and half of the weight of the forklift truck, which— due to experience,— is not bigger than half the rated load: 0,6 + 0,5 × 0,5 = 0,85.

When applying the force on the sill, the car shall be regarded as empty. ~~For~~ At cars with more than one entrance, ~~the force on the sill needs to be applied at the most unfavourable entrance only~~the entrance on which the highest horizontal force is resulting from the sill load shall be considered.

When the car is at the landing and the guide shoes (top and bottom of car) are positioned within 10 % of the distance between the vertical guide rail brackets, the bending due to sill forces may be ignored.

~~5.7.2.3.7~~4.7.2.3.7 Forces and torques per guide rail due to auxiliary equipment fixed to the guide rail, ~~$M_{aux}F_{aux}$~~, shall be considered, except for overspeed governors and their associated parts, switches or positioning equipment.

If the lift machine or suspension means ~~rope suspensions~~ are fixed to the guide rails, additional load cases according to the Table 16 shall be considered.

~~5.7.2.3.8~~4.7.2.3.8 Windloads, WL, shall be considered with lifts outside a building with incomplete well enclosure, and determined by negotiation with the building designer ~~(0.4.2)~~.

~~4.6.3~~4.7.3 ~~5.7.3~~ Combination of ~~loads~~ masses and forces

The ~~loads~~ masses and forces and the load cases to be taken into consideration are shown in Table 16.

Table 16 — ~~Loads~~ Masses and forces to be taken into consideration in the different load cases

~~Load cases Loads and forces~~	P	Q	M_{cwt}/ M_{bwt}	F_s	F_p	M_g	~~$M_{aux}F$~~ $_{aux}$	WL
Running	x	x	x		x[a]	x	x	x
Loading + unloading	x			x	x[a]	x	x	x
Safety device operation	x	x	x		x[a]	x	x	

[a] See ~~5.7.2.3.5~~4.7.2.3.5.

NOTE ~~Load~~ Masses and forces may not act simultaneously.

~~4.6.4~~4.7.4 ~~5.7.4~~ Impact factors

~~4.6.4.1~~4.7.4.1 ~~5.7.4.1~~ Safety device operation

The impact factor due to safety device operation, k_1, (see Table 17) depends on the type of safety device.

Commented [SGD991]: TFHAS
What means [3)] at the end of the TFHAS comment?

Commented [SGD992]: TFHAS

Commented [AD993]: This is a force in Newtons, see also part 2

Commented [AD994]: TFHAS_74_v4 comment 5.6.2.2.3

Commented [AD995]: TFHAS_74_v4

Commented [AD996]: This is a force in Newtons, see also part 2

Commented [SD997]: N2055 & N 2175 combined left hand columns into one "load Cases"

~~4.6.4.2~~4.7.4.2~~5.7.4.2~~ ~~Normal operation~~Load case running

In the load case "~~normal operation,~~ running", the vertical moving masses of the car, $P + Q$, and counterweight/balancing weight, M_{cwt}/M_{bwt}, shall be multiplied by the impact factor, k_2, (see Table 17) to take into consideration hard braking due to electric safety device actuation or by an accidental interruption of the power supply.

~~4.6.4.3~~4.7.4.3~~5.7.4.3~~ Auxiliary parts fixed to the guide rail and/or other operational scenarios

The forces applied to the guide rails of the car, counterweight or balancing weight shall be multiplied with the impact factor, k_3, (see Table 17) to take into account the possible car, counterweight or balancing weight bounce when the car, counterweight/balancing weight is stopped by a safety device.

~~4.6.4.4~~4.7.4.4~~5.7.4.4~~ Values of impact factors

The values of the impact factors are given in Table 17.

Table 17 — Impact factors

Impact at	Impact factor	Value
Operation of instantaneous safety gear, not of the captive roller type	k_1	5
Operation of instantaneous safety gear, of the captive roller type or pawl device with energy accumulation type buffer or energy accumulation type buffer		3
Operation of progressive safety gear or pawl device with energy dissipation type buffer or energy dissipation type buffer		2
Rupture valve		2
Ascending car overspeed protection and unintended movement protection acting on the guide rail		(....) [a]
Running	k_2	1,2
Auxiliary parts fixed to the guide rail and other operational scenarios	k_3	(....)[a]

[a] The value ~~is~~ shall be determined ~~by the manufacturer~~ depending on the actual installation in consideration of static and dynamic conditions of the lift.

~~4.6.4.5~~4.7.4.5~~5.7.4.5~~ Permissible stresses

The permissible stresses shall be determined by Formula (15):

$$\sigma_{perm} = \frac{R_m}{S_t} \quad (15)$$

where

σ_{perm} is the permissible stress, in newtons per square millimetre;

R_m is the tensile strength of the guide rail material, in newtons per square millimetre;

S_t is the safety factor.

The safety factor shall be taken from Table 18.

Commented [SD998]: Combined comments N2055 & N2175

Commented [SD999]: Combined comments N2055 & N2175

Commented [IJ1000]: See N1555

Commented [SGD1001]: TFHAS

Commented [IJ1002]: See N1555

Commented [SGD1003]: TFHAS

Table 18 — Safety factors for guide rails

Load cases	Elongation (A_5)	Safety factor
~~Normal operation~~ Running and loading ~~/+~~ unloading	$A_5 > 12$ %	2,25
	8 % ≤ A_5 ≤ 12 %	3,75
Safety device operation	$A_5 > 12$ %	1,8
	8 % ≤ A_5 ≤ 12 %	3,0

~~The strength values shall be taken from the manufacturer.~~

Materials with elongations less than 8 % are regarded as too brittle and shall not be used.

~~4.6.4.6~~4.7.4.6~~5.7.4.6~~ Permissible deflections

For T-profile guide rails and their fixings (brackets, separation beams), the maximum calculated permissible deflections, δ_{perm}, are:

a) δ_{perm} = 5 mm in both directions for car, counterweight or balancing weight guide rails on which safety gears are operating;

b) δ_{perm} = 10 mm in both directions for guide rails of counterweight or balancing weight without safety gears.

~~a) δ_{perm} = 5 mm in both directions for load cases~~

~~1) 1) Normal operation - running of the car;~~

~~2) 1) Operation of the safety gear.~~

~~b) b) δ_{perm} = 10 mm in both directions for load cases~~

~~1) 1) normal operation – running of the counterweight or balancing weight;~~

~~2) 1) normal operation – loading and unloading;~~

~~3) 1) operation of the pawl device, the rupture valve and the buffer;~~

~~4) 1) other operational scenarios.~~

Commented [SD1004]: Combined comment N2055 & N2175

Commented [SGD1005]: TFHAS

Commented [IJ1006]: See N1556

Commented [SD1007]: As WG1 comments N2045 & Annex V

Commented [SD1008]: N2081

~~Any deflection of building structure shall be taken into account in respect of guide rail displacement. See 0.4.2 negotiations and E.2.~~

~~4.6.4.7~~4.7.4.7~~5.7.4.7~~ Calculation

Guide rails shall be calculated according to:

a) ISO 8100-2:2023, ~~5.10~~4.10; or

b) EN 1993-1-1:2006+A1:2014~~. In countries where EN 1993-1-1:2006+A1:2014 is not adopted, relevant national requirements shall apply~~; or

c) Finite Element Method (FEM).

Commented [SD1009]: Combined comments N2055

Commented [AD1010]: Not possible according ISO rules

4.74.85.8 Buffers

4.7.14.8.1 5.8.1 Car and counterweight buffers

5.8.1.14.8.1.1 Lifts shall be provided with buffers at the bottom limit of travel of the car and counterweight.

In the case of buffer(s) fixed to the car or the counterweight, the impact area(s) of the buffer(s) on the pit floor shall be made obvious by an obstacle(s) (pedestal) of a height not less than 300 mm.

An obstacle is not required for buffer(s) fixed to the counterweight where a screen according to 5.2.5.5.14.2.5.5.1 is extended to not more than 50 mm above the pit floor.

5.8.1.24.8.1.2 In addition to the requirements of 5.8.1.14.8.1.1, positive drive lifts shall be provided with buffers on the car top to function at the upper limit of travel.

5.8.1.34.8.1.3 For hydraulic lifts, when the buffer(s) of a pawl device is (are) used to limit the travel of the car at the bottom, the pedestal according to 5.8.1.14.8.1.1 is also required, unless the fixed stops of the pawl device are mounted on the car guide rails, and the car is not able to pass with pawl(s) retracted.

5.8.1.44.8.1.4 For hydraulic lifts, when buffers are fully compressed, the ram shall not hit the base of the cylinder.

This does not apply to devices ensuring re-synchronisation of telescopic cylinders, where at least one stage shall not hit its down travel mechanical limit.

5.8.1.54.8.1.5 Energy accumulation type buffers, with linear and non-linear characteristics, shall only be used if the rated speed of the lift does not exceed 1,00 m/s.

5.8.1.64.8.1.6 Energy dissipation type buffers can be used regardless of the rated speed of the lift.

5.8.1.74.8.1.7 The energy accumulation type buffers with non-linear characteristics and energy dissipation type buffers ~~are regarded as safety components and~~ shall be verified according to ~~the requirements in~~ ISO 8100-2:2023, ~~5.5~~4.5.

Commented [SGD1011]: TFHAS_105-v2

5.8.1.84.8.1.8 On the buffers other than those with linear characteristics (5.8.2.1.14.8.2.1.1), there shall be a data plate ~~showing~~indicating:

a) the name of the manufacturer of the buffer;

~~b) the type examination certificate number;~~

~~c)~~b) ~~the type~~identification of the buffer;

Commented [AD1012]: TFHAS_74_v4, EU-C3, 5.3.9.1.13

~~d)~~c) the type and designation of the liquid, in the case of hydraulic buffers.

~~4.7.2~~4.8.2 ~~5.8.2~~ Stroke of car and counterweight buffers

~~4.7.2.1~~4.8.2.1~~5.8.2.1~~ Energy accumulation type buffers

~~4.7.2.1.1~~4.8.2.1.1 ~~5.8.2.1.1~~ Buffers with linear characteristics

~~5.8.2.1.1.1~~4.8.2.1.1.1 The total possible stroke of the buffers shall be at least equal to twice the gravity stopping distance corresponding to 115 % of the rated speed: $(0{,}135v^2)$[4]. The stroke is expressed in metres.

However, the stroke shall not be less than 0,065 ~~m~~m.

Commented [AD1013]: Aligned with the text above

~~5.8.2.1.1.2~~4.8.2.1.1.2 Buffers shall be designed to cover the stroke defined in ~~5.8.2.1.1.1~~4.8.2.1.1.1 under a static load of between 2,5 times and 4 times the sum of the mass of the car and its rated load (or the mass of the counterweight).

~~4.7.2.1.2~~4.8.2.1.2 ~~5.8.2.1.2~~ Buffers with non-linear characteristics

~~5.8.2.1.2.1~~4.8.2.1.2.1 Energy accumulation type buffers with non-linear characteristics shall fulfil the following requirements when hitting the buffer(s) with the mass of the car and its rated load or of the counterweight, in case of free fall with a speed of 115 % of the rated speed:

a) the retardation according to ISO 8100-2:2023, ~~5.5.3.2.6.1~~ 4.5.3.2.6.1 a) shall not be more than 1,0 g_n;

b) the retardation of more than 2,5 g_n shall not be longer than 0,04 s;

c) the return speed of the car or the counterweight shall not exceed 1,00 m/s;

d) there shall be no permanent deformation after actuation;

e) the maximum peak retardation shall not exceed 6,0 g_n.

~~5.8.2.1.2.2~~4.8.2.1.2.2 The term "fully compressed", mentioned in Table 1 means a compression of 90 % of the installed buffer height, without considering fixation elements of the buffer, which can limit the compression to a lower value.

[4] $2 \cdot \frac{(1{,}15 \cdot v)^2}{2 \cdot g_n} = 0{,}134\,8 \times v^2$ rounded to $0{,}135v^2$.

~~4.7.2.2~~~~4~~.8.2.2~~5.8.2.2~~ **Energy dissipation type buffers**

~~5.8.2.2.1~~~~4~~.8.2.2.1 The total possible stroke of the buffers, being expressed in metres, shall be at least equal to the gravity stopping distance corresponding to:

a) 115 % of the rated speed: 0,067 4 × v^2. ~~The stroke is expressed in metres.~~or

b) ~~5.8.2.2.2 When the slowdown of lift at the ends of its travel is monitored according to 5.12.1.3, for rated speeds above 2,50 m/s,~~ the speed at which the car (or the counterweight) comes into contact with the buffers, ~~may be used instead of 115 % of the rated speed, when calculating the buffer stroke according to 5.8.2.2.1~~when the slowdown of the lift machine at the ends of its travel is monitored according to ~~5.12.1.3~~4.12.1.3. However, the stroke shall not be less than 0,42 m.

~~5.8.2.2.3~~~~2~~4.8.2.2.2 Energy dissipation type buffers shall fulfil the following requirements:

a) hitting the buffer with the mass of the car with its rated load, in case of free fall with a speed of 115 % of the rated speed or the reduced speed according to ~~5.8.2.2.2~~4.8.2.2.1 b), the average retardation shall not be more than 1,0 g_n;

b) retardation of more than 2,5 g_n shall not be longer than 0,04 s;

c) there shall be no permanent deformation after actuation.

~~5.8.2.2.4~~~~3~~4.8.2.2.3 The buffer shall be provided with~~normal operation of the lift shall depend on the return of the buffers to their normal extended position after operation. The device for checking this shall be~~ an electric safety device in conformity with ~~5.11.2~~4.11.2 , checking the normal extended position.

~~5.8.2.2.5~~~~4~~.8.2.2.4 Buffers, if hydraulic, shall be constructed so that the fluid level can ~~easily~~ be checked.

Commented [AD1014]: TFHAS_74_v4 comment 5.6.2.2.3

Commented [SGD1015]: TFHAS

Commented [SD1016]: Combined comments N2055 & N2175

Commented [SGD1017]: TFHAS

~~4.8~~4.9 ~~5.9~~ Lift machinery and associated equipment

~~4.8.1~~4.9.1 ~~5.9.1~~ General provision

~~5.9.1.1~~4.9.1.1 Each lift shall have at least one lift machine of its own.

Commented [AD1018]: TFHAS_74_v4 comment 5.6.2.2.3

~~5.9.1.2~~4.9.1.2 Effective protection shall be provided for accessible rotating parts of machinery, in particular:

a) keys and screws in the shafts;

b) tapes, chains, belts;

c) gears, sprockets and pulleys;

d) projecting motor shafts.

Exception is made for traction sheaves with protections according to ~~5.5.7~~4.5.7, hand winding wheels, brake drums and any similar smooth, round parts. Such parts shall be painted yellow, at least in part.

~~4.8.2~~4.9.2 ~~5.9.2~~ Lift machine for traction lifts and positive drive lifts

~~4.8.2.1~~4.9.2.1 ~~5.9.2.1~~ General provisions

~~5.9.2.1.1~~4.9.2.1.1 The following two methods of drive are permissible by:

a) traction (use of sheaves and ropes/belts);

b) positive drive, i.e. either:

1) use of a drum and ropes with a rated speed not exceeding 0,63 m/s, counterweights shall not be used, the use of a balancing weight is permitted; or

2) use of sprockets and chains with a rated speed not exceeding 0,63 m/s, counterweights shall not be used, the use of a balancing weight is permitted, or~~.~~

3) elastomeric coated timing belts with a rated speed not exceeding 1,00 m/s.

When calculating driving elements the possibility of the counterweight, balancing weight or the car resting on its buffers shall be taken into account.

Commented [SD1019]: Combined comments N2055

Commented [SD1020]: As WG1 comments & N2012

Commented [SD1021]: As WG1 comments & N2012

~~c) Elastomeric coated timing belts~~

Commented [SD1022]: Delete c) N2055 Combined comments

~~The rated speed shall not exceed 0,63 m/s. Counterweights shall not be used. The use of a balancing weight is permitted.~~

~~The calculations of the driving elements shall take into account the possibility of the counterweight or the car resting on its buffers.~~

~~5.9.2.1.2~~4.9.2.1.2 Use may be made of belts for coupling the motor or motors to the component on which the ~~electro-mechanical~~ machine brake (~~5.9.2.2.1.2~~4.9.2.2.1.2) operates. ~~In this case, a minimum of two belts shall be used.~~

Commented [SD1023]: N1976

~~4.8.2.24~~4.9.2.2~~5.9.2.2~~ **Braking system**

~~4.8.2.14~~4.9.2.2.1 ~~5.9.2.2.1~~ **General provisions**

~~5.9.2.2.1.14~~4.9.2.2.1.1 The lift shall be provided with a braking system which operates automatically in the event of loss of:

a) the ~~main power~~ supply to the drive control system;

b) the supply to control circuits.

~~5.9.2.2.1.24~~4.9.2.2.1.2 The braking system shall have a~~n~~ ~~electro-mechanical~~ friction type machine brake (~~5.9.2.2.24~~4.9.2.2.2) ~~(friction type)~~, but may, in addition, have other braking means (e.g. electric).

~~4.8.2.2.24~~4.9.2.2.2 ~~5.9.2.2.2~~ ~~**Electro-mechanical**~~**Machine brake**

~~5.9.2.2.2.14~~4.9.2.2.2.1 ~~This~~ The machine brake on its own shall be capable of stopping the lift machine when the car is travelling downwards at the rated speed and with the rated load plus 25 %. In these conditions, the average retardation of the car shall not exceed that resulting from operation of the safety gear or stopping on the buffer.

The brake ~~opening~~release shall be done either by electromagnets, or by hydraulic cylinders. All the mechanical components of the machine brake which take part in the application of the braking action on the braking surface and in the release of the brake including manual operation (see ~~5.9.2.3.14~~4.9.2.3.1) shall be installed at least in two sets. If one of the brake sets is not working due to failure of a component, a ~~sufficient braking effort~~ minimum braking torque shall be provided to decelerate, stop and hold the car travelling downwards at the rated speed and with the rated load plus 10% in the car, and upwards with an empty car~~, shall continue to be exercised~~. This minimum braking torque shall be ensured considering wear and tolerances.

Any electromagnet ~~solenoid~~ plunger, cylinder, valve and hydraulic filter is considered to be a mechanical part, any electromagnet ~~solenoid~~ coil is not.

In case of hydraulic cylinders ~~brake release~~ the following applies:

a) The operation of each brake set shall be performed by independent cylinders, valves and pressure release circuits. Valves shall be energized by means according to ~~5.9.2.2.2.34~~4.9.2.2.2.3. Valves shall release pressure from the cylinders when de-energized.

b) The hydraulic pressure source may be installed as a single set.

c) Hydraulic filters shall be used to prevent harmful contaminations effecting operation of cylinders and valves.

d) Hydraulic filters shall not cause the failure of the~~-~~ application of the braking action~~brake to release~~.

~~e) The correct lifting or dropping of the brake shall be monitored. If a failure is detected, the next normal start of the lift shall be prevented.~~

e) The hydraulic equipment shall be provided with means ~~protected~~ to prevent leaking oil penetrating the brake friction elements~~braking surface~~.

~~5.9.2.2.2.24~~4.9.2.2.2.2 The component on which the machine brake operates shall be coupled to the traction sheave or drum or sprocket by direct and positive mechanical means.

Commented [IJ1024]: See N1544

Commented [SD1025]: N1976

Commented [SD1026]: N1976

Commented [SD1027]: N1976

Commented [AD1028]: TFHAS_74_v4 comment 5.6.2.2.3

Commented [SD1029]: As WG1 comments N2045

Commented [SD1030]: Added by I Jones N1572 march 2019, now aligned with N2045

Commented [SD1031]: Combined comments (N2055 Rearranged into simple paragraph)

Commented [SD1032]: N1976

Commented [SD1033]: Changed ref due to N2192

Commented [SD1034]: As WG1 comments N2045

Commented [SD1035]: AS WG1 comments N2045 5.9.2.2.2.1

Commented [SD1036]: Combined comments N2055

Commented [SD1037]: As WG1 comments N2045

Commented [SD1038]: As WG1 comments N2045

Commented [SD1039]: As WG1 comments N2045

Commented [IJ1040]: See N1573

Commented [SD1041]: N1976

~~5.9.2.2.2.34~~.9.2.2.2.3 ~~To hold off, the~~ The release of the machine brake shall require a continuous flow of current, except as permitted by ~~5.9.2.2.2.7~~ ~~5.9.2.3.1~~4.9.2.3.1.

The following shall be met:

a) the interruption of this current, initiated by an electric safety device as required in ~~5.11.2.41~~.74.11.2.1.7, shall be made by one of the following means:

1) Safety circuit ~~satisfying~~according to ~~5.11.2.34~~.11.2.3, or~~two independent electromechanical devices according to 5.10.3.1, whether or not integral with those which cause interruption of the current feeding the lift machine;~~

~~If, while the lift is stationary, one of the electromechanical devices has not opened the brake circuit, any further movement of the car shall be prevented. Stuck-at failure of this monitoring function shall have the same result;~~

2) SIL-rated circuit according to ~~5.11.2.4~~4.11.2.4 fulfilling SIL3 requirements, with a hardware fault tolerance of at least 1 and PFH ≤ 2,5*10-8, or

3) directly by the electrical safety device, provided it is suitably rated electrically.

~~electrical circuit satisfying 5.11.2.3.~~

~~This means is regarded as a safety component and shall be verified according to the requirements in ISO 8100-2:2019, 5.6;~~

b) when the motor of the lift is likely to function as a generator, it shall not be possible for the electric device operating the machine brake to be fed directly by the motor;

c) braking shall become effective ~~without supplementary delay~~ after opening of the brake release circuit without a delay in addition to those of passive acting electrical component (e.g. diode, capacitor or varistors) that reduces sparking;

~~NOTE A passive acting electrical component that reduces sparking (e.g. diode, capacitor or varistors) is not considered as a means of delay.~~

d) operation of an overload and/or over current protective device (if any) for the ~~electro-mechanical~~ machine brake shall initiate the simultaneous de-energization of the lift machine;

e) current shall not be applied to the machine brake until the motor has been powered except during manual emergency operation or automatic rescue operation;

f) where the machine brake is part of the means to stop the car according to ~~5.6.64~~.6.6 or ~~5.6.74~~.6.7, a separate means in addition to a) shall be used to control the brake current during automatic operation;

g) The release of each brake set of the machine brake shall be monitored. If a failure is detected, car and landing doors shall be closed, and further movement of the car in automatic operation shall be prevented. If a failure is detected during movement, the next start of the lift in automatic operation shall be prevented. Failure to continuous "0" or "1" state of this monitoring function shall have the same result.

~~5.9.2.2.2.44~~.9.2.2.2.4 The brake shoe or pad pressure shall be exerted by guided compression springs or weights.

~~5.9.2.2.2.54~~.9.2.2.2.5 Band brakes shall not be used.

Commented [SD1042]: AS WG1 comments N2045
Commented [SD1043]: N1976
Commented [SD1044]: Updated ref due to changes from N2192
Commented [IJ1045]: See N1722
Commented [SD1046]: N1976
Commented [AD1047]: TFHAS_74_v4 comment 5.9.2.2.2.3 c)
Commented [SD1048]: N1976
Commented [AD1049]: TFHAS_74_v4 comment 5.6.2.2.3
Commented [SD1050]: Change made in line with N1976
Commented [IJ1051]: See N1544
Commented [SD1052]: N1976
Commented [SD1053]: As per WG1 comments N1954
Commented [SD1054]: Combined comments N2055 & N2175
Commented [IJ1055]: See N1722
Commented [SD1056]: Combined comments N2055 change stuck-at failure to failure to continuous "0" or "1" state
Commented [SD1057]: As per WG1 comments N1954
Commented [SD1058]: Combined comments N2055 & N2175

~~5.9.2.2.2.64~~4.9.2.2.2.6 Brake linings shall be incombustible.

~~5.9.2.2.2.74~~4.9.2.2.2.7 ~~The machine shall be capable of having the brake released by a continuous manual operation which is protected against involuntary action. The operation can be mechanical (e.g. lever) or electrical, powered by an automatically rechargeable emergency supply.~~

~~In case of hydraulically opened brakes, the brake release shall be either mechanical (e.g. by lever), or by a hand pump. In case of a hand pump, the valve used to release the brakes shall require continuous manual operation to release the brakes. Removal of the manual force shall immediately cause the brakes to engage. These valves shall be operated either mechanically or electrically powered by an automatically rechargeable emergency supply.~~

~~The emergency supply shall be sufficient to move the car to a landing, taking into consideration other equipment connected to this supply and the time taken to respond to emergency situations.~~

~~A failure of the release of the manual operation shall not cause a failure of the braking function. Additionally, for electrical operation if one fault combined with a second fault can lead to a dangerous situation, normal operation of the lift shall be prevented after occurrence of the first fault.~~

It shall be possible to test each brake set independently from outside of the well.

~~5.9.2.2.2.8 Information for use and corresponding warnings, particularly for reduced stroke buffer, shall be fixed on, or near, means to operate the machine brake manually.~~

~~5.9.2.2.2.9~~

~~With the car loaded from (see Formula 17):~~

~~0% of rated load to (q – 0,1) Q and from (q + 0,1) Q to 100% of rated load (1817)~~

~~where~~

- ~~*q* is the balance factor indicating the amount of counterbalance of the rated load by the counterweight;~~
- ~~*Q* is the rated load.~~

Commented [IJ1059]: See N1722

Commented [IJ1060]: See N1573

Commented [SD1061]: Combined comments N2055 & N2175

Commented [IJ1062]: See N1722

Commented [SD1063]: N2055 & N2192 Text Moved to 5.9.2.3.1

Commented [SD1064]: N2055 & N2192 moved text to 5.9.2.3.2

Commented [IJ1065]: See N1538

Commented [GE1066]: INT 001

~~It shall be possible to move the car to an adjacent floor by either:~~

~~a) natural movement due to gravity; or~~

~~b) manual operation consisting of:~~

~~1) mechanical means, present on site; or~~

~~2) electrical means, powered by supply independent from the mains, present on site.~~

~~5.9.2.2.2.8~~4.9.2.2.2.8 The machine brake shall be monitored by one of the following means:

a) the maximum wear of the brake lining material shall be detected;

b) automatic braking torque verification at least once every 24 hours of automatic operation. Monitoring shall verify that in case of failure of any single brake set the remaining brake sets are able to hold the rated load + 10% in the car at the landing;

If a failure is detected, the car and landing doors shall be closed, and the start of the lift in automatic operation shall be prevented. Failure to continuous "0" or "1" state of this monitoring function shall have the same result.

Commented [SD1067]: N2055 & N2192 Moved text to 5.9.2.3.3

Commented [SD1068]: Updated ref due to changes from N2192

Commented [SD1069]: Combined comments N2055 (new text)

Commented [SD1070]: Combined commentsN2055 ('braking force' to 'braking torque')

Commented [SD1071]: Combined comments N2055

Commented [SD1072]: Combined comments N2055 & N2175

Commented [SD1073]: Combined comments N2055 (change stuck-at Failure to failure to continuous "0" or "1" state)

Commented [SD1074]: As WG1 comments N2045

~~4.8.2.3~~4.9.2.3~~5.9.2.3~~ Emergency operation

~~5.9.2.3.1~~4~~.9.2.3.1~~ The lift machine shall be capable of having the brake released by a continuous manual operation which is protected against involuntary action. The operation can be mechanical (e.g. lever) or electrical, powered by an automatically rechargeable emergency supply.

In case of hydraulically opened brakes, the brake release shall be either mechanical (e.g. by lever), or by a hand pump. In case of a hand pump, the valve used to release the brakes shall require continuous manual operation to release the brakes. Removal of the manual force shall immediately cause the brakes to engage. These valves shall be operated either mechanically or electrically powered by an automatically rechargeable emergency supply.

The emergency supply shall ~~be sufficient~~have a capacity to hold the brake open allowing ~~to move~~ the car to reach a landing, taking into consideration other equipment connected to this supply and the time taken to respond to emergency situations.

A failure of the release of the manual operation shall not cause a failure of the braking function. Additionally for electrical operation if one fault combined with a second fault can lead to a dangerous situation, automatic operation, inspection operation or emergency ~~power~~electrical operation of the lift shall be prevented after occurrence of the first fault.

~~5.9.2.3.2~~4~~.9.2.3.2~~ The ~~rescue~~ instructions for emergency operation [see 6.2.5 a)] shall be fixed on or near means to operate the machine brake manually. In the case of reduced stroke buffer, the warning sign according to ISO 7010:2019 W001 supplemented with the text “Reduced Stroke Buffer!” (see Figure 32) shall be fixed on the same location.~~Information for use and corresponding warnings, particularly for reduced stroke buffer, shall be fixed on, or near, means to operate the machine brake manually.~~

Reduced Stroke Buffer!

Figure 32 — Warning sign for reduced stroke buffer

~~5.9.2.3.3~~4~~.9.2.3.3~~ With the machine brake manually released and the car loaded from, see Formula (16):

0% of rated load to (q – 0,1) Q and from (q + 0,1) Q to 100% of rated load (16)

where

q is the balance factor indicating the amount of counterbalance of the rated load by the counterweight;

Q is the rated load.

Commented [AD1075]: TFHAS_74_v4 comment 5.6.2.2.3

Commented [IJ1076]: See N1722

Commented [IJ1077]: See N1573

Commented [AD1078]: TFHAS_74_v4 comment 5.9.2.2.2.7

Commented [AD1079]: Error found by AH6

Commented [SD1080]: Combined comments N2055 & N2175

Commented [IJ1081]: See N1722

Commented [SD1082]: N2055 & N2192 Text moved from 5.9.2.2.2.7 to here

Commented [AD1083]: TFHAS_74_v4 comment 5.9.2.2.2.8

Commented [SD1084]: As per WG1 Comments N1954

Commented [IJ1085]: See N1538

Commented [GE1086]: INT 001

It shall be possible to move the car to an adjacent floor by either:

a) natural movement due to gravity; or

b) manual operation consisting of:

1) mechanical means, present on site; or

2) electrical means, powered by supply independent from the main power supply, present on site.

~~5.9.2.3.4~~4.9.2.3.4 Where a means of emergency operation is required [see ~~5.9.2.3.3~~2.2.94.9.2.3.3 b)], it shall consist of either:

a) a mechanical means, where the manual effort to move the car to a landing does not exceed 150 N, which complies with the following:

1) if the means for moving the car can be driven by the lift moving, then it shall be a smooth, spokeless wheel;

2) if the means is removable, it shall be located ~~in an easily accessible place~~ in the machinery space. In the case of more than one lift machine in the machinery space and where the means fits only to a particular machine, ~~I~~it shall be ~~suitably~~ marked to identify ~~if there is any risk of confusion as to~~ the lift machine for which it is intended;

3) if the means is removable or can be disengaged from the lift machine, an electric safety device in conformity with ~~5.11.2~~4.11.2 shall be actuated, at the latest when the means is about to be coupled with the lift machine; or

b) an electrical means which complies with the following:

1) the power supply shall be able to move the car with any load to an adjacent landing within 1 h after a breakdown;

2) the speed shall be not ~~greater than~~exceed 0,30 m/s.

~~5.9.2.3.2~~4.9.2.3.5 It shall be possible to check ~~easily~~ whether the car is in an unlocking zone. See also ~~5.2.6.6.2~~4.2.6.6.2 c).

~~5.9.2.3.6~~4.9.2.3.6 If the manual effort to move the car in the upward~~s~~ direction with its rated load ~~is greater than~~exceeds 400 N, or if no mechanical means defined in ~~5.9.2.3.4~~4.9.2.3.4 a) is provided, a means of emergency electrical operation shall be provided in accordance with ~~5.12.1.6~~4.12.1.6.

~~5.9.2.3.7~~4.9.2.3.7 The means to actuate the emergency operation shall be located:

— in the machine room (~~5.2.6.3~~4.2.6.3);

— in the machinery cabinet (~~5.2.6.5.1~~4.2.6.5.1); or

— on the emergency and tests panel(s) (~~5.2.6.6~~4.2.6.6).

~~5.9.2.3.5~~4.9.2.3.8 If a hand winding wheel is provided for emergency operation, the direction of movement of the car shall be clearly indicated on the lift machine, close to the hand winding wheel.

If the wheel is not removable, the indication may be on the wheel itself.

Commented [SD1087]: Combined comments N2055

Commented [SD1088]: N2055 & N2192 Text moved from 5.9.2.2.2.9

Commented [IJ1089]: Already corrected by ISO

Commented [SD1090]: Updated ref due to changes from N2192

Commented [AD1091]: TFHAS_74_v4 comment 5.6.2.2.3

Commented [AD1092]: TFHAS_74_v4 comment 5.9.2.3.1

Commented [AD1093]: TFHAS_74_v4 comment 5.6.2.2.3

Commented [AD1094]: TFHAS_74_v4 comment 5.6.2.2.3

Commented [AD1095]: TFHAS_74_v4 comment 5.9.2.3.2

Commented [SD1096]: Updated due to changes from N2192

Commented [AD1097]: TFHAS_74_v4 comment 5.6.2.2.3

~~5.9.2.3.9~~4.9.2.3.9 With the machine brake manually released, the car speed shall be limited to the speed for which the buffers are designed, unless there is direct visual observation of the lift machine, or display device(s) according to ~~5.2.6.6.2~~ 4.2.6.6.2 c) are available.

Commented [AD1098]: TFHAS_74_v4 comment 5.6.2.2.3

Commented [SD1099]: Combined comments N2055 (add and delete 5.6.6.1 b))

Commented [SD1100R1099]: Updated clause number to due to changes in N2192

~~4.8.2.4~~4.9.2.4~~5.9.2.4~~ Speed

The speed of the car, half loaded, in upwards and downwards motion, in mid-travel, excluding all acceleration and retardation periods, shall not exceed the rated speed by more than 5 %, when the supply is at its rated frequency, and the motor voltage is equal to the rated voltage of the equipment.

NOTE It is good practice that, in the above conditions, the speed is not lower than a value 8 % below the rated speed.

This tolerance is also applicable for the speed in the case of:

a) levelling [~~5.12.1.4~~4.12.1.4 c)];

b) re-levelling [~~5.12.1.4~~4.12.1.4 d)];

c) inspection operation [~~5.12.1.5.2.1~~4.12.1.5.2.1 e) ~~and~~, ~~5.12.1.5.2.1~~4.12.1.5.2.1 f) and 4.12.1.5.2.1 g)];

d) emergency electrical operation [~~5.12.1.6.1~~4.12.1.6.1 f)].

~~4.8.2.5~~4.9.2.5~~5.9.2.5~~ Removing the power which can cause rotation of the motor

~~4.8.2.5.1~~4.9.2.5.1 ~~5.9.2.5.1~~ General

The removal of power which can cause rotation of the motor, initiated by an electric safety device, as required by ~~5.11.2.4~~1.7~~4~~.11.2.1.7, shall be controlled as detailed below.

~~4.8.2.5.2~~4.9.2.5.2 ~~5.9.2.5.2~~ Motors supplied directly from A.C. or D.C. mains by contactors

The supply shall be interrupted by two independent contactors, the contacts of which shall be in series in the supply circuit. If, while the lift is stationary, one of the contactors has not opened the main contacts, further movement of the car shall be prevented at the latest at the next change in the direction of motion.

~~Stuck-at failure~~ Failure to continuous "0" or "1" state of this monitoring function shall have the same result.

Commented [SD1101]: Combined comments N2055 change stuck-at failure to failure to continuous "0" or "1" state

~~4.8.2.5.3~~4.9.2.5.3 ~~5.9.2.5.3~~ Drive using a "Ward-Leonard" system

~~4.8.2.5.3.1~~4.9.2.5.3.1 ~~5.9.2.5.3.1~~ Excitation of the generator supplied by classical elements

Two independent contactors shall interrupt:

a) the motor generator loop;

b) the excitation of the generator; or

c) one the loop and the other the excitation of the generator.

If, while the lift is stationary, one of the contactors has not opened the main contacts, further movement of the car shall be prevented, at the latest at the next change in direction of motion. ~~Stuck-at failure~~ Failure to continuous "0" or "1" state of this monitoring function shall have the same result.

Commented [SD1102]: Combined comments N2055 (change Stuck-at Failure-to failure to continuous "0" or "1" state)

In cases b) and c), effective precautions shall be taken to prevent the rotation of the motor in the case of a residual field, if any, in the generator (e.g. suicide circuit).

~~4.8.2.5.3.2~~4.9.2.5.3.2 ~~5.9.2.5.3.2~~ Excitation of the generator supplied and controlled by static elements

One of the following methods shall be used:

a) the same methods as specified in ~~5.9.2.5.3.1~~4.9.2.5.3.1;

b) a system consisting of:

1) a contactor interrupting the excitation of the generator or the motor generator loop.

The coil of the contactor shall be released at least before each change in direction of motion. If the contactor does not release, any further movement of the lift shall be prevented. ~~Stuck-at failure~~ Failure to continuous "0" or "1" state of this monitoring function shall have the same result;

2) a control device blocking the flow of energy in the static elements; and

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

If, during a normal stopping period, the blocking by the static elements is not effective, the monitoring device shall cause the contactor to release and any further movement of the lift shall be prevented.

Effective precautions shall be taken to prevent the rotation of the motor in the case of a residual field, if any, in the generator (e.g. suicide circuit).

Commented [SD1103]: Combined comments N2055 change stuck-at failure to failure to continuous "0" or "1" state

~~4.8.2.5.4~~4.9.2.5.4 ~~5.9.2.5.4~~ A.C. or D.C. motor supplied and controlled by static elements

One of the following methods shall be used:

a) two independent contactors interrupting the current to the motor.

If, while the lift is stationary, one of the contactors has not opened the main contacts, any further movement shall be prevented, at the latest at the next change in direction of motion. Failure to continuous "0" or "1" state ~~Stuck-at failure~~ of this monitoring function shall have the same result;

b) a system consisting of:

1) a contactor interrupting the current at all poles.

The coil of the contactor shall be released at least before each change in direction. If the contactor does not release, any further movement of the lift shall be prevented. Failure to continuous "0" or "1" state ~~Stuck-at failure~~ of this monitoring function shall have the same result;

2) a control device blocking the flow of energy in the static elements; and

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

If, during a normal stopping period, the blocking of the flow of energy by the static elements is not effective, the monitoring device shall cause the contactor to release and any further movement of the lift shall be prevented;

c) ~~electrical~~ safety circuit ~~satisfying~~ according to ~~5.11.2.3~~4.11.2.3;

~~This means is regarded as a safety component and shall be verified according to the requirements in ISO 8100-2:2019~~2023~~, 5.6;~~

d) an adjustable speed electrical power drive system with a safe torque off (STO) function according to IEC 61800-5-2:2016, 4.2.3.2 fulfilling SIL3 requirements, with a hardware fault tolerance of at least 1 and PFH ≤ 2,5*10^{-8};

e) SIL-rated circuit according to ~~5.11.2.4~~4.11.2.4 fulfilling SIL3 requirements, with a hardware fault tolerance of at least 1 and PFH ≤ 2,5*10^{-8}.

~~4.8.2.6~~4.9.2.6 ~~5.9.2.6~~ Control devices and monitoring devices

Control devices according to ~~5.9.2.5.3.2~~4.9.2.5.3.2 b) 2) or ~~5.9.2.5.4~~4.9.2.5.4 b) 2), and monitoring devices according to ~~5.9.2.5.3.2~~4.9.2.5.3.2 b) 3) or ~~5.9.2.5.4~~4.9.2.5.4 b) 3) need not be safety circuits according to ~~5.11.2.3~~4.11.2.3 or ~~5.11.2.4~~4.11.2.4.

These devices shall only be used provided that the requirements of ~~5.11.1~~4.11.1 are met to achieve comparability to ~~5.9.2.5.4~~4.9.2.5.4 a).

Commented [SD1104]: Combined comments N2055 change stuck-at failure to failure to continuous "0" or "1" state

Commented [AD1105]: Use consistent wording

Commented [AD1106]: TFHAS_105, in addition it is removed because 5.11.2.3 itself requires verification, it shall be removed consistently

Commented [SD1107]: As per WG1 comments N1954

Commented [IJ1108]: See N1722

~~4.8.2.7~~4.9.2.7~~5.9.2.7~~ Motor run time limiter

~~5.9.2.7.1~~4.9.2.7.1 Traction drive lifts shall have a motor run time limiter causing the de-energizing of the lift machine, and keep it de-energized, if:

a) the ~~machine~~ motor does not rotate when a start is initiated;

b) the car/counterweight is stopped in downward~~s~~ movement by an obstacle ~~which causes the suspension means~~ropes to slip on the traction sheave.

~~5.9.2.7.2~~4.9.2.7.2 The motor run time limiter shall function in a time which does not exceed the smaller of the following two values:

a) 45 s;

b) time to travel the longest distance between adjacent floors ~~interfloor distance~~ at the intended motor running speed plus 10 seconds with a minimum of 20 s if the intended travel ~~for travelling the full travel in normal operation, plus 10 s, with a minimum of 20 s if the full travel~~ time is less than 10 s.

~~5.9.2.7.3~~4.9.2.7.3 The return of the lift to automatic ~~normal~~ operation shall require intentional reset by means on site [see 6.2.4 g)]~~only be possible by manual resetting by a competent maintenance person competent in maintenance procedures~~. On restoration of the power after a supply disconnection, maintaining the lift machine in the stopped position is not necessary.

~~5.9.2.7.4~~4.9.2.7.4 The motor run time limiter shall not affect the movement of the car under either the inspection operation or the emergency electrical operation.

~~4.8.3~~4.9.3 ~~5.9.3~~ Lift machine for hydraulic lifts

~~4.8.3.1~~4.9.3.1~~5.9.3.1~~ General provision

~~5.9.3.1.1~~4.9.3.1.1 The two following methods of drive are permissible:

a) direct acting;

b) indirect acting.

~~5.9.3.1.2~~4.9.3.1.2 In the case of multiple jacks, all the jacks shall be hydraulically connected in parallel, with similar characteristics such as length and number and type of bends in the pipe work, so that they all are lifting with the same pressure.

The structure of the car, car sling, guide rails and car guide shoes/rollers shall keep the car floor orientation and synchronize the movement of the rams, in any of the applicable loading conditions mentioned in ~~5.7.2.2~~4.7.2.2.

~~In order to equalize pressure within the cylinders, the pipe work from the manifold to each jack should be approximately equal in length and have similar characteristics, such as the number and type of bends in the pipe work.~~

~~5.9.3.1.3~~4.9.3.1.3 The mass of the balancing weight, if any, shall be calculated such that in case of rupture of the suspension gear (car/balancing weight), the pressure in the hydraulic system does not exceed two times the full load pressure.

In the case of several balancing weights, the rupture of only one suspension gear shall be taken into consideration for the calculation.

Commented [AD1109]: TFHAS_74_v4 comment 5.6.2.2.3

Commented [AD1110]: TFHAS_74_v4 comment 5.6.2.2.3

Commented [SD1111]: Combined comments N2055 (391)

Commented [SD1112]: As per WG1 comments N1954

Commented [IJ1113]: See N1544

Commented [SD1114]: Combined comments N2055 & N2175

Commented [IJ1115]: See N1538

Commented [AD1116]: TFHAS_110

Commented [AD1117]: TFHAS_74_v4 comment 5.6.2.2.3

Commented [AD1118]: TFHAS_74_v4

~~5.9.3.1.4 0.4.22~~ 4.9.3.1.4 The fluids used for the operation of hydraulic lifts shall be according to ISO 6743-4:2015.

Commented [SGD1119]: TFHAS comment on 0.4.22.

~~4.8.3.2~~4.9.3.2~~5.9.3.2~~ **Jack**

~~4.8.3.2.1~~4.9.3.2.1 ~~5.9.3.2.1~~ **Calculations of cylinder and ram**

~~4.8.3.2.1.1~~4.9.3.2.1.1 ~~5.9.3.2.1.1~~ **Pressure calculations**

The following shall be satisfied:

a) the cylinder and the ram shall be designed such that, under the forces resulting from a pressure equal to 2,3 times the full load pressure, a safety factor of at least 1,7, referred to the proof stress, $R_{P0,2}$, is assured;

b) for the calculation of the elements of telescopic jacks with hydraulic synchronizing means, the full load pressure shall be replaced by the highest pressure which occurs in an element due to the hydraulic synchronizing means;

It shall be taken into account that abnormally high pressure conditions can arise during installation, due to incorrect adjustment of the hydraulic synchronizing means;

c) in the thickness calculations, a value shall be added of 1,0 mm for cylinder walls and cylinder bases, and 0,5 mm for walls of hollow rams for single and telescopic jacks.

~~The dimensions and tolerances of the tubes used for the manufacture of the jack shall be according to the applicable standard of the EN 10305 series;~~

Commented [AD1120]: TFHAS_74_v4

d) the calculations shall be carried out according to ISO 8100-2:2023, ~~5.13~~15.14.15.1.

Commented [SD1121]: As per WG1 comments N1954

~~4.8.3.2.1.2~~4.9.3.2.1.2 ~~5.9.3.2.1.2~~ **Buckling calculations**

Jacks under compressive loads shall fulfil the following requirements:

a) they shall be designed such that, in their fully extended position and under the forces resulting from a pressure equal to 1,4 times full load pressure, a safety factor of at least two against buckling is assured;

b) the calculations shall be carried out according to ISO 8100-2:2023, ~~5.13~~15.24.15.2;

Commented [SD1122]: As per WG1 comments N1954

~~c) as a deviation from 5.9.3.2.1.2 b), more complex calculation methods may be used provided that at least the same safety factor is assured.~~

Commented [AD1123]: TFHAS_74_v4

~~4.8.3.2.1.3~~4.9.3.2.1.3 ~~5.9.3.2.1.3~~ **Tensile stress calculations**

Jacks under tensile loads shall be designed such that, under the forces resulting from a pressure equal to 1,4 times the full load pressure, a safety factor of at least 2, referred to the proof stress, $R_{P0,2}$, is assured.

~~4.8.3.2.2~~4.9.3.2.2 ~~5.9.3.2.2~~ **Connection car/ram (cylinder)**

~~5.9.3.2.2.1~~4.9.3.2.2.1 In case of a direct acting lift, the connection between the car and the ram (cylinder) shall be flexible.

~~5.9.3.2.2.2~~4.9.3.2.2.2 The connection between the car and the ram (cylinder) shall be constructed to support the weight of the ram (cylinder) and the additional dynamic forces. The connection means shall be secured.

~~5.9.3.2.2.3~~4.9.3.2.2.3 In case of a ram made with more than one section, the connections between the sections shall be constructed to support the weight of the suspended ram sections and the additional dynamic forces.

~~5.9.3.2.2.4~~4.9.3.2.2.4 In the case of indirect acting lifts, the head of the ram (cylinder) shall be guided.

This requirement does not apply for pulling jacks, provided that the pulling arrangement prevents bending forces on the ram.

~~5.9.3.2.2.5~~4.9.3.2.2.5 In the case of indirect acting lifts, no parts of the ram head guiding system shall be incorporated within the vertical projection of the car roof.

~~4.8.3.2.3~~4.9.3.2.3 ~~5.9.3.2.3~~ Limitation of the ram stroke

~~5.9.3.2.3.1~~4.9.3.2.3.1 Means shall be provided to stop the ram with buffered effect in such a position that the requirements of ~~5.2.5.7.1~~4.2.5.7.1 and ~~5.2.5.7.2~~4.2.5.7.2 can be satisfied.

~~5.9.3.2.3.2~~4.9.32.3.2 This limitation of stroke shall be either:

a) by means of a cushioned stop; or

b) effected by shutting off the hydraulic supply to the jack by means of a mechanical linkage between the jack and a hydraulic valve: breakage or stretch of such a linkage shall not result in the retardation of the car exceeding the value specified in ~~5.9.3.2.4.2~~4.9.3.2.4.2.

~~4.8.3.2.4~~4.9.3.2.4 ~~5.9.3.2.4~~ Cushioned stop

~~5.9.3.2.4.1~~4.9.3.2.4.1 This stop shall either:

a) be an integral part of the jack; or

b) consist of one or more devices external to the jack situated outside the ~~car~~ projection of the car, the resultant force of which is exerted on the centre line of the jack.

~~5.9.3.2.4.2~~4.9.3.2.4.2 The design of the cushioned stop shall be such that the average retardation of the car does not exceed 1,0 g_n and that, in case of an indirect acting lift, the retardation does not result in slack rope or chain.

~~5.9.3.2.4.3~~4.9.3.2.4.3 In cases ~~5.9.3.2.3.2~~4.9.3.2.3.2 b) and ~~5.9.3.2.4.1~~4.9.3.2.4.1 b), a stop shall be provided inside the jack to prevent the ram from leaving the cylinder.

In the case of ~~5.9.3.2.3.2~~4.9.3.2.3.2 b), this stop shall be positioned such that the requirements of ~~5.2.5.7.1~~4.2.5.7.1 and ~~5.2.5.7.2~~4.2.5.7.2 are also satisfied.

~~4.8.3.2.5~~4.9.3.2.5 ~~5.9.3.2.5~~ Means of protection

~~5.9.3.2.5.1~~4.9.3.2.5.1 If a jack extends into the ground, it shall be installed in a protective tube, sealed at its bottom end. ~~If it extends into other spaces, it shall be suitably protected equally or such spaces shall be protected as in the last paragraph of~~ 5.2.1.9 4.2.1.9.

~~5.9.3.2.5.2~~4.9.3.2.5.2 Leak and scrape fluid from the cylinder head shall be collected.

~~5.9.3.2.5.3~~4.9.3.2.5.3 The jack shall be provided with an air venting device.

Commented [SD1124]: Combined comments N2055 & N2173

Commented [AD1125]: Does not exist anymore.

Commented [AD1126]: TFHAS_74_v4

Commented [AD1127]: Is covered by new building annex

~~4.8.3.2.6~~4.9.3.2.6 ~~5.9.2.3.6~~ Telescopic jacks

The following requirements apply additionally:

~~5.9.3.2.6.1~~4.9.3.2.6.1 Stops shall be provided between successive sections to prevent the rams from leaving their respective cylinders.

~~5.9.3.2.6.2~~4.9.3.2.6.2 In the case of a jack below the car of a direct acting lift, when the car rests on its fully compressed buffers, the clear distance:

a) between the successive guiding yokes shall be at least 0,30 m; and

b) between the highest guiding yoke and the lowest parts of the car, within a horizontal distance of 0,30 m from the vertical projection of the yoke [parts mentioned in ~~5.2.5.8.2~~4.2.5.8.2 ~~ba~~) excluded] shall be at least 0,30 m.

Commented [IJ1128]: See N1537

NOTE See also ~~5.2.5.8.2~~4.2.5.8.2 d).

~~5.9.3.2.6.3~~4.9.3.2.6.3 The length of the bearing of each section of a telescopic jack without external guidance shall be at least 2 times the diameter of the respective ram.

~~5.9.3.2.6.4~~4.9.3.2.6.4 These jacks shall be provided with mechanical or hydraulic synchronizing means.

~~5.9.3.2.6.5~~4.9.3.2.6.5 When jacks with hydraulic synchronizing means are used, an electric device shall be provided to prevent a start for a normal journey when the pressure exceeds the full load pressure by more than 20 %.

~~5.9.3.2.6.6~~4.9.3.2.6.6 When ropes or chains are used as synchronizing means, the following requirements apply:

a) there shall be at least two independent ropes or chains;

b) the requirements of ~~5.5.7.1~~4.5.7.1 apply;

c) the safety factor shall be at least:

   1) 12 for ropes;

   2) 10 for chains.

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

Commented [SD1129]: Combined comments N2055

   For the calculation of the maximum force, the following shall be taken into consideration:

   — the force resulting from the full load pressure;

   — the number of ropes (or chains).

A device shall be provided which prevents the speed of the car in downward movement exceeding the rated speed downward, v_d, by more than 0,30 m/s in the event of failure of the synchronizing means.

~~4.8.3.3~~4.9.3.3~~5.9.3.3~~ Piping

~~4.8.3.3.1~~4.9.3.3.1 ~~5.9.3.3.1~~ General

~~5.9.3.3.1.1~~4.9.3.3.1.1 Piping and fittings which are subject to pressure (connections, valves, etc.) shall be:

a) appropriate to the hydraulic fluid used;

b) in accordance with ISO 4413:2010, 5.4.6.~~designed and installed in such a way as to avoid any abnormal stress due to fixing, torsion or vibration;~~

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

Commented [AD1130]: TFHAS_74_v4

~~5.9.3.3.1.2~~4.9.3.3.1.2 Pipes and fittings shall be ~~appropriately~~ fixed and shall be accessible for inspection.

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

~~No coupling shall be sited inside a ferrule.~~

~~NOTE National regulations can require identification and fire protection of hydraulic piping routed through the building.~~

Commented [AD1131]: TFHAS_74_v4

~~4.8.3.3.2~~4.9.3.3.2 ~~5.9.3.3.2~~ Rigid pipes

~~5.9.3.3.2.1~~4.9.3.3.2.1 Rigid pipes and fittings between cylinder and non-return valve or down direction valve(s) shall be designed such that, under the forces resulting from a pressure equal to 2,3 times the full load pressure, a safety factor of at least 1,7 referred to the proof stress, $R_{P0,2}$, is assured.

The calculations shall be carried out according to ISO 8100-2:2023, ~~5.13~~15.~~1.1~~4.15.1.1.

Commented [SD1132]: Corrected ref as per WG1 Comments N1954

~~The dimensions and tolerances of the tubes used for the manufacture of the rigid pipes shall be according to the applicable standard of the EN 10305 series.~~

~~In countries where the EN 10305 series of standards are not adopted, relevant national requirements shall apply.~~

Commented [AD1133]: TFHAS_74_v4

In the thickness calculations, a value shall be added of 1,0 mm for the connection between the cylinder and the rupture valve, if any, and 0,5 mm for the other rigid pipes.

~~5.9.3.3.2.2~~4.9.3.3.2.2 When telescopic jacks with more than 2 stages and hydraulic synchronizing means are used, an additional safety factor of 1,3 shall be taken into account for the calculation of the pipes and fittings between the rupture valve and the non-return valve or the down direction valve(s).

Pipes and fittings, if any, between the cylinder and the rupture valve shall be calculated on the same pressure basis as the cylinder.

~~4.8.3.3.3~~4.9.3.3.3 ~~5.9.3.3.3~~ Flexible hoses

~~5.9.3.3.3.1~~4.9.3.3.3.1 The flexible hose between cylinder and non-return valve or down direction valve shall be selected with a safety factor of at least 8~~, relating full load pressure and bursting pressure.~~as the ratio of bursting pressure to full load pressure.

~~5.9.3.3.3.24~~.9.3.3.3.2 The flexible hose and its couplings between cylinder and non-return valve or down direction valve shall withstand without damage a ~~pressure of five times the full load pressure. This test shall be carried out by the manufacturer of the hose assembly.~~test with a pressure of five times the full load pressure.

~~5.9.3.3.3.34~~.9.3.3.3.3 On the assembly mentioned in 4.9.3.3.3.2 the following information shall be indicated ~~The flexible hose shall be marked~~ in an indelible manner ~~with~~:

a) the name of the manufacturer or the trademark;

b) the test pressure;

c) the date of the test.

~~5.9.3.3.3.4 The flexible hose shall be fixed with a bending radius not less than that indicated by the hose manufacturer.~~

Commented [AD1134]: TFHAS_74_v4

~~4.8.3.44~~.9.3.4~~5.9.3.4~~ **Stopping the lift machine and checking its stopped condition**

Commented [AD1135]: TFHAS_74_v4 comment 5.6.2.2.3

~~4.8.3.4.14~~.9.3.4.1 ~~5.9.3.4.1~~ **General**

A stop of the lift machine initiated by an electric safety device, as required by ~~5.11.2.41.7~~4.11.2.1.7, shall be controlled as detailed below.

Commented [AD1136]: TFHAS_74_v4 comment 5.6.2.2.3

~~4.8.3.4.24~~.9.3.4.2 ~~5.9.3.4.2~~ **Upwards motion**

For upwards motion, either:

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

b) the supply to the electric motor shall be interrupted by one contactor, and the supply to the bypass valves (in accordance with ~~5.9.3.5.4.2~~4.9.3.5.4.2) shall be interrupted by at least two independent electromechanical devices connected in series in the supply circuit of these valves; or

In this case, the temperature monitoring device of the motor and/or the oil (~~5.9.3.11~~4.9.3.11, ~~5.10.4.3~~4.10.4.3, ~~5.10.4.4~~4.10.4.4) needs to act on a switching device other than this contactor in order to stop the lift machine~~.~~.

Commented [AD1137]: TFHAS_74_v4 comment 5.6.2.2.3

c) the electric motor shall be stopped by ~~an electrical~~ safety circuit ~~satisfying~~ according to ~~5.11.2.3~~4.11.2.3. ~~This means is regarded as a safety component and shall be verified according to the requirements in ISO 8100-2:2019~~2023, ~~5.6~~; or

Commented [AD1138]: Consistent wording

Commented [AD1139]: TFHAS_105, in addition it is removed because 5.11.2.3 itself requires verification, it shall be removed consistently
WG1 N1722

d) the electric motor shall be stopped by an adjustable speed electrical power drive system with a safe torque off (STO) function according to IEC 61800-5-2:2016, 4.2.2.2, fulfilling SIL3 requirements with a hardware fault tolerance of at least 1; or.

e) the electric motor shall be stopped by a SIL-rated circuit according to 4.11.2.4 fulfilling SIL3 requirements, with a hardware fault tolerance of at least 1 and PFH ≤ $2{,}5*10^{-8}$.

Commented [AD1140]: WG1 N1722

~~4.8.3.4.3~~4.9.3.4.3 ~~5.9.3.4.3~~ Downwards motion

For downwards motion, the supply to the down direction valve(s) shall be interrupted by one of the following means:

~~a) by at least two independent electromechanical devices according to 5.10.3.1, connected in series;~~

a) ~~b)~~ directly by the electric safety device, provided it is suitable rated electrically; or

b) ~~c) electrical~~ safety circuit ~~satisfying~~ according to ~~5.11.2.3~~4.11.2.3, or

~~b) This means is regarded as a safety component and shall be verified according to the requirements in ISO 8100-2:2019, 5.6.~~

c) SIL-rated circuit according to ~~5.11.2.4~~4.11.2.4 fulfilling SIL3 requirements with a hardware fault tolerance of at least 1 and PFH ≤ 2,5*10^{-8}.

~~4.8.3.4.4~~4.9.3.4.4 ~~5.9.3.4.4~~ Checking of the stopped condition

If, while the lift is stationary, one of the contactors [~~5.9.3.4.2~~4.9.3.4.2 a) or ~~5.9.3.4.2~~4.9.3.4.2 b)] has not opened the main contacts or if one of the electromechanical devices [~~5.9.3.4.2~~4.9.3.4.2 b) ~~or 5.9.3.4.3 a)~~] has not opened, a further start shall be prevented, at the latest at the next change in the direction of motion. A ~~stuck-at~~ failure to continuous "0" or "1" state of this monitoring function shall have the same result.

~~4.8.3.5~~4.9.3.5 ~~5.9.3.5~~ Hydraulic control and safety devices

~~4.8.3.5.1~~4.9.3.5.1 ~~5.9.3.5.1~~ Shut-off valve

~~5.9.3.5.1.1~~4.9.3.5.1.1 A shut-off valve shall be provided. It shall be installed in the circuit which connects the cylinder(s) to the non-return valve and the down direction valve(s).

~~5.9.3.5.1.2~~4.9.3.5.1.2 It shall be located ~~close to the other valves~~ on the lift machine.

~~4.8.3.5.2~~4.9.3.5.2 ~~5.9.3.5.2~~ Non-return valve

~~5.9.3.5.2.1~~4.9.3.5.2.1 A non-return valve shall be provided. It shall be installed in the circuit between the pump(s) and the shut-off valve.

~~5.9.3.5.2.2~~4.9.3.5.2.2 The non-return valve shall be capable of holding the car with the rated load at any point when the supply pressure drops below the minimum operating pressure.

~~5.9.3.5.2.3~~4.9.3.5.2.3 The closing of the non-return valve shall be effected by the hydraulic pressure from the jack and by at least one guided compression spring and/or by gravity.

~~4.8.3.5.3~~4.9.3.5.3 ~~5.9.3.5.3~~ Pressure relief valve

~~5.9.3.5.3.1~~4.9.3.5.3.1 A pressure relief valve shall be provided. It shall be connected to the circuit between the pump(s) and the non-return valve. It shall not be possible to bypass the pressure relief valve with the exclusion of the hand pump(s). The hydraulic fluid shall be returned to the tank.

~~5.9.3.5.3.2~~4.9.3.5.3.2 The pressure relief valve shall be adjusted to limit the pressure to 140 % of the full load pressure. The limit shall not exceed 50 MPa.

Commented [AD1141]: WG1 N1722

Commented [AD1142]: Consistent wording

Commented [AD1143]: N1722

Commented [AD1144]: WG1 N1722

Commented [AD1145]: a) is deleted by N1722

Commented [SD1146]: Combined comments N2055 (Missing the word fault - In line with other comments on changing "stuck-at failure" to "failure to continuous "0" or "1" state")

Commented [AD1147]: TFHAS_74_v4

Commented [AD1148]: Removed from Scope, TFHAS_74_v4 Scope comments

~~5.9.3.5.3.3~~4.9.3.5.3.3 The pressure relief valve shall be adjusted to limit the pressure to:~~If necessary, due to high internal losses (head loss, friction), the pressure relief valve may be set to a greater value but not exceeding 170 % of the full load pressure. In this case, for the calculations of the hydraulic equipment (including jack), a fictitious full load pressure shall be used, equal to Formula (1917):~~

a) 140 % of the full load pressure, or

b) a greater selected pressure value not exceeding 170 % of full load pressure. In this case, for the calculations of the hydraulic equipment (including jack) a fictitious full load pressure shall be used, equal to:

$$p = \frac{p_1}{1{,}4} \qquad (1917)$$

Where:

p is the fictitious full load pressure

~~p_s~~ p_1 is the selected pressure setting.

In the buckling calculation, the over pressure factor of 1,4 shall then be replaced by a factor corresponding to the increased setting of the pressure relief valve.

~~4.8.3.5.4~~4.9.3.5.4 ~~5.9.3.5.4~~ **Direction valves**

~~4.8.3.5.4.1~~4.9.3.5.4.1 ~~5.9.3.5.4.1~~ **Down direction valves**

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

~~4.8.3.5.4.2~~4.9.3.5.4.2 ~~5.9.3.5.4.2~~ **Up direction valves**

If the stopping of the lift machine is effected in accordance with ~~5.9.3.4.2~~4.9.3.4.2 b), only bypass valves shall be used for this. They shall be closed electrically. Their opening shall be effected by the hydraulic pressure from the jack and by at least one guided compression spring per valve.

~~4.8.3.5.5~~4.9.3.5.5 ~~5.9.3.5.5~~ **Filters**

Filters ~~or similar devices~~ shall be installed in the circuit between:

a) the tank and the pump(s); and

b) the shut-off valve, the non-return valve(s) and the down direction valve(s).

The filter~~, or similar device,~~ between the shut-off valve, the non-return valve(s) and the down direction valve shall be accessible for inspection and maintenance.

~~4.8.3.6~~4.9.3.6~~5.9.3.6~~ **Checking the pressure**

~~5.9.3.6.1~~4.9.3.6.1 A pressure gauge shall be provided for indication of system pressure. It shall be connected to the circuit between the non-return valve or the down direction valve(s) and the shut-off valve.

Where a second non-return valve is used for unintended car movement protection (see ~~5.6.7~~4.6.7) then the pressure gauge shall be installed between that valve and the down direction valve(s) or the shut-off valve.

Commented [AD1149]: TFHAS_74_v4

Commented [AD1150]: TFHAS_74_v4 comment 5.6.2.2.3

Commented [AD1151]: TFHAS_74_v4

Commented [SD1152]: As per WG1 comments N1954

Commented [IJ1153]: See N1538

~~5.9.3.6.2~~4.9.3.6.2 A gauge shut-off valve shall be provided between the main circuit and the connection for the pressure gauge.

~~5.9.3.6.3~~4.9.3.6.3 The connection shall be provided with an internal thread of either M 20 × 1,5 or G 1/2".

~~4.8.3.7~~4.9.3.7~~5.9.3.7~~ Tank

The tank shall ~~be designed and constructed so that it is easy~~:

a) ~~a) be equipped with a fluid level indicator to check the level of the hydraulic fluid in the tank~~;

b) ~~b) allow complete draining to fill and drain.~~

The characteristics of the hydraulic fluid shall be indicated on the tank.

~~4.8.3.8~~4.9.3.8~~5.9.3.8~~ Speed

~~5.9.3.8.1~~4.9.3.8.1 The rated speed upward~~s~~, v_m, and downward~~s~~, v_d, shall not ~~be greater than~~exceed 1,0 0 m/s ~~[see 1.3 b)]~~.

~~5.9.3.8.2~~4.9.3.8.2 The speed of the empty car upward~~s~~ shall not exceed the rated speed upward~~s~~ by more than 8 %. The speed of the car with rated load downwards shall not exceed the rated speed downward~~s~~ by more than 8 %. In each case, this relates to the normal operating temperature of the hydraulic fluid.

For a journey in the upward direction, it is assumed that the supply is at its rated frequency and that the motor voltage is equal to the rated voltage of the equipment.

~~4.8.3.9~~4.9.3.9~~5.9.3.9~~ Emergency operation

~~4.8.3.9.1~~4.9.3.9.1 ~~5.9.3.9.1~~ Moving the car downwards

~~5.9.3.9.1.1~~4.9.3.9.1.1 The lift shall be provided with a manually operated emergency lowering valve allowing the car to be lowered to a level where the passengers can leave the car, even in the case of a power failure. It shall be located in the relevant machinery space:

— machine room (~~5.2.6.3~~4.2.6.3);
— machinery cabinet (~~5.2.6.5.1~~4.2.6.5.1);
— on the emergency and tests panel(s) (~~5.2.6.6~~4.2.6.6).

~~5.9.3.9.1.2~~4.9.3.9.1.2 The speed of the car shall not exceed 0,30 m/s.

~~5.9.3.9.1.3~~4.9.3.9.1.3 The operation of this valve shall require a continual manual force.

~~5.9.3.9.1.4~~4.9.3.91.4 This valve shall be protected against involuntary action.

~~5.9.3.9.1.5~~4.9.3.9.1.5 The emergency lowering valve shall not cause further sinking of the ram when the pressure falls below the minimum operating pressure ~~a value predetermined by the manufacturer~~.

In the case of indirect acting lifts where slack rope/chain can occur, manual operation of the valve shall not cause the sinking of the ram beyond that causing the slack rope/chain.

~~5.9.3.9.1.6~~4.9.3.9.1.6 There shall be a plate near the ~~manually operated~~ emergency lowering valve ~~for emergency downward movement,~~ stating:

"**Caution — Emergency lowering**".

Commented [AD1154]: TFHAS_74_v4

Commented [AD1155]: Not in the scope

Commented [AD1156]: TFHAS_74_v4

Commented [SD1157]: Combined comments N2055 & N2147

~~4.8.3.9.2~~4.9.3.9.2 ~~5.9.3.9.2~~ **Moving the car upwards**

~~5.9.3.9.2.1~~4.9.3.9.2.1 A hand pump which causes the car to move in the upward~~s~~ direction shall be permanently available for every hydraulic lift.

The hand pump shall be stored in the building where the lift is installed and shall be accessible only ~~to authorized persons~~by use of a key. Provisions for the connection of the pump shall be available at every lift machine.

Commented [AD1158]: TFHAS_74_v4

Where not permanently installed, clear indications on where the hand pump is located and how to properly connect it shall be available ~~to maintenance and rescue operators~~.

Commented [SD1159]: Combined comments N2055 & N2147

~~5.9.3.9.2.2~~4.9.3.9.2.2 The hand pump shall be connected to the circuit between the non-return valve or down direction valve(s) and the shut-off valve.

~~5.9.3.9.2.3~~4.9.3.9.2.3 The hand pump shall be equipped with a pressure relief valve limiting the pressure to 2,3 times the full load pressure.

~~5.9.3.9.2.4~~4.9.3.9.2.4 There shall be a plate near the hand pump ~~for emergency upward movement~~, stating:

Commented [SD1160]: Combined comments N2055 & N2147

"Caution — Emergency lifting".

~~4.8.3.9.3~~4.9.3.9.3 ~~5.9.3.9.3~~ **Checking of the car position**

If the lift serves more than two levels, it shall be possible to check whether the car is in an unlocking zone by a means independent of the power supply, from the relevant machinery space:

a) the machine room (~~5.2.6.3~~4.2.6.3);

b) the machinery cabinet (~~5.2.6.5.1~~4.2.6.5.1); or

c) the emergency and test panel(s) (~~5.2.6.6~~4.2.6.6) where the devices for emergency operation~~s~~ are fitted (~~5.9.3.9.1~~4.9.3.9.1 and ~~5.9.3.9.2~~4.9.3.9.2).

This requirement is not applicable to lifts which are fitted with a mechanical anti-creep device.

~~4.8.3.10~~4.9.3.10~~5.9.3.10~~ **Motor run time limiter**

~~5.9.3.10.1~~4.9.310.1 Hydraulic lifts shall have a motor run time limiter causing the de-energizing of the motor and keeping it de-energized if the motor does not rotate when a start is initiated, or the car does not move.

~~5.9.3.10.2~~4.9.3.10.2 The motor run time limiter shall function in a time which does not exceed the smaller of the following two values:

a) 45 s;

b) the time ~~for to travelling~~ the longest distance between adjacent floors at the intended motor running speed ~~full travel in normal operation~~ with rated load, plus 10 s, with a minimum of 20 s if the ~~full~~ intended travel time is less than 10 s.

Commented [SD1161]: As per WG1 comments N1954

~~5.9.3.10.3~~4.9.3.10.3 The return ~~to normal~~ automatic operation shall only be possible by manual resetting. On restoration of the power after a supply disconnection, maintaining the lift machine in the stopped position is not necessary.

Commented [SD1162]: Combined comments N2055 & N2175

Commented [AD1163]: TFHAS_74_v4 comment 5.6.2.2.3

~~5.9.3.10.4~~4.9.3.10.4 The motor run time limiter, even if tripped, shall not prevent the inspection operation (~~5.12.1.5~~4.12.1.5), the emergency electrical operation (~~5.12.1.6~~4.12.1.6),~~and~~ or the electrical anti-creep system (~~5.12.1.10~~4.12.1.10).

~~4.8.3.11~~4.9.3.11 ~~5.9.3.11~~ Protection against overheating of the hydraulic fluid

A temperature detecting device shall be provided. This device shall stop the lift machine and keep it stopped in accordance with ~~5.10.4.4~~4.10.4.4.

Commented [SD1164]: As per WG1 comments N1954 Also changed "and" to "'or' the electrical anti creep system"

Commented [AD1165]: TFHAS_74_v4 comment 5.6.2.2.3

4.94.10 5.10 Electric installations and appliances

4.9.14.10.1 5.10.1 General provisions

4.9.1.14.10.1.1 5.10.1.1 Limits of application

5.10.1.1.1 The requirements of this document relating to the installation and the constituent components of the electrical equipment apply to:

a) the main switch of the power circuit and dependent circuits;

b) the supply disconnecting device switch for the car lighting circuit and dependent circuits;

c) the well lighting and dependent circuits.

d) the supply disconnecting device for any other incoming source of supply d) the supply disconnecting device for any other incoming source of supply

The lift shall be considered as a whole, in the same way as a machine, with its built-in electrical equipment.

NOTE The national requirements relating to electricity supply circuits apply as far as the input terminals of the switches. They apply to the whole lighting and socket outlet circuits of the machine room and the pulley room.

5.10.1.1.2 The electrical equipment of the lift shall comply with the requirements of IEC 60204-1:20168, as referenced in Clause 5.

When no precise information is given, the electrical components and devices shall be:

a) suitable for their intended use;

b) in conformity with relevant IEC standards;

c) applied in accordance with the supplier's instructions.

5.10.1.1.34.10.1.1.1 The electromagnetic compatibility shall comply with the requirements of ISO 8102-1:2020 and ISO 8102-2:2021.

Control equipment according to 4.9.2.2.2.3 a) 1),5.9.2.2.2.34.9.2.2.2.3 a) 2), 5.9.2.5.44.9.2.5.4 c), 5.9.2.5.44.9.2.5.4 d), 4.9.2.5.4 e), 5.9.3.4.24.9.3.4.2 c), 5.9.3.4.24.9.3.4.2 d), 4.9.3.4.2 e), 4.9.3.4.3 b) and 5.9.3.4.34.9.3.4.3 c) shall also comply with the safety circuit immunity requirements of ISO 8102 2:2021.

5.10.1.1.44.10.1.1.2 Arrangement of electrical actuators shall be in accordance with IEC 61310-3:2007Electrical actuators shall be selected, mounted, and identified in accordance with relevant parts of EN 61310-3:2007IEC 61310-3.

5.10.1.1.54.10.1.1.3 All control gear (see IEC 60204-1:2016+A1:2021, 3.101.13) shall be mounted so as to facilitate its operation and maintenance from the front. Where access is required for regular maintenance or adjustment, the relevant devices shall be located between 0,40 m and 2,00 m above the working area. It is recommended that terminals be at least 0,20 m above the working area and be placed so that conductors and cables can easily be connected to them. These requirements are not applicable to control gear on the car roof.

Commented [IJ1166]: See N1544

Commented [AD1167]: TFHAS_74_v4

Commented [AD1168]: TFHAS_74_v4

Commented [AD1169]: N2204

Commented [IJ1170]: See N1541

Commented [AD1171]: TFHAS_74_v4

~~5.10.1.1.6~~4.10.1.1.4 Heat-emitting components (for example heat sinks, power resistors) shall be located so that the temperature of each component in the vicinity remains within the permitted limit.

~~Under normal operation,~~ In their normal operating conditions, the temperature of ~~directly~~ accessible ~~equipment~~ parts within arm's reach shall not exceed the limits given in Table 19~~IEC 60364-4-42:2010, 42.1 if not otherwise specified in relevant IEC product standard.~~.

Table 19 — Temperature limits ~~in normal service~~ for ~~directly~~ accessible ~~part~~equipment

Accessible parts[a] within arm's reach	Material of accessible surfaces	Maximum temperatures °C
~~Parts accessible to non-authorized persons~~Parts which are accessible without the use of a key	Metallic Non Metallic	55 65
Hand-held means of operation	Metallic Non-metallic	55 65
Parts intended to be touched but not hand-held	Metallic Non-metallic	70 80
Parts which need not be touched ~~for normal operation~~	Metallic ~~Non-metallic~~	80 ~~90~~
Parts located in the lift well or in the machine room, which do not need to be touched and which are marked with ~~symbol~~the warning sign ISO 7010:2019--W017	Non-metallic Metallic	100 110
NOTE 1 Source of temperature limits IEC 60364-4-42:2010+AMD1:2014, Table 42.1		
NOTE 2 Accessible part is a part which can be touched by means of the standard test finger (see IEC 60529:1989+AMD1:1999+AMD2:2013).		

~~Note: Source of temperature limits IEC 60364-4-42:2010 +AMD1:2014 Table 42.1~~

~~5.10.1.1.7~~4.10.1.1.5 Lift components that are capable of connectivity to external systems shall comply with the requirements of ISO 8102-20:2022.

Commented [SD1172]: As per WG1 comments Annex III N1954

Commented [KA1173]: Temperature limits copied from IEC 60364-4-42 in order to make ISO 8100-1 more readable.

Commented [AD1174]: TFHAS_74_v4, see new 5.2.1.1.1

Commented [SD1175]: As WG1 comments Annex III

Commented [SD1176]: As per WG1 comments Annex III N1954 does this need a reference where this definition comes from

Commented [SD1177]: Combined comments N2055 (should this be jointed test finger

Commented [SD1178]: Editorial Moved NOTE to inside table

Commented [SD1179]: Combined comments N2055

~~4.9.1.24~~.10.1.2 ~~5.10.1.2~~Protection against electric shock

~~4.9.1.2.14~~.10.1.2.1 ~~5.10.1.2.1~~ General

The protective measures shall comply with the provisions defined by IEC 60364-4-41:2005+AMD1:2017.

Enclosures that do not otherwise clearly show that they contain electrical equipment that can give rise to a risk of electric shock, shall be marked with the ~~graphical symbol~~warning sign ~~IEC 60417:2002 - 5036~~ISO 7010:2019, W012, with a minimum height of 25 mm on the enclosure door or cover, see Figure 33.~~Dangerous voltage:~~

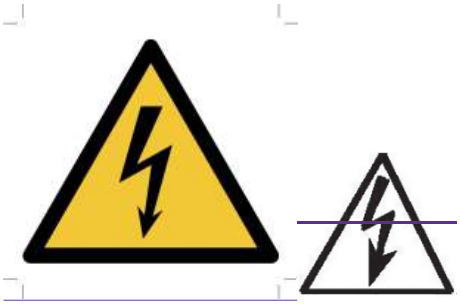


Figure 33 — ~~Symbol~~Warning sign ISO 7010:2019-W012

~~The warning sign shall be plainly visible on the enclosure door or cover.~~

~~4.9.1.2.24~~.10.1.2.2 ~~5.10.1.2.2~~ Basic protection (protection against direct contact)

In addition to the requirements of ~~5.10.1.2.14~~.10.1.2.1, the following applies:

a) in the lift well, machinery spaces and pulley rooms, protection of the electrical equipment against direct contact shall be provided by means of casings providing a degree of protection of at least IP2X (IEC 60529:1989+AMD1:1999+AMD2:2013);

b) when equipment is accessible ~~to non-authorized persons~~without the use of a key, a minimum degree of protection against direct contact corresponding to IP2XD (IEC 60529:1989+AMD1:1999+AMD2:2013) shall be applied;

c) when enclosures containing hazardous live parts are opened for emergency ~~rescue~~ operation~~s~~, access to hazardous voltage shall be prevented by minimum degree of protection of IPXXB (IEC 60529:1989+AMD1:1999+AMD2:2013).

~~d) d) for other enclosures containing hazardous live parts, EN 50274:20xx applies. In countries where EN 50274:20xx is not adopted, relevant national requirements shall apply.~~

Commented [AD1180]: TFHAS_74_v4 see new 5.2.1.1.1

Commented [SD1181]: Combined comments N2055 & N2147

Commented [KA1182]: Delete d) which was temporary solution for EN 81-20. Requirement is not anymore needed in "ISO world".

~~4.9.1.2.3~~4.10.1.2.3 ~~5.10.1.2.3~~ Additional protection

Additional protection by means of a residual current protective device (RCD) with a rated residual operating current not exceeding 30 mA shall be provided for:

a) socket outlets depending on the circuit(s) according to ~~5.10.1.1.1 b) and 5.10.1.1.1 c)~~4.10.7.2;

b) control circuits for landing controls and indicators and the safety chain with voltage higher than 50 V AC; and

c) circuits on the lift car with voltage higher than 50 V AC.

~~4.9.1.2.4~~4.10.1.2.4 ~~5.10.1.2.4~~ Protection against residual voltages

The provisions of IEC 60204-1:2016+A1:2021, 6.2.4 apply.

~~4.9.1.3~~4.10.1.3 ~~5.10.1.3~~Insulation resistance of the electrical installation ~~(IEC 60364-6:2016)~~

~~5.10.1.3.1~~4.10.1.3.1 The insulation resistance shall be measured between all live conductor and earth except for PELV and SELV circuits rated 100 VA or less.

Minimum values of insulation resistance shall be taken from Table 20.

NOTE: source IEC 60364-6:2016

Commented [AD1183]: TFHAS_74_v4

Table 20 — Insulation resistance

~~Nominal~~ Rated circuit voltage V	Test voltage (D.C.) V	Insulation resistance MΩ
SELV[a] and PELV[b] >100 VA	250	≥0,5
≤500 including FELV[c]	500	≥1,0
>500	1 000	≥1,0

[a] SELV: safety extra-low voltage.
[b] PELV: protective extra-low voltage.
[c] FELV: functional extra-low voltage.

Commented [SD1184]: N2055 combined comments

~~5.10.1.3.2~~4.10.1.3.2 The mean value (in direct current) or the Root Mean Square (r.m.s.) value (in alternating current) of the voltage between conductors, or between conductors and earth, shall not exceed 250 V for control and safety circuits.

Commented [SD1185]: As WG1 comments N2045

~~4.9.2~~4.10.2 ~~5.10.2~~ Incoming supply conductor terminations

The provisions of IEC 60204-1:2016+A1:2021, 5.1 and 5.2 apply.

~~4.9.3~~4.10.3 ~~5.10.3~~ Contactors, contactor relays, components of safety circuits

~~4.9.3.1~~4.10.3.1 ~~5.10.3.1~~Contactors and contactor relays

~~5.10.3.1.1~~4.10.3.1.1 The main contactors, i.e. those necessary to stop the lift machine as per ~~5.9.2.5~~4.9.2.5 and ~~5.9.3.4~~4.9.3.4, shall comply with IEC 60947-4-1:2018 and shall be selected according the appropriate utilization category.

Commented [AD1186]: TFHAS_74_v4 comment 5.6.2.2.3

The main contactors with their associated short-circuit protective devices shall have type "1" coordination in accordance with IEC 60947-4-1:2018, 8.2.5.1.

Main contactors directly controlling motors shall, in addition, allow 10 % of starting operations to be made as inching/jogging, i.e. 90 % AC-3 + 10 % AC-4.

These contactors shall have mirror contact(s) according to IEC 60947-4-1:2018, Annex F, in order to ensure the functionality according to ~~5.9.2.5.2~~4.9.2.5.2, ~~5.9.2.5.3.1~~4.9.2.5.3.1, ~~5.9.2.5.3.2~~4.9.2.5.3.2 b) 1), ~~5.9.2.5.4~~4.9.2.5.4 a) ~~and~~, 4.9.2.5.4 b) 1), ~~5.9.3.4.2 a) and b) and 5.9.3.4.3 a)~~and 4.9.3.4.4, i.e. detect the non-opening of a main contact.

~~5.10.3.1.2~~4.10.3.1.2 If contactor relays are used to operate the main contactors, those contactor relays shall comply with IEC 60947-5-1:2016.

If relays are used to operate the main contactors, those relays shall comply with IEC 61810-1:2015+AMD1:2019.

They shall be selected according to the following utilisation categories:

a) AC-15 for controlling A.C. contactors;

b) DC-13 for controlling D.C. contactors.

~~5.10.3.1.3~~4.10.3.1.3 For the main contactors referred to in ~~5.10.3.1.1~~4.10.3.1.1, the contactor relays and relays referred to in ~~5.10.3.1.2~~4.10.3.1.2 and the electrical devices interrupting the current to the machine brake according ~~5.9.2.2.2.3~~4.9.2.2.2.3, it is necessary for the measures taken to comply with ~~5.11.1.2~~4.11.1.2 f), g), h), i), that:

Commented [SD1187]: N1976

a) auxiliary contacts of main contactors are mechanically linked contact elements according to IEC 60947-5-1:2016, Annex L;

b) contactor relays comply with IEC 60947-5-1:2016, Annex L;

c) relays comply with IEC 61810-3:2015, in order to ensure that any make contact(s) and any break contact(s) cannot be in closed position simultaneously.

~~4.9.3.2~~4.10.3.2 ~~5.10.3.2~~Components of safety circuits

~~5.10.3.2.1~~4.10.3.2.1 When contactor relays or relays as per ~~5.10.3.1.2~~4.10.3.1.2 are used, the requirements of ~~5.10.3.1.3~~4.10.3.1.3 apply.

~~5.10.3.2.2~~4.10.3.2.2 Devices used in safety circuits or connected after electric safety devices ~~with regard to creepage distances and clearances with respect to the nominal voltage of the circuit where they are used (see IEC 60664-1),~~ shall meet the requirements of:

a) pollution degree 3;

b) overvoltage category III;

c) basic insulation;

with regard to creepage distances and clearances with respect to the rated voltage of the circuit where they are used.

NOTE Insulation coordination is explained in IEC 60664-1:2020.

If the protection of the device is IP5X (IEC 60529:1989+AMD1:1999+AMD2:2013) or better, pollution degree 2 may be used.

For the electrical separation of other circuits, IEC 60664-1:2020 applies in the same way as above with respect to the Root Mean Square (r.m.s) working voltage between adjacent circuits.

For protection against electric shock, see ~~5.10.1.2~~4.10.1.2.

For fault exclusion on printed circuit boards, requirements as mentioned in ISO 8100-2:2023, ~~5.15~~74.17, Table 4 (3.6) are applicable.

~~4.9.4~~4.10.4 ~~5.10.4~~ Protection of electrical equipment

~~5.10.4.1~~4.10.4.1For the protection of electrical equipment, IEC 60204-1:2016+A1:2021, 7.1 to 7.4 applies.

~~5.10.4.2~~4.10.4.2Protection of motors against overheating shall be provided for each motor.

NOTE According to IEC 60204-1:2016+A1:2021, 7.3.1, motors below 0,5 kW does not need to be provided with overheat protection. This exception, however, does not apply in this document.

~~5.10.4.3~~4.10.4.3If the design temperature of electrical equipment provided with temperature monitoring devices is exceeded, then the car shall stop at a landing so that the passengers can leave the car. The car shall not automatically return to automatic operation as long as the temperature monitoring device is tripped~~The return to automatic An automatic return-to-normal operation of the lift shall only occur after sufficient cooling down~~.

~~5.10.4.4~~4.10.4.4If the design temperature of the hydraulic lift machine pump motor and/or oil provided with a temperature monitoring device is exceeded, then the car shall stop directly and return to the bottom landing so that the passengers can leave the car. The car shall not automatically return to automatic operation as long as the temperature monitoring device is tripped ~~The return to automatic An automatic return-to-normal operation of the lift shall only occur after sufficient cooling down~~.

Commented [SD1188]: As per WG1 comments N1954 (split sentence)

Commented [SD1189]: N2055 change from 'nominal' to 'rated'

Commented [SD1190]: As per WG1 comments N1954

Commented [SD1191]: In line with WG1 comment for 5.10.1.3.2

Commented [KA1192]: Use terminology:
Failure analysis
Fault exclusion

Commented [IJ1193]: See N1722

Commented [AD1194]: TFHAS_74_v4

Commented [SD1195]: Combined comments N2055 & N2175

Commented [AD1196]: TFHAS_74_v4 comment 5.6.2.2.3

Commented [AD1197]: TFHAS_74_v4

Commented [SD1198]: Combined comments N2055 & N2175

~~4.9.5~~4.10.5 ~~5.10.5~~ Main switches

~~5.10.5.1~~4.10.5.1For each lift, a main switch capable of breaking the supply to the lift on all the live conductors shall be provided. This switch shall comply with the requirements of IEC 60204-1:2016+A1:2021, 5.3.2 a) to d) and 5.3.3.

~~5.10.5.1.1~~4.10.5.1.1 This switch shall not cut the circuits feeding:

a) the car's lighting and ventilation;

b) the socket outlet on the car roof;

c) the lighting of machinery spaces and pulley rooms;

d) the socket outlet in the machinery spaces, pulley rooms and in the pit;

e) the lighting of the well.

~~5.10.5.1.2~~4.10.5.1.2 This switch shall be located:

a) in the machine room, where it exists;

b) where no machine room exists, in the control cabinet, except if this cabinet is mounted in the well, or

c) at the emergency and tests panel(s) (~~5.2.6.6~~4.2.6.6) when the control cabinet is mounted in the well. If the emergency panel is separate from the test panel, the switch shall be at the emergency panel.

~~If the main switch is not directly accessible from the control cabinet(s), the drive control system or the lift machine, device(s) according to IEC 60204-1:2006~~20182016~~, 5.5 shall be provided at these locations.~~

~~5.10.5.1.3~~4.10.5.1.3 Where the main switch is not accessible without obstruction from the locations of the following components:

— the control cabinet(s);

— the drive control system;

— the lift machine,

a device according to IEC 60204-1:2016+A1:2021, 5.5 shall be provided at the location of that component.

Commented [SD1199]: N2055 combined comments

Commented [SD1200]: Combined comments N2055

Commented [SD1201]: Removed the word 'these' N2055 combined comments

Commented [SD1202]: As WG1 comments N2045

~~5.10.5.2~~4.10.5.2The control mechanism for the main switch shall be ~~directly~~ accessible without obstruction from the entrance(s) to the machine room. If the machine room is common to several lifts, the control mechanism of the main switches shall allow the lift concerned to be identified (see ~~5.2.1.1.2~~4.2.1.1.2) ~~easily~~.

If the machinery space has several points of access, or if the same lift has several machinery spaces each with its own point(s) of access, a contactor may be used, which shall be controlled by: a device which complies with the requirements of IEC 60204-1:2016+A1:2021, 5.3.2 a) to d) and 5.3.3

~~— a safety contact, in conformity with 5.11.2; or~~

~~— a device according to IEC 60204-1:2006~~2016, ~~5.5 and 5.6,~~ inserted in the supply circuit to the coil of the contactor.

This device shall be provided with an electric safety device in conformity with ~~5.11.2~~4.11.2 or it shall interrupt supply to the electric safety chain.

Commented [SD1203]: Combined comments N2055

The contactor shall have a breaking capacity ~~sufficient~~ to interrupt the current of the largest motor when stalled together with the sum of the normal running currents of all other motors and/or loads.

Commented [SD1204]: As per WG1 comments N2045

The re-engagement of the contactor shall not be carried out or made possible except by means of the device which caused its release. The contactor shall be used in conjunction with a manually controlled isolating switch according to IEC 60204-1:2016+A1:2021, 5.5 and 5.6.

~~5.10.5.3~~4.10.5.3Each incoming source of supply to the lift shall have a supply disconnecting device according to IEC 60204-1:2016+A1:2021, 5.3 located close to the main switch.

In the case of a group of lifts, if, after the opening of the main switch for one lift, parts of the operating circuits remain live, these circuits shall be capable of being separately isolated ~~without breaking the supply to all the lifts in the group~~. This requirement does not apply to PELV and SELV circuits.

Commented [AD1205]: TFHAS_74_v4

~~5.10.5.4 Any capacitors to correct the power factor shall be connected before the main switch of the power circuit.~~

~~If there is a risk of over-voltage, when, for example, the motors are connected by very long cables, the switch of the power circuit shall also interrupt the connection to the capacitors.~~

Commented [AD1206]: TFHAS_74_v4

~~5.10.5.5~~4.10.5.54 If automatic operated movement of the lift cannot be excluded while the main switch has disconnected the supply to the lift (e.g. automatic rescue operation, regenerative power), the main switch shall be provided with an electric safety device in conformity with ~~5.11.2~~4.11.2.~~While the main switch has disconnected the supply to the lift, any automatic operated movement of the lift~~ including automatic rescue ~~operation (e.g. automatic battery powered operation) shall be prevented with electric safety devices in conformity with 5.11.2.~~

Commented [IJ1207]: See N1544

~~5.10.5.6~~4.10.5.65 A supply disconnecting device according to IEC 60204-1:2016+A1:2021, 5.3.2 is required:

a) for any on-board power supply which is supplying circuits having ~~nominal~~ rated voltages exceeding 25 VAC or 60 VDC;

Commented [SD1208]: N2055 combined comments

b) for any on-board power supply which is supplying devices which can cause movement of the lift or doors.

Commented [IJ1209]: See N1544

~~4.9.6~~4.10.6 ~~5.10.6~~ Electric wiring

~~4.9.6.1~~4.10.6.1 ~~5.10.6.1~~Conductors and cables

Conductors and cables shall be selected according to IEC 60204-1:2016+A1:2021, 12.1, 12.2, 12.3 and 12.4.

Travelling cables shall be in conformity with EN 50214:2006 or, IEC 60227-6:2001 ~~or IEC 60245-5~~, excluding insulation material type requirements of those standards. ~~In countries where EN 50214:2006 is not adopted, relevant national requirements shall apply.~~

Minimum fire classification of conductors and cables installed outside enclosures shall be in accordance with EN 13501-6:2018 Class Eca or fire reaction shall be in compliance with minimum requirements set in IEC 60332-1-2:2004+AMD1:2015, Annex A.

Where higher fire classification is needed ~~(see 0.4.2 Negotiations)~~ recommended minimum fire classification EN 13501-6:2018 Class Cca s1b a2 d2 should be used or fire reaction should be in compliance with minimum requirements set in IEC 60332-3-24:2018, Annex B, IEC 61034-2:2005+AMD1:2013+AMD:2019, Annex B and IEC 60754-2:2011+AMD1:2019, Annex A.

~~4.9.6.2~~4.10.6.2 ~~5.10.6.2~~Cross-sectional area of conductors

To ensure adequate mechanical strength, the cross-sectional area of conductors shall not be less than as shown in IEC 60204-1:2016+A1:2021, Table 5.

~~4.9.6.3~~4.10.6.3 ~~5.10.6.3~~Wiring practices

~~4.9.6.3.1~~4.10.6.3.1 ~~5.10.6.3.1~~ General

The general requirements of IEC 60204-1:2016+A1:2021, 13.1.1, 13.1.2 and 13.1.3 apply.

~~5.10.6.3.2~~4.10.6.3.2 Conductors and cables shall be installed in conduits or trunkings or equivalent mechanical protection.

Double insulated conductors and cables can be installed without conduits or trunkings if they are located as to avoid accidental damage~~, e.g.~~ by moving parts.

~~5.10.6.3.3~~4.10.6.3.3 The requirement of ~~5.10.6.3.2~~4.10.6.3.2 need not apply to:

a) conductors or cables not connected to electric safety devices, provided that:

   1) they are not subject to a rated output of more than 100 VA; and

   2) they are part of SELV or PELV circuits;

b) the wiring of operating or distribution devices in cabinets or on panels between, either:

   1) different pieces of electric equipment, or

   2) these pieces of equipment and the connection terminals.

~~5.10.6.3.4~~4.10.6.3.4 If connections, connection terminals and connectors are not located in protective enclosure, their IP2X (IEC 60529:1989+AMD1:1999+AMD2:2013) protection shall be maintained when connected and disconnected, and they shall be properly fixed to prevent unintended disconnection.

Commented [SD1210]: Combined comments N2055

Commented [AD1211]: TFHAS_74_v4

Commented [AD1212]: N2204

Commented [AD1213]: TFHAS_74_v4

Commented [KA1214]: Fire Classification of electric cables

Commented [KA1215]: Another possibility is to put this information in table format.

Commented [AD1216]: IR3

~~5.10.6.3.5~~4.10.6.3.5 If, after opening of the main switch or switches of a lift, some connection terminals remain live, and if the voltage exceeds 25 VAC or 60 VDC, a permanent warning label according to IEC 60204-1:2016+A1:2021, 16, shall be appropriately placed in proximity to the main switch or switches, and a corresponding statement shall be included in the ~~maintenance manual~~instructions.

Furthermore, for circuits connected to such live terminals, the requirements of labelling, separation or identification by colour shall be fulfilled as given in IEC 60204-1:2016+A1:2021, 5.3.5.

~~5.10.6.3.6 Connection terminals whose accidental interconnection could lead to a dangerous malfunction of the lift shall be clearly separated, unless their method of construction obviates this risk.~~

~~5.10.6.3.7~~5.10.6.3.6 In order to ensure continuity of mechanical protection, the protective sheathing of conductors and cables shall fully enter the casings of switches and appliances, or shall terminate in a ~~suitably constructed~~cable gland.

Conductors and cables connected to the electric safety device and subject to contact with moving parts or sharp edges shall be protected mechanically.~~However, if there is a risk of mechanical damage due to movement of parts or sharp edges of the frame itself, the conductors connected to the electric safety device shall be protected mechanically.~~

NOTE Enclosed frames of landing and car doors are regarded as appliance casings.

~~4.9.6.4~~4.10.6.4 ~~5.10.6.4~~Connectors

Plug socket combinations shall comply with the requirements of IEC 60204-1:2016+A1:2021, 13.4.5, ~~except c), d) and i).~~

Connectors and devices of the plug-in type placed in the circuits of electric safety devices shall be designed so that it shall not be possible to insert them in a position which leads to a dangerous situation.

~~4.9.7~~4.10.7 ~~5.10.7~~ Lighting and socket outlets

~~5.10.7.1~~4.10.7.1 The electric lighting supplies to the car, well, machinery spaces and pulley rooms, and emergency and test panel(s) (~~5.2.6.6~~4.2.6.6), shall be independent of the supply to the lift machine, either through another circuit, or through connection to the lift machine supply circuit on the supply side of the main switch (or switches) laid down in ~~5.10.5~~4.10.5.

~~5.10.7.2~~4.10.7.2 The supply shall be taken from the circuits referred to in 4.10.7.1 ~~to~~ for the socket outlets required:

- ~~—~~ on the car roof [4.4.8 c)],
- ~~—~~ in the machinery spaces, ~~in~~ and pulley rooms [4.2.1.3.2 b)],
- ~~—~~ ~~and~~ in the pit [4.2.1.3.1 c)], ~~shall be taken from the circuits referred to in 5.10.7.1~~.

These socket outlets shall be of type 2 P + PE, supplied directly.

~~The use of the above socket outlets does not imply that the supply cable has a cross-sectional area corresponding to the rated current of the socket outlet. The cross-sectional area of the conductors may be smaller, provided that the conductors are correctly protected against excess currents.~~

~~4.9.8~~4.10.8 ~~5.10.8~~ Control of the supply for lighting and socket outlets

~~5.10.8.1~~4.10.8.1 A switch shall control the supply to the circuit for lighting and socket outlets of the car. If the machine room contains several lift machines, it is necessary to have one switch per car. This switch shall be located close to the corresponding main power switch.

Commented [AD1217]: TFHAS_74_v4

Commented [AD1218]: TFHAS_74_v4

Commented [AD1219]: TFHAS_74_v4

Commented [SD1220]: As per WG1 comments N1969

Commented [AD1221]: TFHAS_74_v4 comment 5.6.2.2.3

Commented [AD1222]: TFHAS_74_v4 comment 5.6.2.2.3

Commented [AD1223]: TFHAS_74_v4

~~5.10.8.2~~4.10.8.2In the machinery spaces, other than those in the well, a switch controlling the supply for lighting shall be located near its access(es). See also ~~5.2.1.4.2~~4.2.1.4.2~~4~~4.2.1.3.2.

Well lighting switches (or equivalent) shall be located both in the pit and close to the main switch, so that the well light can be operated from either location.

In case additional luminaires ~~lamps~~ are installed on the car roof, they shall be connected to the car light circuit and switched from the car roof. The switch(es) shall be accessible without obstruction ~~in an easily accessible position,~~ not more than 1,00 m from the entry point(s), for inspection or maintenance personnel.

Commented [SD1224]: AS WG1 comments N2045

Commented [AD1225]: TFHAS_74_v4

~~5.10.8.3~~4.10.8.3Each circuit controlled by the switches laid down in ~~5.10.8.1~~4.10.8.1 and ~~5.10.8.2~~4.10.8.2 shall have its own over current protection devices.

~~4.9.9~~4.10.9 ~~5.10.9~~ Protective earthing

The requirements of IEC 60364-4-41:2005+AMD1:2017, 411.3.1.1 apply.

~~4.9.10~~4.10.10 ~~5.10.10~~ Electrical identification

All control devices, and electrical components shall be plainly identified with the same reference designation as shown in the electrical diagrams.

The necessary fuse specifications, such as value and type, shall be marked on the fuse or on/near the fuse holders.

In the case of the use of multiple wire connectors, only the connector, and not the wires, needs to be marked.

~~4.10~~4.11 ~~5.11~~ Protection against electric faults; failure analysis; electric safety devices

~~4.10.1~~4.11.1 ~~5.11.1~~ Protection against electric faults; failure analysis

~~4.10.1.1~~4.11.1.1~~5.11.1.1~~ General

If any single fault listed in ~~5.11.1.2~~4.11.1.2 in the electric equipment of a lift cannot be excluded under conditions described in ~~5.11.1.3~~4.11.1.3 and/or ISO 8100-2:2023, ~~5.15~~74.17, it shall not, on its own, be the cause of a dangerous malfunction of the lift.

Commented [IJ1226]: See N1722

~~For safety circuits, see 5.11.2.3.~~

~~5.11.1.2~~4.11.1.2 Faults envisaged:

a) absence of voltage;

b) voltage drop;

c) loss of continuity of a conductor;

d) insulation fault in relation to the metalwork or the earth;

e) short circuit or open circuit, change of value or function in an electrical component, e.g. resistor, capacitor, transistor, lamp, etc.;

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

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

h) non-opening of a contact;

i) non-closing of a contact;

j) phase reversal.

k) short circuit between adjacent conductors of travelling cable.

Commented [IJ1227]: See N1722

~~5.11.1.3~~4.11.1.3 The non-opening of a contact need not be considered in the case of safety contacts conforming to the requirements of ~~5.11.2.2~~4.11.2.2.

~~5.11.1.4~~4.11.1.4 An earth fault in a circuit in which there is an electric safety device, or in a circuit controlling the machine brake according to ~~5.9.2.2.2.3~~4.9.2.2.2.3, or in a circuit controlling the down valve according to ~~5.9.3.4.3~~4.9.3.4.3, shall:

Commented [SD1228]: N1976

a) either cause the immediate stopping of the lift machine; or

Commented [AD1229]: TFHAS_74_v4 comment 5.6.2.2.3

b) prevent restarting of the lift machine after the first normal stop, if the first earth fault alone is not dangerous.

Commented [AD1230]: TFHAS_74_v4 comment 5.6.2.2.3

Return to service shall only be possible by manual resetting.

~~4.10.2~~4.11.2 ~~5.11.2~~ Electric safety devices

~~4.10.2.1~~4.11.2.1~~5.11.2.1~~ General provisions

~~5.11.2.1.1~~4.11.2.1.1 During the operation of one of the electric safety devices, as listed in Annex A, the movement of the lift machine shall be prevented, or it shall be caused to stop immediately, as indicated in ~~5.11.2.4~~1.~~7~~4.11.2.1.7.

The electric safety devices shall consist of:

a) either one or more safety contacts ~~satisfying~~ according to ~~5.11.2.2~~4.11.2.2; or

b) safety circuits ~~satisfying~~ according to ~~5.11.2.3~~4.11.2.3, or

c) SIL-rated circuit(s) ~~satisfying~~according to ~~5.11.2.4~~4.11.2.4

~~, consisting of one, or a combination, of the following:~~

~~1) either one or more safety contacts satisfying 5.11.2.2;~~

~~2) contacts not satisfying the requirements of 5.11.2.2;~~

~~3) components in accordance with ISO 8100-2:2019, 5.15;~~

~~4) programmable electronic systems in safety related applications in accordance with 5.11.2.6.~~

~~5.11.2.1.2~~4.11.2.1.2 Apart from exceptions permitted in this document (see ~~5.6.5.10~~4.6.5.10, ~~5.12.1.4~~4.12.1.4, ~~5.12.1.5~~4.12.1.5, ~~5.12.1.6~~4.12.1.6 and ~~5.12.1.8~~4.12.1.8), no electric equipment shall be connected in parallel with an electric safety device.

Connections to different points of the electric safety chain are only permitted for gathering information. The devices used for that purpose shall fulfil the requirements for safety circuits according to ~~5.11.2.3.2~~4.11.2.3.2 and ~~5.11.2.3.3~~4.11.2.3.3.

~~5.11.2.1.3~~4.11.2.1.3 Electric safety device shall meet the immunity performance criteria as defined for safety circuits~~The effects of internal or external induction or capacity as specified~~ in ISO 8102-2:2021 ~~shall not cause a failure of electric safety devices~~.

~~5.11.2.1.4~~4.11.2.1.4 An output signal emanating from an electric safety device shall not be altered by an extraneous signal emanating from another electric device placed further down the same circuit, which would result in a dangerous condition.

~~5.11.2.1.5 In safety circuits comprising two or more parallel channels, all information other than that required for parity checks shall be taken from one channel only.~~

~~5.11.2.1.6~~4.11.2.1.5 Circuits which record, or delay, signals shall not, even in event of fault, prevent or appreciably delay the stopping of the lift machine through the functioning of an electric safety device, i.e. the stopping shall occur in the shortest time compatible with the system.

~~5.11.2.1.7~~4.11.2.1.6 The construction and arrangement of the internal power supply units shall be such as to prevent the appearance of false signals at outputs of electric safety devices due to the effects of switching.

Commented [AD1231]: TFHAS_74_v4 comment 5.6.2.2.3

Commented [AD1232]: Consistent wording

Commented [IJ1233]: See N1722

Commented [SD1234]: N1991

Commented [AD1235]: N2247

Commented [AD1236]: N1722

Commented [IJ1237]: See N1541

Commented [AD1238]: TFHAS_74_v4 comment 5.6.2.2.3

~~5~~4.11.2.1.7~~5.11.2.4~~ Operation of electric safety devices

An electric safety device when operated shall initiate immediately ~~within 0.1s~~ stopping of the lift machine and prevent its setting in motion.

The electric safety devices shall act directly on the equipment controlling the supply to the lift machine in accordance with the requirements of ~~5.9.2.2.2.3~~4.9.2.2.2.3 a), ~~5.9.2.5~~4.9.2.5 and ~~5.9.3.4~~4.9.3.4.

If relays or contactor relays according to ~~5.10.3.1.3~~4.10.3.1.2 are used to control the equipment controlling the supply to the lift machine, the monitoring of these relays or contactor relays shall be done as defined in ~~5.9.2.2.2.3~~4.9.2.2.3 a), ~~5.9.2.5~~4.9.2.5 and ~~5.9.3.4.4~~4.9.3.4.4.

~~4~~4.11.2.1.8~~5.11.2.5~~ Actuation of electric safety devices

The components actuating the electric safety devices shall be built so that they are able to function properly under the ~~mechanical~~ stresses resulting from continuous ~~normal~~lift operation.

~~Mechanical f~~Following failures ~~which can impact the safety function~~ shall be considered.

~~Examples of such failures are:~~

a) slip on traction or friction on a system used for car speed or position sensing;

b) breakage or slack in tape, chain~~,~~ or rope ~~or similar~~ on a system used for car speed or position sensing;

c) smoke~~,~~ or dirt ~~or similar~~ on a system used for car speed or position sensing.

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

~~NOTE A magnet or a bridge piece is not considered a simple means.~~

In the case of redundancy-type safety circuits, it shall be ensured by mechanical or geometric arrangements of the ~~transmitter elements~~sensors that a mechanical fault shall not cause loss of redundancy.

~~For transmitter elements of safety circuits, the requirements of EN 81-50:2020, 5.6.3.1.1 apply.~~

For electromechanical and magnetic sensors of safety circuits, the requirements of ISO 8100-2:2023, ~~5.6.3.1.2~~4.6.3.1.2 a) and ~~5.6.3.1.2~~4.6.3.1.2 b) and ~~5.6.3.2~~4.6.3.2 apply.

Commented [IJ1239]: See N1722

Commented [AD1240]: N1722, moved from 5.11.2.4

Commented [KA1241]: Original EN 81-20:2014 requirement. Reaction time spec of previous draft deleted.
Total system reaction time consists or Electric Safety Device, Activation and Stopping sub-systems.
It is useless to define reaction time only for one of the subsystems.
Total system reaction requirements are already defined for UCMP and for ETSL.
This was already discussed in WG1.

Commented [AD1242]: TFHAS_74_v4 comment 5.6.2.2.3

Commented [AD1243]: TFHAS_74_v4 comment 5.6.2.2.3

Commented [AD1244]: Reference corrected

Commented [AD1245]: TFHAS_74_v4 comment 5.6.2.2.3

Commented [AD1246]: N1722, moved from 5.11.2.5

Commented [SD1247]: As per WG1 comments N1969

Commented [SD1248]: Combined comments N2055 & N2175

Commented [AD1249]: TFHAS_74_v4

Commented [AD1250]: TFHAS_74_v4

Commented [KA1251]:

~~4.10.2.2~~4.11.2.2~~5.11.2.2~~Safety contacts

~~5.11.2.2.1~~4.11.2.2.1 General

Safety contacts shall comply with the requirements of IEC 60947-5-1:2016, Annex K, with a minimum protection degree of IP4X (IEC 60529:1989+AMD1:1999+AMD2:2013) and a mechanical durability suitable for its purpose (at least 10^6 operating cycles). Alternatively, they shall fulfil the following requirements:

~~5.11.2.2.2~~4.11.2.2.2 The operation of a safety contact shall be by positive separation of the circuit-breaking devices. This separation shall occur even if the contacts have welded together.

The design of a safety contact shall be such as to minimize the risk of a short-circuit resulting from component failure.

NOTE Positive opening is achieved when all the contact-breaking elements are brought to their open position and when, for a significant part of the travel, there are no resilient members (e.g. springs) between the moving contacts and the part of the actuator to which the actuating force is applied.

~~5.11.2.2.3~~4.11.2.2.3 The safety contacts shall be provided for a rated insulation voltage of 250 V if the enclosure provides a degree of protection of at least IP4X (IEC 60529:1989+AMD1:1999+AMD2:2013), or 500 V if the degree of protection of the enclosure is less than IP4X (IEC 60529:1989+AMD1:1999+AMD2:2013).

The safety contacts shall belong to the following categories as defined in IEC 60947-5-1:2016:

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

b) DC-13 for safety contacts in D.C. circuits.

~~5.11.2.2.4~~4.11.2.2.4 If the degree of protection is equal or less than IP4X (IEC 60529:1989+AMD1:1999+AMD2:2013), the clearances shall be at least 3 mm, the creepage distances at least 4 mm and the distances for breaking contacts at least 4 mm after separation. If the protection is better than IP4X (IEC 60529:1989+AMD1:1999+AMD2:2013), the creepage distance may be reduced to 3 mm.

~~5.11.2.2.5~~4.11.2.2.5 In the case of multiple breaks, the distance after separation between the contacts shall be at least 2 mm.

~~5.11.2.2.6 Abrasion of conductive material shall not lead to short-circuiting of contacts.~~

Commented [AD1252]: TFHAS_74_v4

~~4.10.2.3~~4.11.2.3~~5.11.2.3~~Safety circuits

~~4.11.2.3.1 5.11.2.3.1 General~~

Commented [AD1253]: IR3 no heading possible

~~Fault~~ Failure analysis of safety circuits shall take into account failures ~~in the whole safety~~for the entire circuit, including sensors, signal transmission paths, power supplies, safety logic and safety output.

Commented [KA1254]: Change term "Fault analysis" to term "Failure analysis" in order to be consistent through out 8100 series.

Terminology shall be aligned with following: Purpose of Failure analysis is to study if Fault in a component causes Failure of the function.

Failure analysis

Fault exclusion

~~5.11.2.3.2~~4.11.2.3.2 Safety circuits shall comply with the requirements of ~~5.11.1~~4.11.1 regarding the appearance of a fault.

For all components of safety circuits, an over-dimensioning factor of at least 1,5 shall be considered for the relevant parameters at normal operating conditions.

Commented [SD1255]: Corrected Typo in numbering N2055

Operating any hardware elements with an over-dimensioning factor of less than 1,5 shall be justified and documented.

Commented [SD1256]: Combined comment N2055 & N2197

~~5.11.2.3.3~~4.11.2.3.3 Furthermore, as illustrated by Figure ~~21~~34, the following requirements shall apply:

a) if one fault combined with a second fault can lead to a dangerous situation, the lift shall be stopped at the latest at the next operating sequence in which the first faulty element should participate.

   All further operation of the lift shall be impossible as long as this fault persists.

   The possibility of the second fault occurring after the first, and before the lift has been stopped by the sequence mentioned above, is not considered;

b) if two faults, which by themselves do not lead to a dangerous situation, can lead to a dangerous situation when combined with a third fault, the lift shall be stopped at the latest at the next operating sequence in which one of the faulty elements should participate.

   The possibility of the third fault leading to a dangerous situation before the lift has been stopped by the sequence mentioned above is not considered;

c) if a combination of more than three faults is possible, then the safety circuit shall be designed with multiple channels and a monitoring circuit checking the equal status of the channels.

   If a different status is detected, the lift shall be stopped.

   In case of two channels, the function of the monitoring circuit shall be checked at the latest prior to a re-start of the lift and, in case of failure, re-starting shall not be possible;

d) on restoration of the power supply after it has been disconnected, maintenance of the lift in the stopped position is not necessary, provided that during the next sequence stopping is re-imposed in the cases covered by ~~5.11.2.3.3~~4.11.2.3.3 a), b) and c);

e) in redundancy-type circuits, measures shall be taken to limit ~~as far as possible~~ the risk of defects occurring simultaneously in more than one circuit, arising from a single cause.

Commented [AD1257]: TFHAS_74_v4

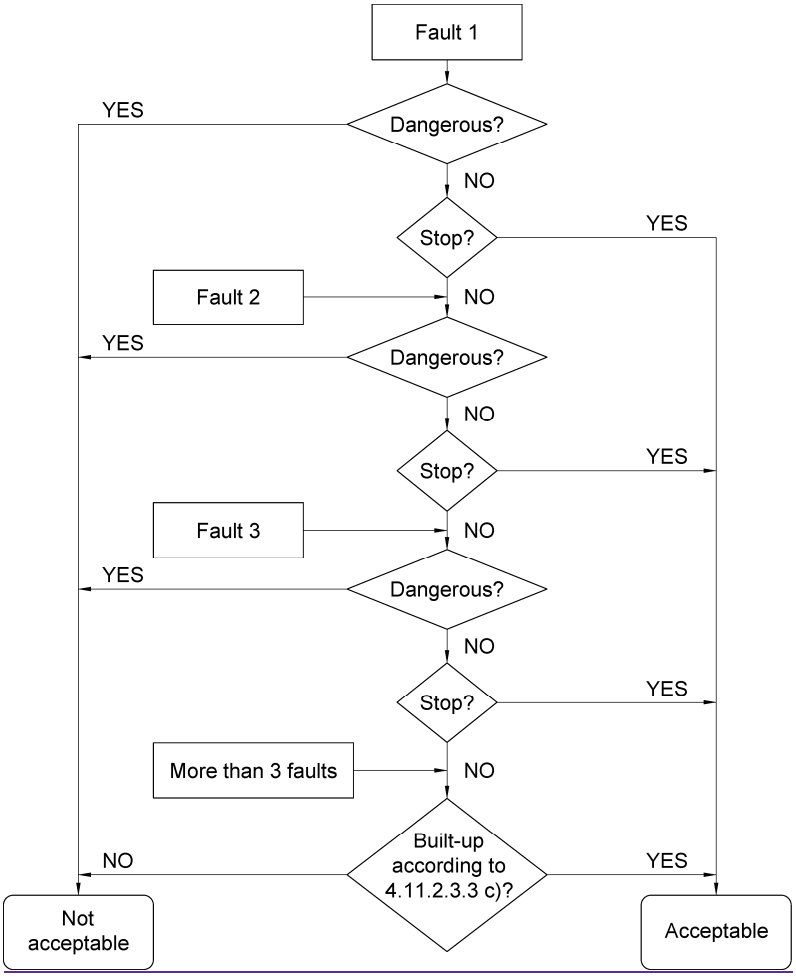


Figure 2134 — Diagram for assessing safety circuits

~~5.11.2.3.4~~4.11.2.3.4 Safety circuits containing electronic components ~~are regarded as safety components and~~ shall be verified according to the requirements in ISO 8100-2:2023, ~~5.6~~4.6, except when all logic and failure detection decision are made exclusively with electromechanical components. In this case sensors of safety circuits may be mechanical, magnetic, electronic or programmable electronic.

Commented [IJ1258]: See N1722

~~5.11.2.3.5~~4.11.2.3.5 A data plate shall be fixed on safety circuits containing electronic components, indicating:

a) the name of the manufacturer of the ~~safety~~ component;

~~b) the type examination certificate number;~~

~~c)~~b) ~~the type~~ identification of the electric safety device.

~~4.10.2.4~~4.11.2.4~~5.11.2.4~~5.11.2.5.11.2.6 ~~Programmable electronic systems in safety related applications (PESSRAL)~~ SIL-rated circuits

~~5.11.2.4.1~~4.11.2.4.1 ~~General~~

~~Table A.1 gives the minimum safety integrity level for each electric safety device.~~

~~Safety circuits, including programmable electronic systems designed in accordance with 5.11.2.6, cover the requirements of 5.11.2.3.3.~~

SIL-rated circuits shall comply with the design rules as defined in ISO 8100-2:2023, ~~5.168~~4.18 and shall have minimum safety integrity level as defined in Table A.1.

~~5.11.2.4.2~~4.11.2.4.2 SIL-rated circuits shall comply with the requirements of ~~5.11.1~~4.11.1 relative to the appearance of a fault.

~~PESSRAL shall comply with the design rules for relevant safety integrity levels (SIL) as listed in ISO 8100-2:2019, 5.16.~~

Failure analysis of SIL-rated circuits shall take into account failures for the entire circuit including sensors, signal transmission paths, power supplies, safety logic and safety output.

For all components of SIL-rated circuits, an over-dimensioning factor of at least 1,5 shall be considered for the relevant parameters at normal operating conditions.

Operating any hardware elements with an over-dimensioning factor of less than 1,5 shall be justified and documented.

Commented [AD1259]: TFHAS_105

Commented [AD1260]: TFHAS_74_v4, EU-C3, 5.3.9.1.13

Commented [KA1261]: Change term "Fault analysis" to term "Failure analysis" in order to be consistent through out 8100 series.

Commented [SD1262]: Combined comments N2055 & N2197

~~5.11.2.4.3~~~~4~~.11.2.4.3 For SIL-rated circuit a proof test interval at least 20 years shall be used in PFD_{avg}/PFH calculations.

The mission time shall not be longer than the proof test interval.

For SIL-rated circuit, applied as electric safety device listed in Table A1, high demand as well as low demand mode of operation shall be considered and the calculated PFD_{avg} and PFH values shall comply with respective limits given in Table 21.

Table 21 — PFD_{avg} and PFH values

SIL	PFD_{avg}	PFH
1	$< 5\times10^{-2}$	$< 5\times10^{-6}$ h^{-1}
2	$< 5\times10^{-3}$	$< 5\times10^{-7}$ h^{-1}
3	$< 5\times10^{-4}$	$< 5\times10^{-8}$ h^{-1}

NOTE For clarification of terms high demand, low demand, proof test, PFDavg and PFH see ISO 8100-2:2023, Annex A or IEC 61508-4.

~~5.11.2.4.4~~~~4~~.11.2.4.4 SIL-rated circuits shall be provided with measures to prevent replacement of the program code without authorization by the manufacturer. Authorization shall follow requirements of IEC 61508-1:2010, 7.16.2.2.

Only software and hardware combinations which have been verified according to the requirements of ISO 8100-2:2023, ~~5.6~~4.6 shall be used.

~~To avoid unsafe modification, measures to prevent unauthorized access to the program code and safety-related data of PESSRAL shall be provided, e.g. using EPROM, access code, etc.~~

~~5.11.2.4.5~~~~4~~.11.2.4.5 Replacement of the program code shall only be possible if replacement is enabled by an intentional action with means ~~manually by a person competent in maintenance procedures who is~~ present on site.

When replacement of the program code is enabled the SIL-rated circuit shall achieve or maintain its safe state.

The return to functional state of the SIL-rated circuit shall require intentional reset by means~~the intervention of a person competent in maintenance procedures who is~~ present on site [see 6.2.4 g)]. A power cycle by itself shall not provide this reset.

Means to return SIL-rated circuit to its functional state shall fulfil the highest SIL of the SIL-rated circuit.

Restoration of the power after a supply disconnection shall not result in transition to the functional state.

~~5.11.2.4.6~~~~4~~.11.2.4.6 When on-site replacement of the program code of SIL-rated circuit is possible, it shall be possible to identify actual software-version of SIL-rated circuit, either by a built-in system or by an external tool. If this external tool is a special tool, it shall be available on the site.

Commented [SD1263]: Combined comments N2055 & N2197

Commented [SD1264]: Combined comments N2055 & N2197 remove header

Commented [AD1265]: TFHAS_110

Commented [SD1266]: Combined comments N2055 & N2175

Commented [AD1267]: TFHAS_110

Commented [SD1268]: Combined comments N2055 & N2175

Commented [SD1269]: Combined comments N2055 & N2175

Commented [SD1270]: Combined comments N2055 & N2175

Commented [SD1271]: Combined comments N2055 & N2197

~~5.11.2.4.5~~4.11.2.4.7 If a SIL-rated circuit~~PESSRAL~~ and a non-safety-related circuit~~system~~ share the same printed circuit board (PCB), the requirements of ~~5.10.3.2~~4.10.3.2 shall apply for the separation of the two systems.

If a SIL-rated circuit ~~PESSRAL~~ and a non-safety-related circuit~~system~~ share the same hardware, the requirements for the SIL-rated circuit~~PESSRAL~~ shall be met.

~~5.11.2.4.6~~4.11.2.4.8 It shall be possible to identify the failure state of the SIL-rated circuit~~PESSRAL~~, either by a built-in system or by an external tool. If this external tool is a special tool, it shall be available on the site.

~~5.11.2.4.7~~4.11.2.4.9 Parametrization

~~5.11.2.4.7.1~~4.11.2.4.9.1 General provisions

SIL-rated circuits are permitted to have parameters to enable the system to be matched to its application.

Parameters shall be prevented from unintentional modification.

Parameters shall have defined value ranges.

For documentation see ~~7.2 and 7.3~~6.2.

~~5.11.2.4.7.2~~4.11.2.4.9.2 Additional requirements for SW driven parametrization

Change of parameter shall only be possible if parametrization is enabled ~~manually~~ by an intentional action with means ~~competent maintenance person~~ present on site.

Means for activation and deactivation of parameterization shall fulfil at least the SIL of the safety function to be parametrized.

When parametrization is enabled the SIL-rated circuit shall be in a safe state.

Deactivation of parametrization shall only be possible by an intentional action with means~~manual action by competent maintenance person~~ present on site.

Unintentional deactivation of parametrization shall be prevented. Power interruption and restoration shall be considered as unintentional actions.

~~5.11.2.4.8~~4.11.2.4.10 ~~Cybersecurity of SIL-rated circuits shall comply with ISO 8102-20:2022.~~

~~5.11.2.4.8~~4.11.2.4.11 SIL-rated circuits ~~are regarded as safety components and~~ shall be verified according ~~to the requirements in~~ ISO 8100-2:2023, ~~5.6~~4.6.

~~5.11.2.4.9~~4.11.2.4.12 On SIL-rated circuits a data plate shall be fixed indicating:

a) the name of the manufacturer of the ~~safety~~ component;

~~the type examination certificate number;~~

b) ~~the type~~identification of the SIL-rated circuit;

c) date of manufacturing;

d) maximum mission time.

Commented [AD1272]: TFHAS_110

Commented [AD1273]: TFHAS_110

Commented [SD1274]: N2055 combined comments

Commented [SD1275]: Combined Comments N2055 (418)

Commented [KA1276]: AH6 report. This paragraph can be also inserted as 5.11.2.4.8 and in that case existing 5.11.2.4.8 and 5.11.2.4.9 needs to be renumbered.

This proposed change has been made

Commented [AD1277]: deleted according N2247, already covered by 4.10.1.1.5

Commented [AD1278]: TFHAS_105

Commented [SD1279]: As agreed in WG1 comments 23/11/2020

Commented [AD1280]: TFHAS_105

Commented [AD1281]: TFHAS_74_v4, EU-C3, 5.3.9.1.13

Commented [IJ1282]: See N1722

~~4.10.2.5 5.11.2.4 Operation of electric safety devices~~

Commented [AD1283]: N1722, Moved to 4.11.2.1.8

~~An electric safety device, when operated, shall immediately initiate the stopping of the machine and prevent it from setting into motion.~~

~~The electric safety devices shall act directly on the equipment controlling the supply to the machine, in accordance with the requirements of 5.9.2.2.2.3 a), 5.9.2.5 and 5.9.3.4.~~

~~If relays or contactor relays according to 5.10.3.1.3 are used to control the equipment controlling the supply to the machine, the monitoring of these relays or contactor relays shall be done as defined in 5.9.2.2.2.3 a), 5.9.2.5 and 5.9.3.4.4.~~

~~4.10.2.6 5.11.2.5 Actuation of electric safety devices~~

Commented [AD1284]: N1722, Moved to 4.11.2.1.9

~~The components actuating the electric safety devices shall be built so that they are able to function properly under the mechanical stresses resulting from continuous normal operation. Mechanical failures which can impact the safety function shall be considered.~~

~~Examples of such failures are:~~

~~a) slip on traction or friction, on a system used for car speed or position sensing;~~

~~b) breakage or slack in tape, chain, rope or similar, on a system used for car speed or position sensing;~~

~~c) smoke, dirt or similar, on a system used for car speed or position sensing.~~

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

~~NOTE A magnet or a bridge piece is not considered a simple means.~~

~~In the case of redundancy-type safety circuits, it shall be ensured by mechanical or geometric arrangements of the transmitter elements that a mechanical fault shall not cause loss of redundancy.~~

~~For transmitter elements of safety circuits, the requirements of ISO 8100-2:2019, 5.6.3.1.1 apply.~~

~~4.11~~4.12 ~~5.12~~ Controls — Final limit switches — Priorities

~~4.11.1~~4.12.1 ~~5.12.1~~ Control of lift operations

~~4.11.1.1~~4.12.1.1 ~~5.12.1.1~~ Control of normal operation

~~5.12.1.1.1~~ 4.12.1.1.1 This control shall be carried out through buttons ~~or similar devices, such as~~ touch control, key switches or ~~magnetic~~ access cards~~, etc~~. ~~These shall be placed in boxes, such that no live parts are accessible to the user.~~

Commented [SD1285]: N2055 combined comments

Commented [AD1286]: TFHAS_74_v4

The colour yellow shall not be used for other control devices than the alarm initiation device.

~~5.12.1.1.2~~4.12.1.1.2 The control devices shall be clearly identified by reference to their function~~, see also EN 81-70:2003, 5.4 or ISO 4190-5~~.

~~5.12.1.1.3~~4.12.1.1.3 The designation of the landing at which the lift has stopped shall be displayed inside the car.~~Visible notices or signals shall enable persons in the car to know at which landing the lift has stopped.~~

Commented [AD1287]: TFHAS_74_v4

~~5.12.1.1.4~~4.12.1.1.4 The stopping accuracy ~~of the car~~ shall be ±10 mm. If, during loading and unloading phases for example, the levelling accuracy of ±20 mm is exceeded, it shall be corrected to ±10 mm.

Re-levelling, where provided, shall be possible with doors not closed and locked according to ~~5.12.1.4~~4.12.1.4.

~~4.11.1.2~~4.12.1.2~~5.12.1.2~~Load control

~~5.12.1.2.1~~4.12.1.2.1 The lift shall be fitted with a device to prevent ~~normal~~ starting in automatic operation, including re-levelling, in the event of overload in the car. In the case of hydraulic lifts, the device shall not prevent re-levelling.

~~5.12.1.2.2~~4.12.1.2.2 The overload shall be detected at the latest when the rated load is exceeded by 10 %~~, with a minimum of 75 kg~~.

~~5.12.1.2.3~~4.12.1.2.3 In the event of overload:

a) an acoustic signal of at least 35 dBA and an optical signal in the car shall be provided~~users shall be informed by an audible and a visible signal in the car~~;

b) automatic power-operated doors shall be brought into the fully open position;

c) manually operated doors shall remain unlocked;

d) any preliminary operation in accordance with ~~5.12.1.4~~4.12.1.4 shall be nullified.

~~4.11.1.3~~4.12.1.3 ~~5.12.1.3~~Monitoring the normal slowdown of the lift machine in case of reduced buffer stroke

~~5.12.1.3.1~~4.12.1.3.1 In the case of ~~5.8.2.2.2~~5.8.2.2.1 b), electric safety devices in conformity with ~~5.11.2~~4.11.2 shall check that the slowdown is effective before arrival at terminal landings.

If the slowdown is not effective, the machine brake shall cause the car speed to be reduced in such a way that if the car or the counterweight comes into contact with the buffers, the striking speed shall not exceed that for which the buffers were designed.

~~5.12.1.3.2~~4.12.1.3.2 Once activated, the electric safety device shall keep the lift out of normal service. The return of the lift to automatic operation shall require intentional reset by means on site [see 6.2.4 g)]. A power cycle by itself shall not provide this reset~~.the intervention of a competent maintenance person~~.

Commented [SD1288]: As WG1 comments N2045

Commented [SD1289]: As WG1 comment N2045

Commented [SD1290]: As WG1 comment N2045

Commented [SD1291R1290]: Changed to 10% from 5% N2055 (421)

Commented [AD1292]: TFHAS_74_v4

Commented [AD1293]: TFHAS_74_v4 comment 5.6.2.2.3

Commented [SD1294]: As agreed in WG1 comments N1954

Commented [SD1295]: As agreed in WG1 comments N1954

Commented [AD1296]: TFHAS_110

~~4.11.1.4~~4.12.1.4~~5.12.1.4~~Control of levelling, re-levelling and preliminary operation with doors not closed and locked

Movement of the car with landing and car doors not closed and locked is permitted for levelling, re-levelling and preliminary operation on condition that:

a) the movement is limited to the unlocking zone (~~5.3.8.1~~4.3.8.1) by an electric safety device in conformity with ~~5.11.2~~4.11.2. During preliminary operations, the car shall be kept within 20 mm from the landing (see ~~5.12.1.1.4~~4.12.1.1.4 and ~~5.4.2.2.1~~4.4.2.2.1);

b) during levelling operations, the means for making the electric safety devices of doors inoperative shall only function after the stopping signal for this landing has been given;

c) the speed of levelling does not exceed 0,80 m/s; ~~In addition, on lifts with manually controlled landing doors, it shall be checked that:~~

~~1) for machines whose maximum speed of rotation is determined by the fixed frequency of the supply, only the control circuit for the low speed movement has been energized;~~

~~2) for other machines, the speed at the moment the unlocking zone is reached does not exceed 0,80 m/s;~~

d) the speed of re-levelling does not exceed 0,30 m/s.

~~4.11.1.5~~4.12.1.5~~5.12.1.5~~Control of inspection operation

~~4.11.1.5.1~~4.12.1.5.1 ~~5.12.1.5.1~~ Design requirements

~~5.12.1.5.1.1~~4.12.1.5.1.1 ~~To facilitate inspection and maintenance, a readily operable~~An inspection control station shall be permanently installed:

a) on the car roof (~~5.4.8~~ 4.4.8 a);

b) in the pit (~~5.2.1.5.1 4.2.1.4.1~~4.2.1.3.1 b);

c) in the car in the case of ~~5.2.6.4.3.3~~4.2.6.4.3.3~~4~~;

d) on a platform in the case of ~~5.2.6.4.5.6~~4.2.6.4.5.6.

~~5.12.1.5.1.2~~4.12.1.5.1.2 The inspection control station shall consist of:

a) a switch (inspection operation switch) which shall satisfy the requirements for electric safety devices (~~5.11.2~~4.11.2).

This switch, which shall be bi-stable, shall be protected against involuntary operation;

b) direction push buttons “UP” and “DOWN” protected against accidental operation with the direction of movement clearly indicated;

c) a push button "RUN" protected against accidental operation;

d) a stopping device in conformity with ~~5.12.1.11~~4.12.1.11.

The control station may also incorporate special switches, protected against accidental operation, for controlling the mechanism of doors from the car roof.

Commented [IJ1297]: See N1541

Commented [AD1298]: TFHAS_74_v4

Commented [SD1299]: Clause change Combined comments N2055 & N2147

~~5.12.1.5.1.3~~4.12.1.5.1.3 The inspection control station shall have a minimum degree of protection of IPXXD (IEC 60529:1989+AMD1:1999+AMD2:2013).

Rotary control switches shall have a means of prevention of rotation of the stationary member. Friction alone shall not be considered sufficient.

~~4.11.1.5.24~~.12.1.5.2 ~~5.12.1.5.2~~ Functional requirements:

~~4.11.1.5.2.14~~.12.1.5.2.1 ~~5.12.1.5.2.1~~ Inspection operation switch

The inspection operation switch, when in the inspection position, shall satisfy the following conditions for functioning simultaneously:

a) neutralize the normal operation controls (~~5.12.1.1.14~~.12.1.1.1);

b) neutralize emergency electrical operation (~~5.12.1.64~~.12.1.6);

c) levelling and re-levelling (~~5.12.1.44~~.12.1.4) shall be disabled;

d) any automatic movement of power-operated doors shall be prevented. Power-operated closing of the door(s) shall depend on:

   1) the operation of a direction push button for car movement; or

   2) additional switches protected against accidental operation for controlling the mechanism of doors.

e) the car speed shall not exceed 0,63 m/s;

f) the car speed shall not exceed 0,30 m/s when the vertical distance above any standing area on car roof (see ~~5.2.5.7.34~~.2.5.7.3) or in pit is 2,00 m or less;

g) the car shall stop at the limits of normal car travel, further movement beyond these limits is permitted under following conditions:

   1) the speed is limited to 0,15 m/s;

   2) the requirements of ~~5.12.1.8~~.3 ~~4~~.12.1.8.3 ~~g~~c) apply;

   3) before starting of the lift, the buttons of the inspection control station have been released and pressed again.~~the limits of normal car travel shall not be overrun, i.e. not exceed the stopping positions in normal operation;~~

h) the operation of the lift shall remain dependent on the electric safety devices. In case inspection operation can bypass normal travel limits as permitted in ~~5.12.1.5.2.1~~ ~~4~~.12.1.5.2.1 g), the inspection operation switch shall render inoperative by itself or through another electric switch in conformity with ~~5.11.24~~.11.2 the following electric safety devices:

   1) those mounted on the buffers, according to ~~5.8.2.2.44~~.8.2.2.3;

   2) final limit switches, according to ~~5.12.24~~.12.2.~~;~~

i) if more than one inspection control station is switched to "INSPECTION"~~:~~

   1) the car shall be prevented from moving~~;~~ or

   2) movement of the car is only possible by operation of the run button and the same direction push button on the respective inspection control stations simultaneously.~~in case of 5.2.6.4.3.4 the inspection operation switch in the car shall render inoperative the electric safety device according to 5.2.6.4.3.3 e)~~.

Commented [SD1300]: Combined comments N2055

Commented [KA1301]: See AH6 report: Proposal_bypass_always_with_inspection_operation_2020-06-10

Commented [SD1302]: Combined comments N2055 & N2176 (number was updated 5.12.1.8.4 c) to 5.12.1.8.3 c) due to comment 428)

Commented [KA1303]: See AH6 report: Proposal_bypass_always_with_inspection_operation_2020-06-10

Commented [IJ1304]: See N1538

~~if more than one inspection control station is switched to "INSPECTION", it shall not be possible to move the car from any of them, unless the same push buttons on the inspection control stations are operated simultaneously;~~

j) in case of ~~5.2.6.4.3.3~~4.2.6.4.3.34, the inspection operation switch in the car shall render inoperative the electric safety device according to ~~5.2.6.4.3.23~~ 4.2.6.4.3.2 e);~~.~~

k) neutralise the automatic rescue operation.

~~4.11.1.5.2.24~~4.12.1.5.2.2 ~~5.12.1.5.2.2~~ Return ~~-~~to ~~-normal~~ automatic operation of the lift

The return ~~-~~to ~~-normal~~automatic operation of the lift shall only be effected by switching the inspection operation switch(es) back to normal.

Additionally, return ~~-~~to~~-~~ automatic~~normal~~ operation of the lift from the pit inspection station shall only be made under the following conditions:

a) the landing doors giving access to the pit are closed and locked;

b) all the stopping devices in the pit are inactive;

c) the electrical reset device outside the well is operated and located:

1) in conjunction with emergency unlocking means of the door giving access to the pit; or

2) ~~in a place~~ accessible only by use of a key ~~to authorized persons only, e.g. inside a locked cabinet~~ located in close proximity to the door giving access to the pit.

Precautions shall be taken to prevent all involuntary movement of the car, in the event of one of the faults listed in ~~5.11.1.2~~4.11.1.2 appearing in the circuit(s) involved in the inspection operation.

~~4.11.1.5.2.34~~4.12.1.5.2.3 ~~5.12.1.5.2.3~~ Push buttons

The movement of the car in inspection operation shall solely depend on constant pressure on a direction push button, and the "RUN" push button.

It shall be possible to operate the "RUN" button and a direction button with one hand simultaneously.

The inspection operation electric safety device shall be bypassed by one of the following solutions:

a) a series connection of a direction and the "RUN" push button.

These push buttons shall belong to the following categories, as defined in IEC 60947-5-1:2016:

— AC-15 for contacts in A.C. circuits;

— DC-13 for contacts in D.C. circuits.

The durability shall be at least 1 000 000 mechanical and electrical operating cycles related to the applied load.

b) an electric safety device in accordance with ~~5.11.2~~4.11.2 which is monitoring the correct operation of the direction and "RUN" push buttons.

Commented [SD1305]: Cause change Combined comments N2055 & N2147

Commented [SD1306]: Clause number change Combined comments N2055 & N2147

Commented [IJ1307]: See N1544

Commented [SD1308]: Combined comments N2055 & N2175

Commented [AD1309]: TFHAS_74_v4 see new 5.2.1.1.1

Commented [SD1310]: Undeleted As agreed in WG1 comments 23/11/2020

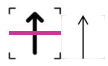
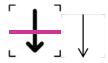
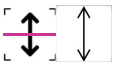
~~4.11.1.5.2.4~~4.12.1.5.2.4 ~~5.12.1.5.2.4~~ **Inspection control station(s)**

The following information shall be given on the inspection control station(s) (see Figure ~~22~~35):

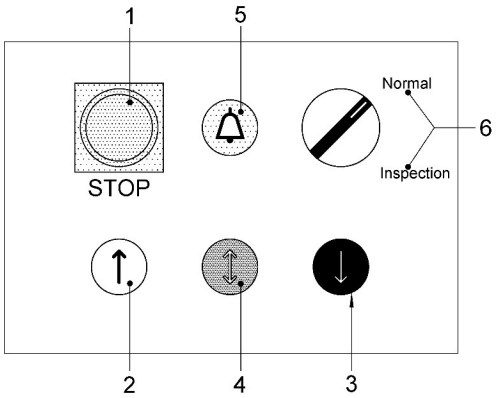
a) the words **"NORMAL"** and **"INSPECTION"** on or near the inspection operation switch;

b) the direction of motion identified by colours, as in Table 22.

Table 22 — Inspection control station — Button designations

			In case inspection operation cannot bypass normal travel limits		In case inspection operation can bypass normal travel limits as permitted in ~~5.12.1.5.2.1~~ 4.12.1.5.2.1 g)	
Control	**Colour of Button**	**Colour of Symbol**	**Symbol Reference**	**Symbol**	**Symbol Reference**	**Symbol**
UP	White	Black	IEC 60417:2002-5022		IEC 60417:2002-2765	
DOWN	Black	White	IEC 60417:2002-5022		IEC 60417:2002-2765	
RUN	Blue	White	IEC 60417:2002-5023		IEC 60417:2002-2764	

Commented [KA1311]: See AH6 report: Different symbol on Inspection operation gives information for the used that bypassing normal travel limits is possible.



Key

1 stopping device
2 upwards push button
3 downward push button
4 RUN push button
5 alarm push button
6 normal/inspection switch

NOTE Placing the alarm button in the control station is optional.

Figure 22 35 — Inspection control station — Controls and pictogramssymbols

~~4.11.1.6~~4.12.1.6~~5.12.1.6~~Control of emergency electrical operation

~~5.12.1.6.1~~4.12.1.6.1 If a means of emergency electrical operation is required in accordance with ~~5.9.2.3~~.6~~3~~4.9.2.3.6, an emergency electrical operation switch in conformity with ~~5.11.2~~4.11.2 shall be installed. The lift machine shall be supplied from the normal main supply, or from the stand-by supply if there is one.

Commented [SD1312]: Updated ref due to changes in N2192

Commented [AD1313]: TFHAS_74_v4 comment 5.6.2.2.3

The following conditions shall be satisfied simultaneously:

a) operation of the emergency electrical operation switch shall allow the control of car movement by constant pressure on buttons protected against accidental operation. The direction of movement shall be clearly indicated;

b) after operation of the emergency electrical operation switch, all movement of the car, except that controlled by this switch, shall be prevented;

c) the effects of the emergency electrical operation shall be overridden by switching on the inspection operation as follows:

   1) when actuating the emergency electrical operation switch while the inspection operation is actuated, the emergency electrical operation is inactive, the up/down/run buttons of the inspection operation shall remain effective;

   2) when actuating the inspection operation while the emergency electrical operation is actuated, the emergency electrical operation becomes inactive, the up/down/run buttons of the inspection operation shall become effective.

d) the emergency electrical operation switch shall render inoperative, by itself or through another electric switch in conformity with ~~5.11.2~~4.11.2, the following electric devices:

   1) those used for checking slack rope or chain, according to ~~5.5.5.3~~4.5.5.3 b); in case of hydraulic lifts down movements shall only be enabled when the hydraulic system is preventing further sinking of the ram beyond that causing slackening of all ropes/chains;

Commented [SD1314]: As WG1 comments N2039

   2) those mounted on the car safety gear, according to ~~5.6.2.1.5~~4.6.2.1.5;

Commented [SD1315]: Moved to new line N2055

   3) those for overspeed, according to ~~5.6.2.2.1.6~~ 4.6.2.2.1.6 a) and b);

   4) those mounted on the ascending car overspeed protection means, according to ~~5.6.6.5~~4.6.6.5;

   5) those mounted on the buffers, according to ~~5.8.2.2.4~~4.8.2.2.3;

   6) final limit switches, according to ~~5.12.2~~4.12.2;

e) the emergency electrical operation switch and its push buttons shall be placed so that the lift machine can be observed directly or by display devices (~~5.2.6.6.2~~ 4.2.6.6.2 c);

Commented [AD1316]: TFHAS_74_v4 comment 5.6.2.2.3

f) the car speed shall not exceed 0,30 m/s.

~~5.12.1.6.2~~4.12.1.6.2 The emergency electrical operation means shall have a minimum degree of protection of IPXXD (IEC 60529:1989+AMD1:1999+AMD2:2013).

Rotary control switches shall have a means of prevention of rotation of the stationary member. Friction alone shall not be considered sufficient.

~~4.11.1.7~~4.12.1.7~~5.12.1.7~~Protection for maintenance operations

The control system shall be provided with means to:

— prevent the lift from answering to landing calls and remote commands;

— disable the automatic door operation; and

— give at least terminal floor calls for maintenance.

The means shall be clearly indicated and ~~only~~ accessible only ~~to authorized persons~~by use of a key.

Commented [AD1317]: TFHAS_74_v4

~~4.11.1.8~~4.12.1.8~~5.12.1.8~~Landing and car door bypass device

~~5.12.1.8.1~~4.12.1.8.1 For maintenance of contacts of the landing door, car door, and door locking, a bypass device shall be provided in the control panel or emergency and test panel.

~~5.12.1.8.2~~4.12.1.8.2 The device(s) shall be either a switch protected against unintended use by mechanically movable means (e.g. cover, security cap) permanently installed, or a plug socket combination.

Commented [IJ1318]: See N1537 & N1541

Following conditions for functioning shall satisfy the requirements for electric safety devices according ~~5.11.2~~4.11.2:

a) bypassing the contacts of the landing doors (4.3.9.4~~5.3.9.4~~, 4.3.11.2~~5.3.11.2~~), the landing door locks (4.3.9.1~~5.3.9.1~~), the car door(s) (4.3.13.2~~5.3.13.2~~) and the car door locks (4.3.9.2~~5.3.9.2~~) shall be possible;

b) it shall not be possible to bypass the contacts of the car door(s) and landing doors at the same time;

c) in case of manually operated landing doors, it shall not be possible to bypass the contacts of the landing doors (4.3.9.4~~5.3.9.4~~) and the landing door locks (4.3.9.1~~5.3.9.1~~) at the same time;

d) movement of the car shall only be possible in inspection operation (~~5.12.1.5~~4.12.1.5) or emergency electrical operation (~~5.12.1.6~~4.12.1.6);

~~a) be a switch protected against unintended use by mechanically movable means (e.g. cover, security cap) permanently installed, or~~

~~5.12.1.8.3~~4.12.1.8.3 Other conditions for functioning when any of bypass devices is in bypass state:

a) normal operation controls (~~5.12.1.1.1~~4.12.1.1.1), including the operation of any automatic power-operated doors, shall be neutralized;

Commented [SD1319]: Combined comments N2055 (comment 028 note this was clause 5.12.1.8.4 a) but the order was changed see comment below)

b) a separate monitoring signal shall be provided to check that the car door(s) is/are in the closed position in order to allow a car movement with bypassed car door closed contact(s). This applies also if the car door closed contact(s) and the car door locked contact(s) are combined;

c) an audible signal in the car and a flashing light under the car shall be activated during movement. The sound level of the audible warning shall be minimum 55 dB(A) below the car at a distance of 1,00 m.~~b) a plug socket combination~~

Commented [SD1320]: Combined comments N2055 & N2176 (note comment 428 called for the order of the clauses 5.12.1.8.3 & 5.12.1.8.4 to be changed from the proposal in N 2176)

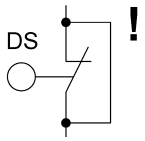
~~The device(s) in a) or b) which shall satisfy the requirements for electric safety devices according 5.11.2.~~

Commented [SD1321]: Combined comments N2055 & N2176

~~5.12.1.8.4~~~~3~~4.12.1.8.4 The landing and car door bypass devices shall be identifiable by the word "**BYPASS**" written on or near to them. In addition, the contacts to be bypassed shall be indicated with the identifiers according to the electrical diagrams.

Commented [SD1322]: Was originally 5.12.1.8.3 Combined comments N2055 & N2176 (note comment 428 called for the order of the clauses 5.12.1.8.3 & 5.12.1.8.4 to be changed from the proposal in N 2176)

Alternatively, the symbol shown in Figure ~~23~~36 together with an identifier according to electric diagrams can be used.



Key

DS example of designation found on the wiring diagram

Figure ~~23~~ 36 — Bypass ~~pictograms~~symbol

The activation state of the bypass device(s) shall be clearly indicated.

~~The following conditions for functioning shall be satisfied:~~

~~a) normal operation controls, including the operation of any automatic power-operated doors, shall be neutralized;~~

~~b) bypassing the contacts of the landing doors (5.3.9.4, 5.3.11.2), the landing door locks (5.3.9.1), the car door(s) (5.3.13.2) and the car door locks (5.3.9.2) shall be possible;~~

~~c) it shall not be possible to bypass the contacts of the car door(s) and landing doors at the same time;~~

~~d) a separate monitoring signal shall be provided to check that the car door(s) is/are in the closed position in order to allow a car movement with bypassed car door closed contact(s). This applies also if the car door closed contact(s) and the car door locked contact(s) are combined;~~

~~e) in case of manually operated landing doors, it shall not be possible to bypass the contacts of the landing doors (5.3.9.4) and the landing door locks (5.3.9.1) at the same time;~~

~~f) movement of the car shall only be possible in inspection operation (5.12.1.5) or emergency electrical operation (5.12.1.6);~~

~~g) an audible signal in the car and a flashing light under the car shall be activated during movement. The sound level of the audible warning shall be minimum 55 dB(A) below the car at a distance of 1 m.~~

Commented [SD1323]: Combined comments N2055 & N2176

~~4.11.1.9~~4.12.1.9~~5.12.1.9~~Prevention of automatic ~~normal~~ operation of the lift with faulty door contact circuits

During automatic operation, t~~T~~he correct operation of:

Commented [SD1324]: Combined comments N2055 & N2175

— the ~~electric safety device~~ circuit used for checking the closed position of a car door (~~5.3.13.2~~4.3.13.2);~~,~~

— the ~~electric safety device~~ circuit used for checking the locked position of a landing door locking device (4.3.9.1~~5.3.9.1~~) ; and

— the monitoring signal referred to in ~~5.12.1.8.3 d~~4.12.1.8.3 b)~~,~~

Commented [SD1325]: Combined comments N2055 & N2176 (number was updated from 5.12.1.8.4 c) to 5.12.1.8.3 c) due to comment 428)

shall be ~~monitored~~ checked at least once while the car is in the unlocking zone, the car door is opened and the landing door lock is released.

The contacts of a door assembly may be checked in a series connected circuit

If a circuit or the monitoring signal ~~devices is~~are detected ~~as~~ faulty, ~~the~~ automatic ~~normal~~ operation of the lift shall be prevented.

Commented [SD1326]: Combined comments N2055 & N2175

Commented [SD1327]: As agreed in WG1 comments 1986 Annex VIII

~~4.11.1.10~~4.12.1.10 ~~5.12.1.10~~ Electrical anti-creep system (see Table 15)

An electrical anti-creep system shall satisfy the following conditions:

a) the car shall be dispatched automatically to the lowest landing within 15 min after the last normal journey;

b) in the case of a lift provided with manually operated doors, or with power-operated doors where closing is carried out under the continuous control of the users, there shall be a notice in the car as follows:

"**CLOSE DOORS**".

The minimum height of the characters shall be 50 mm;

c) there shall be an inscription on or near the main switch as follows:

"Switch off only when the car is at the lowest landing".

~~4.11.1.11~~4.12.1.11 ~~5.12.1.11~~ Stopping devices

~~5.12.1.11.1~~4.12.1.11.1 A stopping device shall be provided for stopping, and maintaining the lift out of service, including the power-operated doors:

a) in the lift pit [~~5.2.1.5.1 4.2.1.4.1~~4.2.1.3.1 a)];

b) in the pulley room [~~5.2.1.5.2 c)4.2.1.4.3~~4.2.1.3.3];

c) on the car roof [~~5.4.8~~ 4.4.8 b)];

d) at the inspection control devices [~~5.12.1.5.1.2~~ 4.12.1.5.1.2 d)];

e) at the lift machine, unless there is a main switch or another stopping device ~~nearby that is directly~~ accessible within 1,00 m without obstruction;

Commented [AD1328]: TFHAS_74_v4

f) at the test panel(s) (~~5.2.6.6~~4.2.6.6), unless there is a main switch or another stopping device ~~nearby that is directly~~ accessible within 1,00 m without obstruction.

Commented [AD1329]: TFHAS_74_v4

The marking "**STOP**" shall be on or near the stopping device.

~~5.12.1.11.2~~4.12.1.11.2 The stopping devices shall consist of electric safety devices in conformity with ~~5.11.2~~4.11.2. They shall be bi-stable and such that a return to service cannot result from an involuntary action.

Button type devices according to IEC 60947-5-5:1997+AMD1:2005+AMD2:2016 shall be used as stopping device.

~~5.12.1.11.3~~4.12.1.11.3 A stopping device in the car shall not be used.

4.12.1.12 ~~5.12.1.12~~ Control of automatic rescue operation

~~5.12.1.12.1~~ 4.12.1.12.1 Automatic rescue operation if provided shall move the lift car to a landing in case of failure or loss of power supply.

~~5.12.1.12.2~~ 4.12.1.12.2 The automatic rescue operation shall not make ineffective any electric safety device unless additional electric safety device provides same safety function.

NOTE As example electric safety devices for Overspeed detection and Check on retardation can be replaced with additional electric safety device which operates at buffer rated speed or lower.

~~5.12.1.12.3~~ 4.12.1.12.3 Car speed shall not exceed rated speed during automatic rescue operation.

~~5.12.1.12.4~~ 4.12.1.12.4 Stopping accuracy ~~during~~ after a car movement with automatic rescue operation shall be +/-20mm. Re-levelling is not required

Opening of doors during levelling according to ~~5.12.1.4~~4.12.1.4 shall not be permitted during automatic rescue operation.

An acoustic signal shall operate at any time the ~~door(s) is (are)~~ doors are not closed when the car is more than 20mm from the landing for more than 3 seconds.

~~5.12.1.12.5~~ 4.12.1.12.5 Automatic rescue operation may use on-board power supply common with other functions provided that all corresponding performance requirements are fulfilled after automatic rescue operation is ceased.

~~4.11.2~~4.12.2 ~~5.12.2~~ Final limit switches

~~4.11.2.1~~4.12.2.1~~5.12.2.1~~General

Final limit switches shall be provided:

a) at top and bottom of travel for traction and positive drive lifts;

b) at top of travel only for hydraulic lifts.

Final limit switches shall ~~be set to function as close as possible to the terminal floors, without risk of accidental operation.~~

~~They shall~~ operate before the car (or counterweight if there is one) comes into contact with the buffers or the ram comes into contact with its cushioned stop. The actuation of the final limit switches shall be maintained while the buffers are compressed or the ram is in the zone of the cushioned stop.

~~4.11.2.2~~4.12.2.2~~5.12.2.2~~Actuation of the final limit switches

~~5.12.2.2.1~~4.12.2.2.1 Separate actuating devices shall be used for normal terminal stopping and final limit switches.

~~5.12.2.2.2~~4.12.2.2.2 In the case of positive drive lifts, actuation of the final limit switches shall be effected by:

a) a device linked to the movement of the lift machine; or

b) the car and by the balancing weight, if there is one, at the top of the well; or

c) the car at the top and the bottom of the well, if there is no balancing weight.

Commented [SD1330]: As agreed in WG1 comments 23/11/2020

Commented [SD1331]: As agreed in WG1 comments 23/11/2020

Commented [SD1332]: As agreed in WG1 comments 23/11/2020

Commented [AD1333]: TFHAS_74_v4

Commented [AD1334]: TFHAS_74_v4 comment 5.6.2.2.3

Commented [SD1335]: N2055 combined comments

~~5.12.2.2.3~~4.12.2.2.3 In the case of traction drive lifts, actuation of the final limit switches shall be effected either:

a) directly by the car at the top and bottom of the well; or

b) indirectly by a ~~device~~rope, belt or chain linked to the car~~, e.g. by a rope, belt or chain~~.

~~In case b), breakage of, or slack in, this linkage shall cause the machine to stop by means of an electric safety device in conformity with 5.11.2.~~

~~5.12.2.2.4~~4.12.2.2.4 In the case of direct acting hydraulic lifts, actuation of the final limit switch shall be effected either:

a) by the car or the ram, or

b) indirectly by a ~~device~~rope, belt or chain linked to the car~~, e.g. by a rope, belt or chain~~.

~~In case b) the machine shall be stopped by means of an electric safety device in conformity with 5.11.2 if breakage or slack in this linkage occurs.~~

~~5.12.2.2.5~~4.12.2.2.5 In the case of indirect acting hydraulic lifts, actuation of the final limit switch shall be effected:

a) either directly by the ram; or

b) indirectly by a ~~device~~rope, belt or chain linked to the ram~~, e.g. by a rope, belt or chain~~.

~~In case b), the machine shall be stopped by means of an electric safety device in conformity with 5.11.2 if breakage of, or slack in, this linkage occurs.~~

4.12.2.2.6 In the case of 4.12.2.2.3 b), 4.12.2.2.4 b) and 4.12.2.2.5 b) the breakage of, or slack in, the linkage shall be checked by an electric safety device in conformity with 4.11.2.

~~4.11.2.3~~4.12.2.3~~5.12.2.3~~**Method of operation of final limit switches**

~~5.12.2.3.1~~4.12.2.3.1 The final limit switch(es) shall open:

a) directly by positive mechanical separation of the circuits feeding the lift machine ~~motor and brake~~; or

b) an electric safety device in conformity with ~~5.11.2~~4.11.2.

~~5.12.2.3.2~~4.12.2.3.2 After the operation of the final limit switches, car movement in response to car and landing calls shall no longer be possible, even in the case of the car leaving the actuation zone by creeping for hydraulic lifts.

When an electrical anti-creep system as per ~~5.12.1.10~~4.12.1.10 is used, the automatic dispatch of the car according to ~~5.12.1.10~~ 4.12.1.10 a) shall come into operation immediately as soon as the car leaves the actuation zone of the final limit switch.

The return of the lift to automatic ~~normal~~ operation ~~of the lift~~ shall require intentional reset by means on site [see 6.2.4 g)]. A power cycle by itself shall not provide this reset.~~the intervention of a competent maintenance person competent in maintenance procedures.~~

Commented [AD1336]: IR3

Commented [AD1337]: Editorial alignment considering TFHAS_74_v4, comment 5.6.2.2.3 and AH6 comment

Commented [AD1338]: IR3

Commented [AD1339]: TFHAS_74_v4 comment 5.6.2.2.3

Commented [AD1340]: Editorial alignment considering TFHAS_74_v4, comment 5.6.2.2.3 and AH6 comment

Commented [AD1341]: IR3

Commented [AD1342]: Editorial alignment considering TFHAS_74_v4, comment 5.6.2.2.3 and AH6 comment

Commented [AD1343]: Editorial alignment considering TFHAS_74_v4, comment 5.6.2.2.3 and AH6 comment

Commented [AD1344]: Editorial alignment considering TFHAS_74_v4, comment 5.6.2.2.3 and AH6 comment

Commented [SD1345]: N1976

Commented [SD1346]: Combined comments N2055 & N2175

Commented [IJ1347]: See N1538

Commented [AD1348]: TFHAS_74_v4

~~4.11.3~~4.12.3 ~~5.12.3~~ Emergency alarm device and intercom system

~~5.12.3.1~~4.12.3.1 A ~~remote alarm~~communication system in accordance with EN 81-28:2022, 4, 5, 6 and 7 shall be installed (see also ~~5.2.1.6~~4.2.1.5~~4~~.2.1.4) ensuring a two-way voice communication allowing permanent contact with a rescue service.

Commented [AD1349]: name of EN 81-28 will change

Commented [SD1350]: Added reference

Commented [AD1351]: TFHAS_74_v4

~~5.12.3.2~~4.12.3.2 An intercom system, or similar device, powered by the emergency supply referred to in ~~5.4.10.4~~4.4.10.4, shall be installed between inside the car and the place from which the emergency operation is carried out, if the lift travel exceeds 30 m, or if a direct acoustic communication between both locations is not possible.

~~4.11.4~~4.12.4 ~~5.12.4~~ Priorities and signals

~~5.12.4.1~~4.12.4.1 For lifts with manual doors, a device shall prevent the car leaving a landing for a period of at least 2 s after stopping.

~~5.12.4.2~~4.12.4.2 After the car door is closed, there shall be at least 2 s to register a car call before an external command becomes effective. ~~A passenger entering the car shall have at least 2 seconds after the doors have closed, to actuate a control device before any external call buttons can become effective.~~

This requirement ~~need~~ shall not apply in the case of lifts operating on collective control.

Commented [SD1352]: As WG1 comments N2045

~~5.12.4.3~~4.12.4.3 In the case of collective control, an illuminated signal, ~~which is clearly visible from the landing,~~ shall indicate to the users waiting on this landing the direction of the next movement imposed on the car.

Commented [SD1353]: As WG1 comments N2045

~~For groups of lifts, position indicators on the landings are not recommended. However, it is recommended that the arrival of a car be preceded by an audible signal.~~

Commented [SD1354]: As WG1 comments N2045

5 ~~6~~Verification of the safety requirements and/or protective measures

~~5.1 6.1 Technical compliance documentation~~

~~Technical compliance documentation shall be provided to facilitate the verification according to 6.2. The technical compliance documentation shall contain the necessary information to ascertain that the constituent parts are correctly designed and the installation is in conformity with this document.~~

~~NOTE Annex B gives guidance on the information to be included in the technical compliance documentation.~~

Commented [SGD1355]: TFHAS

~~5.2~~5.1~~6.2~~1 Verification ~~of design~~methods

Commented [SGD1356]: TFHAS

Table 23 indicates the methods by which the safety requirements and/or protective measures described in Clause ~~5~~4 shall be verified. Secondary subclauses, which are not listed in Table 23, are verified as part of the quoted subclause. For example, ~~5.2.2.4~~4.2.2.4 is verified as part of ~~5.2.2~~4.2.2.

~~Devices subject to tests according to ISO 8100-1:2023 are listed in Annex xyz.~~

Commented [SGD1357]: TFHAS comment on 5.6.2.2.1.8.
Rather use means instead of devices.
More means are tested according to ISO 8100-2 than safety components, e.g. doors and suspension means.
No Annex foreseen.

Commented [SGD1358]: Needs to be revised when all changes are agreed.

Table 23 — Means of verification of the safety requirements and/or protective measures

Sub-clause	Safety requirements	Visual inspection[a]	Performance check / test[b]	Measure-ment[c]	Drawing / calculation[d]	User information[e]
~~5.1~~4.1.1	**General**					
~~5.1.1~~4.1.1.1	Non-significant hazards	✓				✓
~~4.1.2~~						✓
4.1.2~~3~~	Fixing system of guards					✓
~~5.1.2~~4.1.1.4	Notices and Labels	✓				✓
~~5.2~~4.2.2	**Well, machinery spaces and pulley rooms**					
~~5.2.1~~4.2.1.1	General provisions	✓	✓	✓	✓	✓
~~5.2.2~~4.2.2.2	Access to ~~well and to machinery spaces and pulley rooms~~the pit	✓		✓		✓
~~5.2.3~~4.2.2.3	Access, ~~and~~ emergency, ~~doors — Access~~ trap ~~doors — and Inspection~~ inspection doors	✓		✓		✓
~~5.2.4~~4.2.2.4	Notices	✓				✓
~~5.2.5~~4.2.2.5	Well	✓	✓	✓	✓	✓
~~5.2.6~~4.2.2.6	Machinery spaces and pulley rooms	✓	✓	✓	✓	✓

Commented [AD1359]: To be updated

Sub-clause	Safety requirements	Visual inspection[a]	Performance check / test[b]	Measure-ment[c]	Drawing / calculation[d]	User information[e]
~~5.3~~4.3	**Landing doors and car doors**					
~~5.3.1~~4.3.1	General provisions	✓		✓	✓	
~~5.3.2~~4.3.2	Height and width of entrances			✓	✓	
~~5.3.3~~4.3.3	Sills, guides, door suspension	✓	✓		✓	
~~5.3.4~~4.3.4	Horizontal door clearances	✓	✓	✓	✓	✓
~~5.3.5~~4.3.5	Strength of landings and car doors	✓	✓	✓	✓	✓
~~5.3.6~~4.3.6	Protection in relation to door operation	✓	✓	✓	✓	✓
~~5.3.7~~4.3.7	~~Local landing lighting and~~ “~~car~~ Car here” ~~signal lights~~indication	✓	✓	✓		✓
~~5.3.8~~4.3.8	Locking and closed landing door check	✓	✓			✓
~~5.3.9~~4.3.9	Locking and emergency unlocking of landing and car doors	✓	✓			✓
~~5.3.10~~4.3.10	Requirements common to devices for proving the locked condition and the closed condition of the landing door		✓			
~~5.3.11~~4.3.11	Sliding landing doors with multiple, mechanically linked panels	✓	✓		✓	
~~5.3.12~~4.3.12	Closing of automatically operated landing doors	✓	✓		✓	✓
~~5.3.13~~4.3.13	Electric safety device for proving the car doors closed	✓	✓			✓
~~5.3.14~~4.3.14	Sliding or folding car doors with multiple, mechanically linked panels	✓	✓		✓	
~~5.3.15~~4.3.15	Opening the car door	✓	✓		✓	

Commented [IJ1360]: See N1564

Sub-clause	Safety requirements	Visual inspection[a]	Performance check / test[b]	Measure-ment[c]	Drawing / calculation[d]	User information[e]
~~5.4~~.4.4	**Car, counterweight and balancing weight**					
~~5.4.1~~4.4.1	Height of car			✓	✓	✓
~~5.4.2~~4.4.2	Available car area, rated load, number of passengers		✓	✓	✓	✓
~~5.4.3~~4.4.3	Walls, floor and roof of the car	✓			✓	
~~5.4.4~~4.4.4	Car door, floor, wall, ceiling and decorative materials	✓			✓	
~~5.4.5~~4.4.5	Apron	✓		✓	✓	
~~5.4.6~~4.4.6	Emergency trap doors and emergency doors	✓		✓	✓	✓
~~5.4.7~~4.4.7	Car roof	✓	✓	✓	✓	✓
~~5.4.8~~4.4.8	Equipment on top of the car	✓	✓			
~~5.4.9~~4.4.9	Ventilation	✓			✓	
~~5.4.10~~4.4.10	Lighting	✓	✓	✓	✓	✓
~~5.4.11~~4.4.11	Counterweight/balancing weight	✓			✓	
~~5.5~~4.5	**Suspension means, compensation means and related protection means**					
~~5.5.1~~4.5.1	Suspension means and related sheaves/drums/sprockets	✓		✓	✓	✓
~~5.5.2~~4.5.2	Sheave, pulley, drum and rope/load bearing member diameter or thickness ratios, rope/chain and their terminations	✓		✓	✓	
~~5.5.3~~4.5.3	Suspension means~~Rope~~ traction/transmission		✓		✓	
~~5.5.4~~4.5.4	Winding up of ropes for positive drive lifts		✓		✓	
~~5.5.5~~4.5.5	Distribution of load between the suspension means~~ropes or the chains~~	✓	✓		✓	
~~5.5.6~~4.5.6	Compensation means		✓		✓	
~~5.5.7~~4.5.7	Protection for sheaves, pulleys and sprockets	✓			✓	
~~5.5.8~~4.5.8	Traction sheaves, pulleys and sprockets in the well	✓		✓	✓	
4.5.9	Marking for suspension and compensation means	✓				✓
~~5.6~~4.6	**Precautions against free fall, excessive speed, unintended car movement and creeping of the car**					
~~5.6.1~~4.6.1	General provisions	✓			✓	✓
~~5.6.2~~4.6.2	Safety gear and its tripping means	✓	✓		✓	✓
~~5.6.3~~4.6.3	Rupture valve	✓	✓		✓	✓
~~5.6.4~~4.6.4	Restrictors	✓	✓	✓	✓	

Commented [SGD1361]: TFHAS comment not clear

Commented [SGD1362]: TFHAS

Commented [SGD1363]: TFHAS

Sub-clause	Safety requirements	Visual inspection[a]	Performance check / test[b]	Measure-ment[c]	Drawing / calculation[d]	User information[e]
5.6.54.6.5	Pawl device	✓	✓		✓	
5.6.64.6.6	Ascending car overspeed protection means	✓	✓	✓	✓	✓
5.6.74.6.7	Protection against unintended car movement	✓	✓	✓	✓	✓
5.74.7	**Guide rails**					
5.7.14.7.1	Guiding of the car, counterweight or balancing weight	✓			✓	✓
5.7.24.7.2	Permissible stresses and deflections	✓			✓	
5.7.34.7.3	Combination of loads and forces				✓	
5.7.44.7.4	Impact factors				✓	
5.84.8	**Buffers**					
5.8.14.8.1	Car and counterweight buffers	✓	✓	✓	✓	✓
5.8.24.8.2	Stroke of car and counterweight buffers	✓	✓		✓	✓
5.94.9	**Lift machinery and associated equipment**					
5.9.14.9.1	General provision	✓			✓	
5.9.24.9.2	Lift machine for traction lifts and positive drive lifts	✓	✓	✓	✓	✓
5.9.34.9.3	Lift machine for hydraulic lifts	✓	✓	✓	✓	✓
5.104.10	**Electric installations and appliances**					
5.10.14.10.1	General provisions	✓	✓	✓	✓	✓
5.10.24.10.2	Incoming supply conductor terminations				✓	
5.10.34.10.3	Contactors, contactor relays, components of safety circuits	✓	✓		✓	
5.10.44.10.4	Protection of electrical equipment	✓	✓		✓	✓
5.10.54.10.5	Main switches	✓	✓		✓	✓
5.10.64.10.6	Electric wiring	✓			✓	
5.10.74.10.7	Lighting and socket outlets	✓	✓		✓	✓
5.10.84.10.8	Control of the supply for lighting and socket outlets	✓	✓		✓	✓
5.10.94.10.9	Protective earthing		✓		✓	
5.10.104.10.10	Electrical identification	✓			✓	✓
5.114.11	**Protection against electric faults; failure analysis; electric safety devices**					
5.11.14.11.1	Protection against electric faults; failure analysis	✓	✓		✓	✓

Sub-clause	Safety requirements	Visual inspection[a]	Performance check / test[b]	Measure-ment[c]	Drawing / calculation[d]	User information[e]
5.11.24.11.2	Electric safety devices	✓	✓		✓	✓
5.124.12	**Controls — Final limit switches — Priorities**					
5.12.14.12.1	Control of lift operations	✓	✓	✓	✓	✓
5.12.24.12.2	Final limit switches	✓	✓		✓	
5.12.34.12.3	Emergency alarm device and intercom system	✓	✓	✓	✓	✓
5.12.44.12.4	Priorities and signals	✓	✓	✓	✓	✓

[a] Visual inspection is ~~used~~ to verify whether the feature~~s~~ ~~necessary~~ called for by the requirement~~, by visual examination of the components supplied~~ is present~~.~~

[b] A performance check/test verifies that the features provided perform their function in such a way that the requirement is met.

[c] Measurement verifies, by the use of instruments, that requirements are met to the specified limits.

[d] Drawings/calculations verify that the design characteristics of the components provided meet the requirements.

[e] Verify that the relevant point is dealt with in the instructions ~~handbook~~ or by marking.

~~5.3~~5.2 ~~6.3~~ Specific E~~e~~xaminations and tests ~~before putting into service~~on installed lift

5.2.1 ~~6.3.1~~ General

Before the lift is put into service, the particular tests specified in ~~6.3.2~~5.2.2 to ~~6.3.17~~5.2.17, as referred to in Table 23, shall be carried out.

~~5.3.1~~5.2.2 ~~6.3.2~~ Braking system (~~5.9.2.2~~4.9.2.2)

~~Before the lift is put into service, the particular tests specified in 6.3.1 to 6.3.14, as referred to in Table 18~~21, shall be carried out.

The test shall demonstrate that:

a) the ~~electro-mechanical~~ machine brake on its own is capable of stopping the lift machine. The test shall be carried out when the car is travelling downwards at the lower end of the well, at ~~the~~ rated speed and with ~~the~~ rated load plus 25 %. ~~In these conditions, the retardation of the car shall not exceed that resulting from operation of the safety gear or stopping on the buffer;~~

b) ~~additionally, it shall be verified by practical tests that,~~ where one brake set is not working, ~~a sufficient braking effort~~minimum braking torque ~~is exerted to~~ the remaining brake set(s) decelerate, stop and hold the car, when travelling downwards at the lower half of the well, at ~~the~~ rated speed and with ~~the~~ rated load plus 10% in the car and travelling upwards with empty car (see ~~5.9.2.2.2.1~~4.9.2.2.2.1);

c) with the machine brake manually released and the car loaded from ~~within the limits of~~ see Formula~~e~~ (~~(~~2018) ~~and (21)~~:

0% of rated load to (q – 0,1) Q and from (q + 0,1) Q to 100% of rated load (18)

~~$(q - 0{,}1) \cdot Q$ (20)~~

~~$(q + 0{,}1) \cdot Q$ (21)~~

where

q is the balance factor indicating the amount of counterbalance of the rated load by the counterweight, and;

Q is the rated load

it shall be verified that the manual release of the machine brake (~~5.9.2.2.2.7~~ ~~5.9.2.3.1~~4.9.2.3.1) causes a natural movement of the lift, or that the means for that purpose (~~5.9.2.2~~3.32.9 4.9.2.3.3 b) are available and operative.

Commented [SGD1364]: Renumber all clauses 6.3 > 6.2.

Commented [SGD1365]: TFHAS

Commented [SD1366]: As combined comments N0255

Commented [SD1367]: Renumbered due to new 6.3.1

Commented [SD1368]: Moved hanging paragraph from braking systems to new General clause, as per WG1 comments N1969 also update the numbering of section 6.3

Commented [SD1369]: N1976

Commented [AD1370]: TFHAS_74_v4 comment 5.6.2.2.3

Commented [SGD1371]: TFHAS

Commented [SD1372]: As per WG1 comments N1969

Commented [SGD1373]: TFHAS

Commented [SD1374]: As WG1 comments N2045

Commented [SD1375]: Change made in line with N1976

Commented [IJ1376]: See N1538

Commented [GE1377]: INT 001

Commented [SD1378]: As per WG1 comments N1954

Commented [SD1379]: N1976

Commented [SD1380]: Updated ref due to changes from N2192

Commented [SD1381]: Updated ref due to changes from N2192

~~5.3.2~~5.2.3 ~~6.3.3~~ Electric installation

The following tests shall be performed:

a) visual check ~~(e.g. damage, loose wires, all earth wires connected)~~;

b) continuity of the protective conductors according to IEC 60364-6:2016, ~~61.3.2 a)~~6.4.3.2 (~~5.10.9~~4.10.9);

c) measurement of the insulation resistance of the different circuits (~~5.10.1.3~~4.10.1.3). For this measurement, all the electronic components shall be disconnected;

d) verification of the effectiveness of the measures for fault protection (protection against indirect contact) by automatic disconnection of supply according to IEC 60364-6:2016, ~~61.3.6~~6.4.3.7 and ~~61.3.7~~6.4.3.8.

~~5.3.3~~5.2.4 ~~6.3.4~~ Checking of the traction (~~5.5.3~~4.5.3)

~~6.3.4.1~~5.2.4.1 The traction shall be checked by making several stops with the most severe braking compatible with the installation. At each test, complete stoppage of the car shall occur.

The test shall be carried out:

a) ascending, with the car empty, in the upper part of the travel;

b) descending, with the car loaded with 125 % of the rated load, in the lower part of the travel.

~~6.3.4.2~~5.2.4.2 With the car empty ~~T~~the counterweight shall be brought into contact with the buffer(s) and the lift machine shall continue to be turned until:

a) suspension means~~rope~~ slippage occurs see ~~5.5.3.1~~4.5.3.1 c) 1); or

b) the electric safety device according ~~5.5.3.1~~4.5.3.1 ~~c) 2)~~4.5.3.1.3 stops the car before its highest position according ~~5.2.5.6.1~~4.2.5.6.1.~~If slippage does not occur, the car shall not be raised. It shall be checked that the balance is as stated by the installer.~~

Commented [AD1382]: IR3

Commented [AD1383]: Updated to new revision of IEC

Commented [AD1384]: Updated to new revision of IEC

Commented [AD1385]: TFHAS_74_v4 comment 5.6.2.2.3

Commented [AD1386]: Reference corrected

Commented [SD1387]: Combined comments N2055 (440)

~~5.3.4~~5.2.5 ~~6.3.5~~ Car safety gear (~~5.6.2~~4.6.2)

The aim of the test, before putting into service, is to check the correct mounting, correct setting and the soundness of the complete assembly, comprising car and decorative finishes, safety gear, guide rails and their fixing to the building.

The safety gear~~test~~ shall be triggered~~made~~ while the car is descending, with the required load uniformly distributed over the car area, the lift machine running until the suspension means~~ropes~~ slip or become slack, and under the following conditions:

a) instantaneous safety gear:

The car shall travel at the rated speed and be loaded ~~either:~~

~~1)~~ with the rated load, ~~when the rated load corresponds to Table 6 (5.4.2.1), or~~

~~2) for hydraulic lift;~~

~~with 125% of the rated load, or~~

~~in case of lifts designed and load capacities to table 7, a load corresponding to the load from table 6~~

~~for hydraulic lifts, with 125 % of the rated load, except that the load shall not exceed the corresponding Table 6 load when the rated load is smaller than the value given in Table 6 (5.4.2.1);~~

b) progressive safety gear:

For traction drive lifts, the car shall be loaded with 125 % of rated~~the rated~~ load, and travel at the rated speed or lower.

For positive drive lifts and hydraulic lifts~~, when the rated load corresponds with Table 6 (5.4.2.1),~~ the car shall be loaded with the ~~rated~~ rated load, and travel at the rated speed or lower.

~~For hydraulic lifts, when the rated load is smaller than the value given by Table 6 (5.4.2.1), the car shall be loaded with 125 % of the rated load, except that the load shall not exceed the corresponding Table 6 load, and travel at rated speed or lower.~~

When the test is made at a speed lower than the rated speed, the manufacturer shall provide curves to illustrate the behaviour of the type tested progressive safety gear when dynamically tested with the suspensions attached.

After the test, ~~it~~ a visual check shall ~~be~~ ascertain~~ed~~ that no deterioration, except on replaceable friction components, which ~~could adversely~~ affects the normal use of the lift has occurred. ~~If necessary, friction components may be replaced. Visual check is considered to be sufficient.~~

In order to facilitate disengagement of the safety gear, it is recommended that the test be carried out opposite a door in order to be able to unload the car.

Commented [SD1388]: As per WG1 comments N1954

Commented [AD1389]: TFHAS_74_v4 comment 5.6.2.2.3

Commented [SD1390]: Combined comments N2055 & N2190

Commented [IJ1391]: WG1 comment to make the requirement clearer.

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Commented [SD1392]: As per WG1 comments N1954 Annex VII

Commented [SD1393]: Combined comments N2055 & N2190

Commented [SD1394]: Combined comments N2055 & N2190

Commented [SD1395]: As per WG1 comments N1954 Annex VII

Commented [SGD1396]: TFHAS

~~5.3.5~~5.2.6 ~~6.3.6~~ Counterweight or balancing weight safety gear (~~5.6.2~~4.6.2)

The aim of the test, before putting into service, is to check the correct mounting, correct setting and the soundness of the complete assembly, comprising counterweight or balancing weight, safety gear, guide rails and their fixing to the building.

The test shall be made while the counterweight or the balancing weight is descending, and under the following conditions. The lift machine shall remain running until the ropes slip or become slack:

a) for instantaneous safety gear tripped by overspeed governor or safety rope, the test shall be made with an empty car, at the rated speed;

b) for progressive safety gear, the test shall be made with an empty car, at the rated speed or lower.

When the test is made at a speed lower than the rated speed, the manufacturer shall provide curves to illustrate the behaviour of the type tested progressive safety gear under counterweight or balancing weight application when dynamically tested with the suspensions attached.

After the test, ~~it~~a visual check shall ~~be~~ ascertain~~ed~~ that no deterioration, except on replaceable friction components, which ~~could adversely~~ affects the normal use of the lift has occurred. ~~If necessary, friction components may be replaced. Visual check is considered to be sufficient.~~

~~5.3.6~~5.2.7 ~~6.3.7~~ Pawl device (5.6.5)

a) dynamic test:

The test shall be made while the car is travelling at a rated ~~normal~~ speed downwards, with the load uniformly distributed; the contacts on the Pawl device and on the energy dissipation buffer [5.6.5.7 b)], if any, being short-circuited to avoid closing of the down direction valves.

The car shall be loaded with 125 % of the rated load and shall be stopped by the pawl device at each landing.

After the test, ~~it~~a visual check shall ~~be~~ ascertain~~ed~~ that no deterioration which ~~could adversely~~ affects the normal use of the lift has occurred~~. Visual check is considered to be sufficient~~;

b) visual examination of the engagement of the pawl(s) with all supports, and of the running clearance measured horizontally between the pawl(s) and all supports during travel;

c) verification of the stroke of the buffers;

~~5.3.7~~5.2.8 ~~6.3.8~~ Buffers (~~5.8.1, 5.8.2~~4.8)

a) for energy accumulation type buffers, the test shall be carried out in the following manner:

1) the car with its rated load shall be placed on the buffer(s);

2) the suspension means ~~ropes~~ shall be made slack or the pressure in the hydraulic system shall be reduced to the minimum by pressing the emergency manual lowering button; and

3) it shall be checked that the compression corresponds to the values~~figures~~ given in the ~~technical compliance documentation (see Annex B)~~~~logbook~~instructions [~~7.3.2 a) 4)~~6.2.2 b)];

~~NOTE It can be necessary to override the minimum pressure device or temporarily modify the setting of the minimum low pressure device.~~

Commented [AD1397]: TFHAS_74_v4 comment 5.6.2.2.3

Commented [AD1398]: N2247

Commented [SGD1399]: TFHAS

Commented [SD1400]: N2055 combined comments

Commented [SD1401]: N2055 combined comments

Commented [SGD1402]: TFHAS

Commented [IJ1403]: WG1 editorial change

Commented [SGD1404]: TFHAS

b) for energy dissipation type buffers, the test shall be carried out in the following manner: the car with its rated load and the counterweight shall be brought into contact with the buffers at the rated speed or at the speed for which the stroke of the buffers has been calculated, in the case of the use of reduced stroke buffers with verification of the retardation ~~{[5.8.2.2.2~~4.8.2.2.1 b~~)]~~].

After the test, ~~it~~a visual ~~test~~check shall ~~be~~ ascertain~~ed~~ that no deterioration, which ~~could adversely~~ affect~~s~~ the normal use of the lift has occurred. ~~Visual check is considered to be sufficient;~~

~~5.3.8~~5.2.9 ~~6.3.9~~ Rupture valve (~~5.6.3~~4.6.3)

A system test shall be carried out, with the rated load uniformly distributed in the descending car at an overspeed (~~5.6.3.1~~4.6.3.1) to operate the rupture valve. ~~The correct adjustment of the tripping speed can be checked, for instance, by comparison with the manufacture's adjustment diagram (see Annex B).~~

For lifts with several interconnected rupture valves, ~~check~~ the simultaneous closing shall be checked by measuring the inclination of the car floor (~~5.6.3.4~~4.6.3.4);

Commented [SGD1405]: TFHAS

~~5.3.9~~5.2.10 ~~6.3.10~~ Restrictor/one-way restrictor (~~5.6.4~~4.6.4)

Check that the maximum speed, v_{max}, does not exceed v_d + 0,30 m/s:

— either by measuring; or

— by using Formula (19):

$$v_{max} = v_t \sqrt{\frac{p}{p - p_t}} \qquad (19)$$

where

p is the full load pressure, in megapascals;

p_t is the pressure measured during a downward journey with rated load in the car, in megapascals;[a]

v_{max} is the maximum downward speed in the case of a rupture in the hydraulic system, in metres per second;

v_t is the speed measured during a downward journey with rated load in the car, in metres per second.

[a] If necessary, pressure losses and friction losses shall be taken into account.

~~5.3.10~~5.2.11 ~~6.3.11~~ Pressure test

A pressure of 200 % full load pressure is applied to the hydraulic system between the non-return valve and the jack included. The system is then observed for evidence of pressure drop and leakage during a period of 5 min (taking into account the possible effects of temperature change in the hydraulic fluid).

After this test, it shall be visually ascertained that the integrity of the hydraulic system is maintained:

This test should be carried out after the test of the devices against free fall (~~5.6~~4.6), and include any hydraulic elements included in the uncontrolled movement protection means.

~~5.3.11~~5.2.12 ~~6.3.12~~ Ascending car overspeed protection means (~~5.6.6~~4.6.6)

The test shall be made while the empty car is ascending ~~with overspeed at not less than the rated speed~~, using only the means for detecting the overspeed, for actuating the speed reducing elements and ~~this device~~ for braking. If the means requires self-monitoring (~~5.6.6.2~~4.6.6.2), its function shall be checked.

Commented [AD1406]: N2247

Commented [SD1407]: Combined comments N2055

~~5.3.12~~5.2.13 ~~6.3.13~~ Stopping of the car at landings and levelling accuracy (~~5.12.1.1.4~~4.12.1.1.4)

The stopping accuracy of the car shall be verified to be in compliance with ~~5.12.1.1.4~~4.12.1.1.4, at all landings, and in both directions for intermediate floors.

It shall be verified that the car maintains levelling accuracy as per ~~5.12.1.1.4~~4.12.1.1.4 during loading and unloading conditions. This verification shall be made at the most unfavourable floor.

~~5.3.13~~5.2.14 ~~6.3.14~~ Protection against unintended car movement (~~5.6.7~~4.6.7)

The aim of the test before putting into service is to check detection and stopping elements.

Test requirements: only the stopping element of the means defined in ~~5.6.7~~4.6.7 shall be used for the tests for stopping the lift. The test shall:

- consist in verifying that the stopping element of the means is triggered ~~as required by type examination~~;
- be made by moving the empty car in the upward direction in the upper part of the well (e.g. from one floor from top terminal) and a fully loaded car in the downward direction in the lower part of the well (e.g. from one floor from bottom terminal) with a pre-set speed, e.g. as defined during type testing, (inspection speed etc.).

The test~~, as defined by the type examination,~~ shall confirm that the unintended movement distance will not exceed the value given in ~~5.6.7.5~~4.6.7.5.

If the means requires self-monitoring (~~5.6.7.3~~4.6.7.3), its function shall be checked.

NOTE If the stopping element of the means involves elements present at landing floors, it can be necessary to repeat the test for each concerned landing.

~~5.3.14~~5.2.15 ~~6.3.15~~ Protection against falling/shearing (~~5.3.9.3.4~~4.3.9.3.4)

With the car outside of the unlocking zone (see ~~5.3.8.1~~4.3.8.1) and the landing door held open with a gap of 100 mm, it shall be checked that, when released, the landing door closes and locks.

5.2.16 ~~6.3.16~~ Balancing of vertical sliding door (~~5.3.3.3.5~~4.3.3.3.5)

It shall be checked that a vertical sliding door does not start to open or to close by itself when the door is open with 100 mm gap~~it is at a position with a gap of 100 mm from fully closed~~.

5.2.17 ~~6.3.17~~ Counterweight balance (~~5.4.11~~4.5.3)

Before performing tests of traction, machine brakes, ascending car overspeed protection means and unintended car movement protection means, it shall be verified by practical tests or measurements that the counterweight balance is as stated in the instructions. ~~For this purpose, the car shall be loaded with the load according ormula (20) $q \cdot Q$.~~

~~$= q * Q$ (20)~~

~~where:~~

- ~~q is the balance factor indicating the amount of counterbalance of the rated load by the counterweight, and;~~
- ~~Q is the rated load.~~

Commented [AD1408]: TFHAS_74_v4; EU-C3

Commented [AD1409]: TFHAS_74_v4; EU-C3

Commented [SD1410]: Realigned clause number

Commented [SD1411]: Combined comments N2055

Commented [SD1412]: Realigned clause number

Commented [SD1413]:

~~The car shall be positioned at half of the travel height, the machine brake shall be released, and it shall be checked that~~

- ~~the car does not start moving by gravity, and~~
- ~~the effort needed to move the car in both directions, either manually or electrically, is approximately the same~~

Commented [SD1414]: As per WG1 N2045

Commented [AD1415]: Deleted according comment 436 in N2225

6 ~~7~~Information for use

Commented [SGD1416]: Modified according to TFHAS_116-v4

6.1 ~~7.1~~ General

The documentation shall consist of ~~an~~ instruction~~s manual~~ and a logbook.

6.2 ~~7.2~~ Instruction~~s manual~~

6.2.1 ~~7.2.1~~ General

~~The manufacturer/installer shall provide an instruction manual~~Each lift shall be accompanied by instructions as detailed below.

6.2.2 ~~7.2.2~~ Basic data and characteristics

The instructions shall include at least the following information:

a) general description of the lift (characteristics, load, speed, rise, stops, etc.);

b) list and description of main components;

c) plans of the installation in the building;

d) electrical diagrams;

The electrical diagrams shall include at least the circuits for understanding of the safety considerations and use IEC 60617:2012 DB symbols. Any graphical symbol not shown in IEC 60617:2012 DB shall be separately shown and described on the diagrams or supporting documents. Symbols and identification of components and devices shall be consistent throughout electrical diagrams and in line with those provided on the lift (see also ~~5.10.10~~4.10.10).

The abbreviations used with the symbols shall be explained by means of a nomenclature.

If the electrical diagram has several alternatives, it shall be indicated which alternative is valid~~:~~.

e) hydraulic circuit diagrams;

The circuit diagrams shall include at least the circuits for understanding of the safety considerations and use symbols from ISO 1219-1:2012. The abbreviations used with the symbols shall be explained by means of a nomenclature~~:~~.

f) the full load pressure and the minimum operating pressure;

Commented [AD1417]: TFHAS_74_v4 comment 5.9.3.9.1.5

g) the characteristics or type of hydraulic fluid;

h) the characteristics of each incoming supply:

— rated voltage, number of phases and frequency (if AC);
— full load current;
— short circuit rating at the point of incoming supply terminals;

i) configuration record describing parameter settings.

Commented [SGD1418]: DS comment: Combined comments N2055 – Moved from b) below to a) 11) as original proposal in N1722.

~~6.2.2~~6.2.3 ~~7.2.23~~ Information ~~on normal~~for use

The instruction~~s manual~~ shall ~~give the necessary information about the normal use of the lift and rescue emergency operation as described in EN 13015:2001+A1:2008 and,~~include in particular~~, about~~ the following information on normal use:

a) operation of the lift from the landing and from inside the car;

b) ensuring~~keeping~~ the machine and pulley rooms doors are kept locked;

c) safe loading and unloading;

d) the precautions to be taken in case of lifts with partially enclosed well [~~5.2.5.2.3 e)~~4.2.5.2.3 d)];

e) the events needing the intervention of ~~–~~a ~~competent maintenance~~ maintenance person; ~~competent in maintenance procedures;~~

f) information on the ~~ambient temperatures~~environmental conditions for which the lift is designed. ~~including possible extended range, which need to be ensured for safe operation of the lift.~~

~~a) e) the number of persons allowed on the car roof and in the pit for maintenance and inspection;~~

~~b) f) keeping the logbook updated;~~

~~c) g) the location and use of special tools, if any (see 7.2.3);~~

~~d) h) the use of the emergency unlocking key, detailing the essential precautions to be taken in order to avoid accidents which could result from an unlocking which was not followed by effective relocking.~~

~~This key shall be available on the site of the lift installation and accessible only to authorized persons.~~

~~The emergency unlocking key shall have a label attached, drawing attention to the danger which can be involved in using this key and the need to make sure that the door is locked after it has been closed;~~

~~i) rescue emergency operation: in particular, detailed instructions shall be given on the release of the machine brake, ascending car overspeed protection means, unintended car movement protection means, rupture valve and the safety gear, including the identification of special tools, if any;.~~

~~j) Rescue emergency operation and maintenance with heavy/large landing and/or car doors where more than 1 person is needed due to e.g. size, physical distances of unlocking devices or necessary manual forces.~~

Commented [SD1419]: Combined comments N2055 & N2147

Commented [SD1420]: Added reference

Commented [SD1421]: As agreed in WG1 comments N 1954

Commented [IJ1422]: See N1538

Commented [SGD1423]: TFHAS comment on 0.4.16. AD: Modified in relation with building Annex

Commented [SD1424]: Deleted combined comments N2055

Commented [SD1425]: Combined comments N2055 & N2147

Commented [SD1426]: N1976

Commented [SD1427]: Combined comments N2055 & N2147

Commented [SD1428]: As Per WG1 comments N1969

Commented [IJ1429]: See N1564

Commented [SD1430]: Combined comments N2055

~~6.2.3~~6.2.4 ~~7.2.34~~ Information ~~on~~for maintenance

The instructions ~~manual~~ shall include in particular the following information ~~on~~for maintenance: ~~be in accordance with EN 13015:~~2001+A1:2008~~2019~~.

~~It shall inform in particular about:~~

a) content, frequency and procedures for required maintenance to ensure the safe and intended functioning of the installation;

b) list of the ~~elements~~components or parts that must be regularly checked in order to detect excessive wear and/or aging;

c) criteria for the repair or replacement of parts subject to wear and/or aging;

d) parameters for re-adjustment of components, if needed;~~.~~

~~number of persons allowed on the car roof and in the pit for maintenance and inspection;~~

e) procedures ~~regarding the escape~~ to leave the well during the maintenance in case of a blocked car, see ~~5.2.6.4.3.1~~4.2.6.4.3.1 c);

f) resetting means, its location and procedures for ~~resetting~~intentional reset of the lift to ~~normal~~automatic operation, including prior checking, as required by ~~5.6.2.1.4.3~~4.6.2.1.4.3, ~~5.6.5.9.2~~4.6.5.9, ~~5.6.6.7~~4.6.6.7, ~~5.6.7.9~~4.6.7.9, ~~5.9.2.7.3~~4.9.2.7.3, 4.11.2.4.5, 4.12.1.3.2, ~~5.12.2.3.2~~4.12.2.3.2;

g) location and use of special tools, if any;

h) keeping the logbook updated;~~.~~

~~a) about the identification and use of the special tools;.~~

~~b) about periodical checking on aging of accumulation type buffers made from synthetic materials considering instructions from the manufacturer (see ISO 8100-2EN 81-50: 20142023, 5.5.1 c) and 5.5.4 i);.~~

i) about testing of automatic rescue operation if provided;~~.~~

j) procedures to transfer critical data (see 4.5.2.2.5.3.1 & 4.5.2.2.5.4.1) of lifetime monitoring for suspension or compensation means ~~shall be transferred~~ at repair/replacement of the monitoring device ~~by a competent and authorized person only~~;~~.~~

Commented [SGD1431]: a) to n) could be reordered in a logic sequence after approval of items.

Commented [SD1432]: As agreed in WG1 comments N 1954

Commented [SGD1433]: Do we need this due to same information available at these locations?
agree

Commented [SD1434]: N2055 combined comments

Commented [SGD1435]: Covered by b) above. May be deleted.
correct

Commented [IJ1436]: See N1544

k) for SIL-rated circuits, the ~~instruction manual~~instructions shall inform about:

1) ~~maximum actuation interval~~ maximum time interval between operations (actuations) for electro-mechanical components (see ISO 8100-2:2023, ~~B.0~~A.1);

2) replacement of device before maximum mission time is expired;

3) parameters, their value ranges, dependencies, safe use and safe verification process;~~.~~

4) method to compare actual parameter settings to configuration record;~~.~~

5) ~~necessity~~procedures to verify correctness of the parameter settings after change;~~.~~

6) method to ~~compare actual~~ identify the software-version of SIL-rated circuits ~~to the data plate and configuration record when on-site replacement of the program code of SIL-rated circuit is possible~~;

~~the minimum decelerations for the empty car in up direction and the car loaded with rated load in down direction resulting from the factor according to 5.9.2.2.2.1 for testing of the braking system when one brake set is not working~~

l) h~~ow~~procedures to identify that a friction part of a deceleration or stopping means according ~~5.6.6~~4.6.6 and ~~5.6.7~~4.6.7 shall be replaced;

m) clearance between the safety gear and the guide rails to avoid accidental tripping of the safety gear;

n) method of lifting of components when they cannot be carried by hand.

~~Accumulation type buffers made from synthetic materials shall be checked periodically on aging considering instructions from the manufacturer [see ISO 8100-2:2019, 5.5.1 c) and 5.5.4 i)].~~

Commented [SD1437]: As WG1 comments

Commented [IJ1438]: See N1722

Commented [AD1439]: Comment 007 to ISO 8100-2

Commented [SD1440]: As WG1 comments N2045 Annex VI

Commented [SD1441]: Delete as N2055 (445)

Commented [AD1442]: Comment 445 to N2055

Commented [SGD1443]: HAS comment on 5.6.2.1.6.3

Commented [SD1444]: Combined comments N2055

Commented [SGD1445]: TFHAS comment on 0.2.3.

Commented [SD1446]: As per WG1 comments N1954

6.2.5 ~~7.2.5~~ Information ~~on~~for ~~rescue~~emergency operation~~s~~

The instructions shall include in particular the following information on ~~rescue~~emergency operation~~s~~s:

a) instructions for ~~rescue~~emergency operation~~s~~ in different expected situations, in particular on the release of the brake, ascending car overspeed protection means, unintended car movement protection means, reduced stroke buffer, rupture valve and the safety gear;

b) use of the emergency unlocking key, detailing the essential precautions to be taken in order to avoid accidents which could result from an unlocking which was not followed by effective re-locking;

c) identification of special tools, if any.

~~7.2.4 Examinations and tests~~

~~The instruction manual shall inform about the following.~~

~~a) Periodical examinations:~~

~~When periodical examinations and tests on lifts are carried out after they are placed on the market, to verify that they are in good condition, these periodical examinations and tests should be carried out in accordance with Annex C and be recorded in the logbook.~~

~~b) any specific requirements.~~

6.3 ~~7.3~~ Logbook

~~7.3.1~~ A logbook shall be provided~~, in which~~ for recording notes about repairs~~, examinations after modifications and accidents~~ and periodic checks, including those specified ~~by the manufacturer/installer, can be recorded~~in the instructions.

~~7.3.2 The basic characteristics of the lift shall be recorded in the logbook. This register or file shall comprise:~~

~~a) a technical section giving:~~

~~1) the date the lift was put into service;~~

~~2) the basic characteristics of the lift;~~

~~3) the characteristics of the ropes and/or chains suspension means including terminals and traction sheave profitsprofiles or elastomeric coated timing belts;;~~

~~4) the characteristics of those parts for which verification of conformity is required (Annex B);~~

~~5) the plans of installation in the building;~~

~~6) electric schematic diagrams;~~

~~The electric schematic diagrams may be limited to the circuits for the overall understanding of the safety considerations and use IEC 60617:2012-DB symbols. Any graphical symbol not shown in IEC 60617:2012 DB shall be separately shown and described on the diagrams or supporting documents. The symbols and identification of components and devices shall be consistent throughout all documents and on the lift.~~

~~The abbreviations used with the symbols shall be explained by means of a nomenclature.~~

~~If the electrical schematic diagram has several alternatives, it shall be indicated which alternative is valid, e.g. by listing of the applicable alternative solutions;~~

~~7) hydraulic circuit diagrams (using symbols from ISO 1219-1:2012).~~

~~The circuit diagrams may be limited to the circuits for the overall understanding of the safety considerations. The abbreviations used with the symbols shall be explained by means of a nomenclature;~~

~~8) the full load pressure;~~

~~9) the characteristics or type of hydraulic fluid;~~

~~10) the characteristics of each incoming supply:~~

~~— rated voltage, number of phases and frequency (if A.C.);~~

~~— full load current;~~

~~— short-circuit rating at the point of incoming supply terminals;~~

~~11) configuration record describing parameter settings~~

Commented [SD1447]: Combined comments N2055

Commented [SD1448]: As per WG1 Comments N1954

Commented [IJ1449]: See N1722

Commented [SD1450]: Combined comments N2055 - Moved from b) below to a) 11 as original proposal in N1722

~~b) a section intended to keep duplicate dated copies of examination and inspection reports, with observations. This register or file shall be kept up-to-date in case of:~~

~~1) important modifications to the lift (Annex C);~~

~~2) replacement of ropes or important parts;~~

~~3) accidents.~~

~~11) configuration record describing parameter settings~~

Commented [IJ1451]: See N1722

Commented [SD1452]: Combined comments N2055 - Moved from here to a) 11 above as original proposal in N1722

~~This register or file should be available to those in charge of the maintenance, and to the person or organization responsible for the periodical examinations and tests.~~

7 ~~8~~Use of ISO/TS 8100-3

ISO/TS 8100-3:2019, Clause 4, includes requirements that shall be followed when applicable for use in combination with this document.

Annex A
(normative)

List of the electric safety devices

Table A.1 — List of the electric safety devices

Clause	Devices checked	Minimum SIL
~~5.2.1.5.1 a)~~	~~Stopping device in the pit~~	~~3~~
~~5.2.1.5.2 c)~~	~~Stopping device in the pulley room~~	~~3~~
~~5.2.2.4~~	~~Check of the stored position of pit ladder~~	~~1~~
~~5.2.3.3~~4.2.3.3 d)	Check of the closed position of access~~,~~ ~~and~~ emergency ~~doors~~ and inspection doors	2
~~5.2.5.3.1~~ 4.2.5.3.1 c)	Check of the locking of car door	2
~~5.2.6.4.3.1~~ 4.2.6.4.3.1 b)	Check of the inactive position of the mechanical device	3
~~5.2.6.4.3.2~~3 4.2.6.4.3.2 e)	Check of the locked position of the inspection ~~doors or traps~~door(s) in the car wall	2
~~5.2.6.4.4.1~~ 4.2.6.4.4.1 d)	Check of the opening of ~~any~~ doors providing access to the pit	2
~~5.2.6.4.4.1~~ 4.2.6.4.4.1 e)	Check of the inactive position of the mechanical device	3
~~5.2.6.4.4.1~~ 4.2.6.4.4.1 f)	Check of the active position of the mechanical device	3
~~5.2.6.4.5.4~~ 4.2.6.4.5.4 a)	Check of the retracted position of the working platform	3
~~5.2.6.4.5.5~~ 4.2.6.4.5.5 b)	Check of the retracted position of movable stops for the working platform	3
~~5.2.6.4.5.5~~ 4.2.6.4.5.5 c)	Check of the extended position of movable stops for the working platform	3
~~5.3.9.1~~1~~4~~4.3.9.1.1	Check ~~on~~ of the ~~locked position~~ locking of the landing door ~~locking device~~	3
4.3.9.1.12 f)	Check of the force limiter of flap type locking devices	3
~~5.3.9.4.1~~4~~4~~4.3.9.4.1	Check of the closed position of landing doors	3
~~5.3.11.2~~4.3.11.2	Check of the closed position of the panels without locks	3
~~5.3.13.2~~4.3.13.2	Check of the closed position of car door(s)	3
~~5.4.2.2.1 b) 4) iv)~~	~~Check active position of mechanical device~~	~~1~~

Commented [AD1453]: Moved to 4.12.1.11.1

Commented [AD1454]: Moved to 4.12.1.11.1

Commented [AD1455]: Changed to basic function see new 4.2.2.4

Commented [SD1456]: N2055 combined comments

Commented [SD1457]: Clause number change Combined comments N2055 & N2147

Commented [IJ1458]: See N1537

Commented [AD1459]: N1997

Clause	Devices checked	Minimum SIL
5.4.2.2.1 b) 4) v)4.4.2.2.1 c) 3)	Check inactive of the retracted position of the mechanical device	1
4.4.2.2.1 c) 3)	Check of the unlocking zone to make inactive the check of the retracted position	3
5.4.6.3,4.4.4.6.3.4	Check of the locking of the emergency trap and the emergency door in the car	2
5.4.8 b)	Stopping device on the car roof	3
4.5.3.1.35.5.3 c) 2)	Check raising of car or counterweight	1
5.5.5.34.5.5.3 a)	Check of the abnormal relative extension of a each suspension means member rope or chain in case of two suspension means membersropes or two chain type suspension	1
5.5.5.34.5.5.3 b)	Check for of slack rope or slack chain or slack timing beltsuspension means for positive drive and hydraulic lifts	2
5.5.6.14.5.6.1 c)	Check of the anti-rebound device	3
5.5.6.2.4.5.6.2 f)	Check of the tension in the compensation meansropes	3
5.6.2.1.54.6.2.1.5	Check of the inactive position of the car safety gear	1
5.6.2.2.1.6 4.6.2.2.1.6 a)	Over speed detection	2
5.6.2.2.1.6 4.6.2.2.1.6 b)	Check of the release of the over speed governor	3
5.6.2.2.1.6 4.6.2.2.1.6 c)	Check on of the breakage or excessive rope stretch of the tension in the overspeed governor rope	3
5.6.2.2.3 4.6.2.2.3 e)	Check of the breakage or slackening of the safety rope	3
4.6.2.2.4.1 e)	check of the retracted position of the rope blocking mechanism	2
4.6.2.2.4.1 e)	Check of the unlocking zone to make inactive the check of the retracted position of the rope blocking mechanism	3
5.6.2.2.4.2 4.6.2.2.4.2 h)	Check of the retracted position of the tripping lever	2
4.6.2.2.4.2 h)	Check of the unlocking zone to make inactive the check of the retracted position of the tripping lever	3
5.6.5.94.6.5.9	Check of the retracted position of the pawl device	1
4.6.5.9	Check of the unlocking zone to make inactive the check of the retracted position of the pawl device	3
5.6.5.104.6.5.10	Check of the return to normal extended position of energy dissipation type buffers where energy dissipation are used in conjunction with pawl device	3
5.6.6.54.6.6.5	Check of the ascending car over speed protection means	2
5.6.7.74.6.7.7	Detection of unintended car movement with open doors	2
5.6.7.84.6.7.8	Check of the activation of the unintended car movement with open doors protection	1

Commented [SD1460]: Combined comments N2055

Commented [IJ1461]: Comment made during final vote on EN 81-20:2014

Commented [AD1462]: N2247 -058

Commented [SD1463]: Updated clause number (from 5.4.6.3.2 to 5.4.6.3.4 due to renumbering)

Commented [AD1464]: Moved to 4.12.1.11.1

Commented [AD1465]: TFHAS_74_v4 comment 5.6.2.2.3

Commented [AD1466]: TFHAS_74_v4 comment 5.6.2.2.3

Commented [AD1467]: TFHAS_74_v4 comment 5.6.2.2.3

Commented [AD1468]: AH6

Commented [AD1469]: N2247 -058

Commented [AD1470]: N2247 -058

Commented [AD1471]: N2247 -058

Clause	Devices checked	Minimum SIL
~~5.8.2.2.4~~4.8.2.2.3	Check of the ~~return to~~ normal extended position of energy dissipation type buffers	3
~~5.9.2.3~~4~~1~~ 4.9.2.3.4 a) ~~)~~ 3)	Check of the positions of the removable wheel	1
~~5.10.5.2~~4.10.5.2	~~Control of main switch by means of circuit breaker~~ Check of the device controlling the contactor where several access points exist	2
~~5.10.5.5~~4.10.5.54	Check ~~on~~of the main switch	3
~~5.12.1.3~~4.12.1.3	Check of the retardation in the case of reduced stroke buffers	3
~~5.12.1.4~~ 4.12.1.4 a)	Check of the unlocking zone ~~on~~ for levelling, re-levelling and preliminary operations	~~2~~3
~~5.12.1.5.1.2~~ 4.12.1.5.1.2 a)	Inspection operation switch	3
~~5.12.1.5.2.3~~ 4.12.1.5.2.3 b)	Check of push buttons in conjunction with inspection operation	1
~~5.12.1.6.1~~4.12.1.6.1	Emergency electrical operation switch	3
~~5.12.1.8.2~~4.12.1.8.2	Bypass device for landing and car door contacts	3
4.12.1.11.1 a)	Stopping device(s) in the pit [4.2.1.3.1 a)]	3
4.12.1.11.1 b)	Stopping device in the pulley room [4.2.1.3.3]	3
4.12.1.11.1 c)	Stopping device on the car roof [4.4.8 b)]	3
~~5.12.1.11.1~~ 4.12.1.11.1 d)	Stopping device at the ~~with~~ inspection control device~~operation~~	3
~~5.12.1.11.1~~ 4.12.1.11.1 e)	Stopping device at the lift machine	3
~~5.12.1.11.1~~ 4.12.1.11.1 f)	Stopping device at tests and emergency operation panel	3
~~5.12.2.2.3~~4.12.2.2.6	Check of breakage of, or slack in, the linkage to the device actuating the final limit switch~~the tension in the device for transmission of the car position (final limit switches)~~	1
~~5.12.2.2.4~~	~~Check of the tension in the device for transmission of the ram position (final limit switches)~~	~~1~~
~~5.12.2.2.5~~	~~Check of the tension in the device for transmission of the ram position (final limit switches). In case of indirect acting hydraulic lift~~	~~1~~
~~5.12.2.3.1~~ 4.12.2.3.1 b)	Final limit switches	1

NOTE The SIL levels are only relevant for SIL-rated circuits~~PESSRAL~~ as described in ~~5.11.2.6~~4.11.2.4.

Commented [SD1472]: Updated due to changes from N2192

Commented [IJ1473]: See N1722

Commented [AD1474]: Editorial alignement

Commented [AD1475]: All stopping devices in 4.12.1.11.1

Commented [AD1476]: TFHAS_74_v4 comment 5.6.2.2.3

Commented [IJ1478]: AH06 update file – 12-6-18

Commented [SD1477]: Combined comments N2055

Commented [IJ1479]: See N1722

~~Annex AAnnex B (informative)~~
~~Technical compliance documentation~~

Commented [AD1480]: TFHAS_74_v4

~~The technical compliance documentation should include the following information, which can be necessary for conformity assessment procedures:~~

- ~~the name and address of the manufacturer/installer of the lift;~~
- ~~details of the place where the lift can be examined;~~
- ~~a general description of the lift (characteristics, load, speed, rise, stops, etc.);~~
- ~~design and manufacturing drawings and/or diagrams (mechanic/electric/hydraulic);~~

  ~~NOTE Drawings or diagrams for understanding design and operation.~~

- ~~a copy of the type-examination certificates of the safety components used on the lift. See also ISO 8100-2:2023;~~
- ~~certificates and/or reports, where applicable, of:~~
  - ~~ropes, bletsbelts or chains;~~
  - ~~glass panels;~~
  - ~~door impact test;~~
  - ~~door fire test;~~
- ~~results of any tests or calculations performed or subcontracted by the manufacturer, e.g. traction, guide rail, hydraulic calculations;~~
- ~~a copy of the instructions manual for the lift:~~
  - ~~plans and diagrams;~~

    ~~NOTE Plans and diagrams for performing normal use, maintenance, repair, periodical inspections and rescue emergency operations.~~
  - ~~instructions for use of the lift;~~
- ~~maintenance instructions (see EN 13015:2001+A1:2008);~~
  - ~~emergency operation procedures;~~
  - ~~manufacturers requirements for periodic inspections;~~

    ~~NOTE Requirements do not include national regulations.~~
- ~~A copy of the the logbook;~~

  ~~NOTE Logbook for notes about repairs and, where appropriate, periodic checks.~~

Commented [SD1481]: Correct spelling as per WG1 comments N1954

Commented [SD1482]: Combined comments N2055 & N2147

Commented [SD1483]: Added reference

Commented [SD1484]: Combined comments N2055 & N2147

Commented [SD1485]: Duplicated word

~~Annex BAnnex C~~
~~(informative)~~
~~Periodic examinations and tests, examinations and tests after an important modification or after an accident~~

Commented [SGD1486]: Deletion due to TFHAS decision on clause 7 (see TFHAS_116-v4).

~~C.1 Periodic examinations and tests~~

~~Periodic examinations and tests shall not be more stringent than those required before the lift was put into service for the first time.~~

~~These periodic tests should not, through their repetition, cause excessive wear or impose stresses likely to reduce the safety of the lift. This is the case, in particular, of the test on components such as the safety gear and the buffers. If tests on these components are made, they shall be carried out with empty car and at a reduced speed.~~

~~The person appointed to make the periodic test should assure himself that these components (which do not operate in automatic normal operation) are still in an operating condition.~~

Commented [SD1487]: Combined comments N2055 & N2175

~~A duplicate copy of the report should be attached to the register or file in the part covered by 7.3.2 b).~~

~~C.2 Examinations and tests after an important modification or after an accident~~

~~The important modifications and accidents shall be recorded in the technical part of the register or file covered in 7.3.2 b).~~

~~In particular, the following are considered as important modifications:~~

~~a) change of:~~

- ~~the rated speed;~~
- ~~the rated load;~~
- ~~the mass of the car;~~
- ~~the travel;~~

~~b) change or replacement of:~~

- ~~the type of locking devices (the replacement of a locking device by a device of the same type is not considered as an important modification) (5.3.9.1 and 5.3.9.2);~~
- ~~the control system;~~
- ~~the guide rails or the type of guide rails (5.7);~~
- ~~the type of door (or the addition of one or more landing or car doors) (5.3);~~
- ~~the machine or the traction sheave (5.9.2);~~
- ~~the overspeed governor (5.6.2.2.1);~~

- the ascending car overspeed protection means (5.6.6);
- the buffers (5.8);
- the safety gear (5.6.2.1);
- the unintended car movement protection (5.6.7);
- the pawl device (5.6.5);
- the jack (5.9.3.2);
- the pressure relief valve (5.9.3.5.3);
- the rupture valve (5.6.3);
- the restrictor/one-way restrictor (5.6.4);
- the mechanical device for preventing movement of the car (5.2.6.4.3.1);
- the mechanical device for stopping the car (5.2.6.4.4.1);
- the platform (5.2.6.4.5);
- the mechanical device for blocking the car or movable stops (5.2.6.4.5.2);
- the devices for emergency operation and tests operations (5.2.6.6).

c) Modification of:

- parameter or configuration of circuit according to 5.11.2.3 or 5.11.2.4
- parameter or configuration of control equipment according to 5.9.2.2.2.3 a) 2), 5.9.2.5.4 c), 5.9.2.5.4 d), 5.9.3.4.2 c), 5.9.3.4.2 d) or 5.9.3.4.3 c)

d) Replacement of:

- Software of SIL-rated circuit

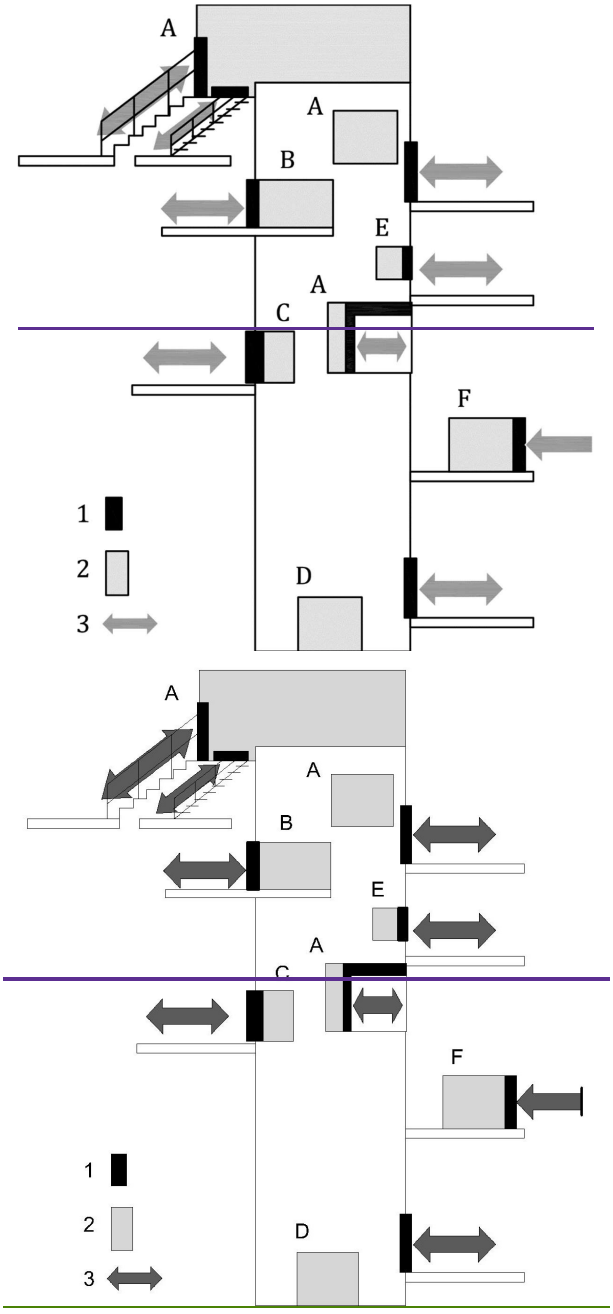
Commented [SD1488]: Combined comments N2055 & N2147

Commented [IJ1489]: See N1722

Commented [KA1490]: Based on AH6 report: "SW-modifications proposal 2019-05-15"

~~Annex CAnnex D~~
~~(informative)~~

~~Machinery spaces — Access~~



~~Key~~

1	doors and trap doors (5.2.34.2.3)	A	(5.2.6.4.34.2.6.4.3)
2	machinery spaces (5.2.64.2.6)	B	(5.2.6.4.54.2.6.4.5)
3	access (5.2.24.2.2)	C	(5.2.6.4.64.2.6.4.6)
-	-	D	(5.2.6.4.44.2.6.4.4)
-	-	E	(5.2.6.64.2.6.6)
-	-	F	(5.2.6.54.2.6.5)

Figure B.1 — Machinery spaces - Access (5.2.24.2.2)

Commented [SD1491]: Updated figure with fully formed arrow for F N2055 (455)

~~Annex D~~Annex B~~Annex E~~
(~~informative~~normative)
Building-related boundary conditions in which the lift is installed ~~Building interfaces~~

~~Additional items for annex on building interfaces information~~

Commented [AD1492]: All items below are moved here according TfHAS_74_v4. There is a new text for this whole Annex.

~~0.3.3 This document states minimum rules for the installation of lifts into buildings/constructions. There can be regulations for the construction of buildings in some countries which cannot be ignored.~~

~~Typical clauses affected by this are those defining minimum values for the height of the machine and pulley rooms and for the dimensions of their access doors.~~

~~0.4.2 Negotiations~~

~~d) civil engineering problems (for example, building regulations);~~

~~e) other aspects related to the place of installation;~~

~~f) the dissipation of heat from the components/equipment of the lift which would require ventilation of the well and/or the machinery space/location of equipment;~~

~~0.4.15 Means of access are provided for the hoisting of heavy equipment [see 0.4.2 e)].~~

~~0.4.17 The well is suitably ventilated, according to national building regulation, taking into consideration the heat output as specified by the manufacturer, the environmental conditions of the lift and the limits given in 0.4.16, e.g. ambient temperature, humidity, direct sunlight, air quality and air tightness of buildings due to energy saving requirements.~~

~~NOTE See 0.4.2 and E.3 for further guidance.~~

Commented [SGD1493]: Complete the information as said in TFHAS_74_v4.

~~0.4.18 Access ways to the working areas are adequately lit (see 0.4.2).~~

~~0.4.19 Minimum passageways, corridors, fire escapes, etc. are not obstructed by the open door/trap of the lift and/or any protection means for working areas outside of the well, where fitted according to the maintenance instructions (see 0.4.2).~~

Commented [SGD1494]: Text needs to be reformulated as said in TFHAS_74_v4.

~~This document applies to, starting from the point of connection of the equipment defined in 4.10.5, 4.10.7 and 4.10.8 to the incoming supply.~~

~~NOTE The requirements for the electrical supply installation are given in the IEC 60364 series. This document does not specify additional and special requirements that can apply to the electrical equipment of lifts that:~~

- ~~are intended for use in open air (i.e. outside buildings or other protective structures);~~
- ~~are intended for use in potentially explosive and/or flammable atmospheres;~~

Commented [AD1495]: TFHAS_74_v4

~~Other types of doors, such as power operated hinge doors, to be excluded (or clearly indicate what sort of doors are covered) in the scope of the standard.~~

Commented [AD1496]: TFHAS_74_v4 comment 5.3.6.2.3

5.2.1.2.1 The well, machine and pulley rooms shall not be used for purposes other than lifts. They shall not contain ducts, cables or devices other than for the lift.

The lift well, machine and pulley rooms may, however, contain:

a) equipment for air-conditioning or heating of these spaces, excluding steam heating and high pressure water heating. However, any control and adjustment devices of the heating apparatus shall be located outside the well.

b) fire detectors or extinguishers, with a high operating temperature (e.g. above 80° C), appropriate for the electrical equipment and suitably protected against accidental impact.

When sprinkler systems are used, activation of the sprinkler shall only be possible, when the lift is stationary at a landing and the electrical supply of the lift and lighting circuits are automatically switched off by the fire or smoke detection system.

NOTE Such smoke, fire detection and sprinkler systems are the responsibility of the building management.

5.2.1.2.2 Machine rooms may contain machines for other kinds of lifts, e.g. goods only lifts.

5.2.1.3 Ventilation of the well, machinery spaces and pulley rooms

The well, machinery spaces and pulley rooms shall not be used to provide ventilation of rooms other than those belonging to the lift.

Ventilation shall be such that the machinery, as well as electric cables, etc., are protected from dust, harmful fumes and humidity.

5.2.1.9 Surfaces of walls, floors and ceilings

Surfaces of walls, floors and ceilings of wells, machine and pulley rooms shall be in durable material e.g. concrete, brick or blockwork, not favouring the creation of dust.

The surface of the floor where a person needs to work or to move between working areas shall be of non-slip material.

NOTE 1 For guidance, see ISO 14122-2:2016, Annex A.

The floor of working areas shall be approximately level, except for any buffer and guide rail bases and water drainage devices.

After the building in of guide rail fixings, buffers, any grids, etc., the pit shall be impervious to infiltration of water.

For hydraulic lifts, the space in which the power unit is situated and the pit shall be designed in such a way that it is impervious, so that all the fluid contained in the machinery placed in these areas is retained if it leaks out or escapes.

NOTE 2 National regulations can require the protection of hydraulic pipe routed through the building.

5.2.2 Access to well and to machinery spaces and pulley rooms

5.2.2.1 The well, machinery spaces and pulley rooms and the associated working areas shall be accessible.

Commented [RH1497]: TFHAS_74_v4 comment 5.2.1.3

Commented [AD1498]: 5.2.1.3 TFHAS_74_v4 comment 5.6.2.2.3

Commented [RH1499]: 5.2.1.3 TFHAS_74_v4 comment 5.2.1.9

Commented [SD1500]: Combined comments N2055

Commented [SD1501]: Combined comments N2055

Commented [RH1502]: TFHAS_74_v4 comment 5.2.2.1

5.2.2.2 The access way adjacent to any door/trap giving access to the well or to machinery spaces and pulley rooms shall be lit by a permanently installed electric lighting with an intensity of at least 50 lx.

5.2.2.3 If access to the lift for maintenance and emergency operation purposes is via private premises, then permanent access of authorized persons to the premises and relevant instructions shall be provided.

The manufacturer/installer should make the building designer/architect/owner aware of the agreement regarding access, fire, entrapment and also problems of security associated with lifts serving directly into private premises (see 0.4.2).

NOTE Access via private premises can be subject to national regulations.

5.2.2.5 A safe access for persons to machinery spaces and pulley rooms shall be provided. For preference, this should be effected entirely by way of stairs. If it is not possible to install stairs, ladders satisfying the following requirements shall be used:

a) the access to the machinery spaces and pulley rooms shall not be situated more than 4 m above the level accessible by stairs. For access over 3 m in height by ladder, fall protection shall be provided;

b) ladders shall be fastened to the access permanently or at least by rope or chain in such a way that they cannot be removed;

c) ladders exceeding 1,50 m in height shall, when in position for access, form an angle between 65° and 75° to the horizontal and shall not be liable to slip or turn over;

d) the clear width of the ladder shall be at least 0,35 m, the depth of the steps shall not be less than 25 mm and in the case of vertical ladders the distance between the steps and the wall behind the ladder shall not be less than 0,15 m. The steps shall be designed for a load not less than 1 500 N;

e) adjacent to the top end of the ladder there shall be at least one hand hold within easy reach;

f) around a ladder, within a horizontal distance of 1,50 m, the risk of falling by more than the height of the ladder shall be prevented.

NOTE National building regulations can require access only by stairs.

5.2.5.4 Protection of any spaces located below the well

If accessible spaces do exist below the well, the base of the pit shall be designed for an imposed load of at least 5 000 N/m².

5.2.6.4.1.1 In the case of wells partially enclosed at the exterior of buildings, the machinery shall be suitably protected against environmental influences.

5.3.4.2 NOTE Where additional doors are added in front of the landing door, in order to avoid the trapping of persons, the maximum distance between landing and additional door shall not exceed 0,10 m.

Commented [SD1503]: Combined comments N2055 & N2147

Commented [RH1504]: TFHAS_74_v4 comment 5.2.2.5

Commented [RH1505]: TFHAS_74_v4 comment 5.2.5.4

Commented [RH1506]: TFHAS_74_v4 comment 5.2.6.4.1.1

Commented [AD1507]: TFHAS_74_v4 comment 5.3.4.2

~~5.3.7.1 Local landing lighting~~

~~The natural or artificial lighting of the landings in the vicinity of landing doors shall be at least 50 lx at floor level, such that a user can see ahead when they are opening the landing door to enter the lift, even if the car light has failed.~~

~~NOTE This can be subject to national building regulations.~~

Commented [AD1508]: TFHAS_74_v4

B.1 General provisions

For the construction of buildings local building regulations ~~shall be applied~~apply.

This annex states technical interfaces of the building or construction in which the lifts is installed.

Information about technical interfaces according B.2 ~~shall be~~is exchanged. The information ~~is depending~~depends on the phase of building/construction and is exchanged on the characteristics of the lift design and the building/construction in which the lift ~~is to~~will be installed.

B.2 Technical interfaces

B.2.1 Type and purpose of lift(s)

The type and purpose/usage of lift(s) ~~shall be~~is specified, including information about the expected traffic (persons/good person lifts, load, building height etc.) and the accessibility to lifts in the whole building, (entrances, accessible spaces below lift well).

Information about requirements regarding seismic conditions, accessibility, vandalism, fire protection and evacuation ~~shall be~~is exchanged.

B.2.2 Layout & Access

The lift well, machinery spaces and pulley rooms ~~shall~~are not ~~be~~ used for purposes other than lifts. They ~~shall~~do not contain ducts, cables, or devices other than for the lift. In the case of a partially enclosed well, such elements are located outside of present enclosures or have a minimum distance of 1,50 m from moving parts of the lift. Steam heating and high-pressure water heating are not used. Control and adjustment devices of heating or air-conditioning apparatus are located outside the well.

~~The lift well, machine rooms and pulley rooms may, however, contain equipment for air-conditioning or heating of these spaces, excluding steam heating and high-pressure water heating. However, any control and adjustment devices of the heating apparatus shall be located outside the well.~~

Suspension point(s) tested and labeled with the working load, are provided as indicated in the instructions.

Commented [AD1509]: moved from 4.2.1.6 N2237

The lift well, machine rooms and pulley rooms ~~shall be~~are accessible only by use of a key.

~~If access~~ Access to the lift for maintenance and emergency operation purposes is not via private premises~~, then permanent access to the premises and relevant instruction shall be provided~~.

Access for persons to machine rooms and pulley rooms ~~shall be~~is provided by stairs.

The access way adjacent to any door/trap giving access to the well or to machinery spaces or pulley rooms ~~shall be~~is lit by a permanent installed electric lighting with an intensity of at least 50 lx.

Minimum passageways/fire escapes ~~shall~~ are not ~~be~~ obstructed by ~~the~~ an open door/trap of the lift.

B.2.3 Environmental conditions

~~The climatic environmental conditions according to IEC 60721-3-3:2019, Class 3K22/3B1/3S5/3M10 shall beare ensured in the lift well, machine rooms and pulley rooms. For the well this shall be assured also if the car is stationary.~~ The ambient temperature in the well and the machinery space(s) is maintained between + 5 °C and + 40 °C.

NOTE See IEC 60364-5-51, Code AA5.

Formatted: Note

~~shall be~~Necessary measures for environmental conditions ~~not covered by IEC 60721-3-3:2019, Class 3K22/3B1/3S5/3M10shall be~~are negotiated and clarified, such as:

- Temperature
- Humidity
- Building sway (wind);
- Chemical substances (salt, chloride);
- Outdoor installations;
- Altitude of installation.

The heat emission of the lift equipment is considered.

The lift pit ~~shall be~~is impervious to infiltration of water.

For hydraulic lifts, the space, in which the power unit or the jack(s) are situated, and the pit ~~shall be~~are impervious to leaking oil~~designed in such a way that it is impervious to oil leakage~~.

B.2.4 Forces, lift disposition, equipment

The building/construction withstands~~shall withstand~~ the lift and lift installation forces according to the information of the lift supplier, e.g., guide rail/buffer forces, suspension forces during installation etc.

~~Additionally, the lift supplier shall define~~ The building related lift infrastructure (electrical supplies, functional recesses, user interfaces, suspension, protective coating etc.) and the layout (dimension and tolerances of well, machinery spaces and pulley room, placement of equipment etc.) is as agreed with the lift supplier.

Note Usually, the lift supplier exchanges & documents the information & requirements within a preparatory work plan and a disposition plan.

Forces of the building with impact on the lift or the lift equipment ~~shall be~~are communicated to the lift supplier, e.g., building shrinkage, wind loading etc.

B.2.5 Building Execution

The surfaces of well, machinery spaces and pulley rooms ~~shall be~~are in durable material not favouring the creation of dust.

The floor of working areas ~~shall be~~is:

— of non-slip material;

— level to maximum of 50 mm deviations, except for any buffer and guide rail bases and water drainage devices.

The natural or artificial lighting of the landings in the vicinity of landing doors ~~shall be~~is at least 50 lx at floor level.

The building construction ~~shall enable~~enables, that function sound of the lift and user noise are below the necessary level.

~~E.1 General provisions~~

~~The building structure should be constructed to withstand loads and forces to which it is subjected by the lift equipment. If not specified differently in this document for particular applications, these loads and forces are:~~

- ~~values resulting from the static masses; and~~
- ~~values resulting from moving masses and their emergency operation. The dynamic effect is represented by a factor of 2.~~

~~E.2 Support of guide rails~~

~~It is important that the guide rails of the lift be supported in such a way that the effects of movement of the building structure to which they are connected are minimized.~~

~~When considering buildings made of concrete, blockwork or bricks, it can be assumed that the guide rail brackets which support the guides are not subjected to displacement caused by movement of the well walls (other than compression, see 5.7~~4.7~~).~~

~~However, where the guide brackets are connected to the building fabric by steel beams, or by connection to timber frames, there can be deflection of this structure due to the load imposed by the car through the guides and guide brackets. Additionally, there can be movement of the lift's supporting structure due to external forces such a wind loading, snow loading, etc.~~

~~Any deflection of these beams or frames should be taken into account during the calculations required in 5.7.~~

~~The total permissible deflection of the guide rails for the safe operation of the safety gear~~device~~, etc., shall should include any displacement of the guide rail due to deflection of the building fabric, and the deflection of the guide itself due to the load imparted on it by the car.~~

~~It is therefore important that the persons responsible for the design and fabrication of these supporting structures communicate with the lift provider in order to ensure that they are suitable under all load conditions.~~

~~E.3 Ventilation of car, well and machine rooms~~

~~E.3.1 General~~

~~See 0.4.2, 0.4.17 and 0.4.18.~~

~~The requirement to suitably ventilate the well and machine rooms is often contained within local building regulations, either specifically or as a general requirement, as would be given for any building space where machinery is installed or people are accommodated (for leisure, work, etc.). As such, this document cannot~~

Commented [RH1510]: TFHAS_74_v4 comment 5.2.1.8.1

Commented [AD1511]: TFHAS_74_v4, the whole Annex has a new text

Commented [IJ1512]: See N1556

Commented [GE1513]: INT #10

provide exact guidance on the specific requirements to ventilate such areas when the well and machine rooms are part of one larger and often complex total build environment.

Doing so would conflict with these national requirements.

However, some general guidance can be given.

E.3.2 Ventilation of the well and car

The safety and comfort of persons in the lift, working in the well or who can become entrapped in the car or well should the car become stalled between floors, depends on many factors:

— the ambient temperature of the well as part of the building or even totally standalone;

— the exposure to direct sunlight;

— volatile organic components, CO_2, air quality;

— fresh air access in the well;

— the size of the well, both in cross-sectional area and height;

— the number, size, gaps around, and location of, landing doors;

— the expected heat output from installed equipment;

— the fire-fighting and smoke evacuation strategy and related BMS (building management system);

— the humidity, dust and fumes;

— the air flow (heat/cooling) and energy-saving building technology applied;

— the air tightness of the well and the entire building.

The car should be provided with sufficient ventilation aperture to ensure an adequate flow of air for the maximum number of permitted occupants (see 5.4.94.4.9).

During automatic normal operation and maintenance of the lift, the gaps around the landing doors, the opening/closing of these doors and the pump effect of the lift travelling within the well, can generally be sufficient to provide the air exchange necessary for human needs between the staircases, lobbies and the well.

Commented [SD1514]: Combined comments N2055 & N2175

However, for technical needs, and in some cases for human needs, the air tightness of the well and the entire building, the environmental conditions, particularly higher ambient temperature, radiation, humidity, air quality, result in the need for a permanent or on-demand ventilation aperture(s) and/or (combined with) forced ventilation and/or fresh air entry. This can also be necessary when transporting certain items such as motorized vehicles where exhaust fumes can be hazardous. This can only be decided on a case-by-case basis.

Furthermore, in the event of a prolonged stoppage (considering normal and accidental conditions) of the car, further sufficient ventilation should be provided.

In particular, attention should be given to those buildings (new and in case of refurbishing) in which energy-efficient design and technology is present.

Wells are not intended to be used as a means to ventilate other areas of the building.

In some cases, this can be an extremely dangerous practice, such as industrial environments or underground car parks, where the drawing of dangerous gasses through the well can cause additional risk to persons travelling in the car. Under these considerations, the stale air from other areas of the building should not be used to ventilate the well.

Where the well forms part of a fire-fighting shaft, particular care needs to be taken.

In these cases, advice should be obtained by those who specialize in such equipment, or from local building and fire regulations.

In order to allow the person responsible for the work on the building or construction to determine if/what ventilation needs to be provided related to the total lift installation as part of the building, the installer of the lift should provide the necessary information to allow suitable calculations and appropriate building design to be made. In other words, they should keep each other informed of the facts necessary for the proper operation and safe use and maintenance of the lift within the building, and take the appropriate steps to ensure it.

E.3.3 Ventilation of machine rooms

The ventilation of the machine rooms is normally carried out to provide a suitable working environment for the engineer and the equipment installed into such spaces.

For this reason, the ambient temperature of machine rooms should be kept as given in the assumptions. See 0.4.17. Additional care should be taken with regard to humidity and air quality to avoid technical problems, e.g. condensation.

Failure to maintain these temperatures can result in the lift automatically removing itself from service until the temperature returns to its intended levels.

In order to allow the person responsible for the work on the building or construction to determine if/what ventilation needs to be provided in these machine rooms as part of the building, the installer of the lift should provide the necessary information to allow suitable calculations and appropriate building design to be made. In other words, they should keep each other informed of the facts necessary for the proper operation, safe use and maintenance of the lift, and take the appropriate steps to ensure it.

~~Annex E~~Annex C~~Annex F~~
(normative)

Pit access ladder

~~E.1~~C.1 ~~F.1~~Types of pit access ladder

The following types of pit access ladder ~~may~~ shall be used for access and egress to the pit of the lift (see Figure ~~F.1~~C.3):

a) a fixed ladder (Type 1), which stands upright in one position for both use and storage purposes;

b) a retractable ladder (Type 2a), which stands upright in two positions, one for use, other for storage. The use position is obtained when a person is placing their weight on the rung;

c) a retractable ladder (Type 2b), which stands upright for storage and is manually put in position of use by horizontal sliding of its bottom part;

d) a movable ladder (Type 3~~a~~), which stands upright for storage and is manually put in an inclined position of use;

~~e) e) a movable ladder (Type 3b), which lays down on the pit floor for storage and is manually put in an inclined position of use; or~~

e) a foldable ladder (Type 4a), which is ~~stored~~ fixed in the pit and then positioned and hooked onto the landing door sill~~;~~.

f) a foldable ladder (Type 4b), which is fixed in the pit and then positioned and hooked to the wall of the well.

~~E.2~~C.2 ~~F.2~~General provisions

~~F.2.1~~C.2.1 ~~According to the type of pit ladder chosen when designing a lift installation (see F.1), t~~The ladder shall be secured~~ permanently stored in the lift pit~~ so that it cannot be removed from the well ~~or used for other purposes.~~

~~F.2.2~~C.2.2 The ladder shall be:

a) able to withstand the weight of one person counting for 1 500 N;

b) made of aluminium or steel. ~~In the case of steel, an anti-corrosion protection shall be applied. Wood ladders shall not be used.~~

~~F.2.3~~C.2.3 ~~The length of the ladder shall be such that, i~~In the position of use, ~~the length of~~ the ladder ~~uprights~~stiles~~,~~ or ~~other suitable~~ handhold~~s~~, shall extend~~s~~ to a minimum height of 1,10 m measured vertically above the landing sill.

Commented [SD1515]: Combined comments N0255 & N2163

Commented [SD1516]: Combined comments N0255 & N2163

Commented [SD1517]: Combined comments N0255 & N2163

Commented [SD1518]: Combined comments N0255 & N2163

Commented [SD1519]: Combined comments N2055 and N2163

Commented [SD1520]: Combined comments N0255 & N2163

Commented [SD1521]: Combined comments N2055 and N2163

Commented [SD1522]: Combined comments N0255 & N2163

Commented [SD1523]: Combined comments N2055 and N2163

~~E.3~~C.3 ~~F.3~~ Ladder ~~uprights~~ stiles and rungs

C.3.1 ~~F.3.1~~ General

The mechanical strength shall be verified in accordance with ISO 14122-4:2016: 6.

Commented [SD1524]: Combined comments N2055 and N2163

~~E.3.1~~C.3.2 ~~F.3.2~~ Ladder ~~uprights~~stiles

The cross-section of the ladder ~~uprights~~ stiles shall ~~be so that:~~

~~a) for easy and safe hand grasping, the width does~~ not exceed a width of 35 mm, and depth of 100 mm.~~; and~~

~~b) the mechanical strength tests as defined in EN 131-2:0, Clause 5, are fulfilled. In countries where EN 131-2 is not adopted, relevant national requirements shall apply.~~

Commented [SD1525]: Combined comments N2055 and N2163

~~E.3.2~~C.3.3 ~~F.3.3~~ Ladder rungs

The ladder rungs shall fulfil the following requirements:

a) the clear width of the ladder rungs shall be between minimum 280 mm and 600mm;

Commented [SD1526]: Combined comments N2055 and N2163

b) the rungs shall be equally spaced, between ~~250~~ 225 mm and 300 mm;

Commented [SD1527]: Combined comments N2055 and N2163

c) ~~the cross-section of the ladder rungs shall be either circular or polygonal (square or more than 4 sides), with a diameter or a flat tread of minimum 25 mm and maximum 35 mm;~~ The tread walking surface of the rung shall be flat and minimum 20 mm;

Commented [SD1528]: Combined comments N2055 and N2163

d) the surface conditions of the rungs shall be non-slippery, i.e. by means of profiled surface or special durable anti-slippery coating.

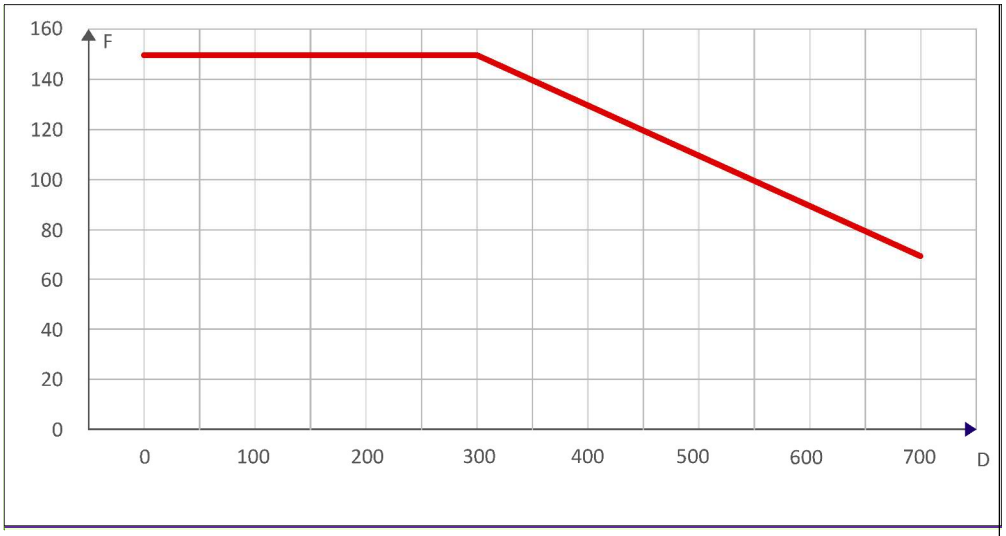
~~E.4~~C.4 ~~F.4~~ Specific provisions for non-fixed type ladders

For ~~movable and foldable~~ ladders ~~(~~type 2a, type 2b types 3 and type 4b~~)~~, the following apply:

a) ~~the maximum weight of the ladder shall not exceed 15 kg in order to allow easy and safe handling from the landing sill;~~In case the ladder must be moved from its stored position to the position of use, or from position of use back to stored position, the maximum needed force from the landing entrance to the ladder or its moving device shall not exceed the values according formula (see Figure ~~F.1~~C.1):

   — Handling distance up to 300mm: handling force ≤ 150N

   — Handling distance from 300 up to 700mm: handling force = 150 - (D-300)/5



Key

F Handling Force [N]

D Handling Distance [mm]

Figure ~~F.1~~C.1 — Handling force for movement of ladder

~~NOTE National regulations can request a maximum weight less than 15 kg for manual handling.~~

b) safe use of the ladder in position of use shall be ensured by means of a device securing the ladder to the landing sill, the bottom of the pit, or the wall of the well;

c) the ladder shall be prevented from tipping over when a person is standing or grasping the upper part of the ladder (above landing sill level) by means of appropriate devices at bottom end of the ladder ~~uprights~~stiles;

d) for ~~retractable~~ ladders ~~(~~type 2a,~~)~~ type 2b, type 4a and ~~and foldable ladders (~~type 4b~~)~~, provisions shall be fitted so that, when putting the ladder from position of use back to storage position, the risk of shearing and/or crushing hands or feet is prevented when retracting or folding back the parts of the ladder.

e) for ladders Type 3 and Type 4a, positioned and hooked onto the landing door sill, there shall be a free distance of at least 500 mm between:

— the handholds, see Figure ~~F.2~~ C.2 a);

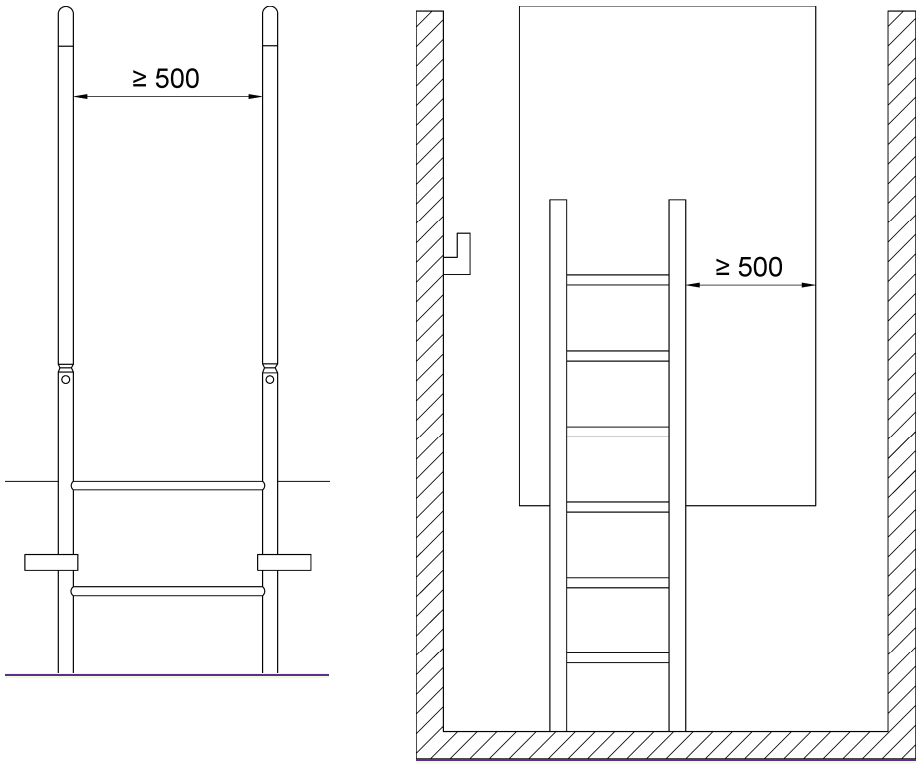
— between a stile or handhold, and the door frame, see Figure ~~F.2~~ C.2 b);

Commented [SD1529]: Combined comments N2055 and N2163

Commented [SD1530]: Combined comments N2055 and N2163

Commented [SD1531]: Combined comments N2055 and N2163

Commented [SD1532]: Combined comments N2055 and N2163



a) between handholds

b) between stile and door frame

Figure ~~F.2~~C.2 — Distance between the handholds or between a stile and the door frame

Commented [SD1533]: Combined comments N2055 and N2163

~~E.5~~C.5 ~~F.5~~Location of the ladder in the pit

The location of the ladder in the pit shall be such that~~, in position of use,~~ the following are fulfilled:

a) for ladders type 1and type 2a there shall be a clear distance of 200 mm minimum between the ~~back~~ front of any rung and the pit wall~~, in the case of vertical ladder~~;

b) the distance between the edge of the landing entrance and the ladder in its stored position (or the means to access ~~the ladders as in Figure F.1, Type 3b and~~ Type 4a and type 4b) shall not be more than ~~800~~ 700 mm;

c) for ladders type 1, type 2a, type 2b and type 4b the distance between the edge of the landing entrance and the middle of the rungs of the ladder in ~~the working~~ position of use shall be 600 mm maximum for easy reach;

d) ~~the height of the first rung of the ladder shall be positioned as close as possible at the same level as the landing sill.~~for ladders Type 1, Type 2a Type 2b and Type 4b, the top of the first rung of the ladder shall be positioned at not more than 150 mm below the level of the landing sill.

Commented [SD1534]: Combined comments N2055 and N2163

Commented [SD1535]: Combined comments N2055 and N2163

Commented [IJ1536]: Editorial request by China

Commented [SD1537]: Combined comments N2055 & N2163

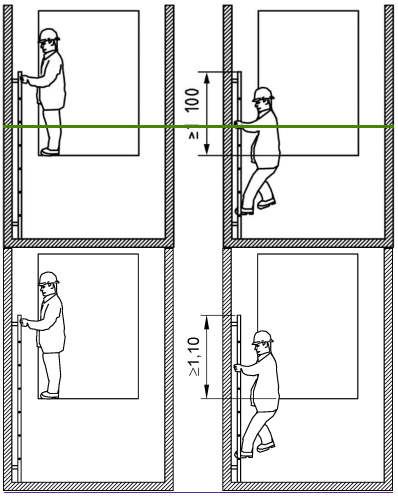
Commented [SD1538]: Combined comments N2055 and N2163

Commented [SD1539]: Combined comments N2055 and N2163

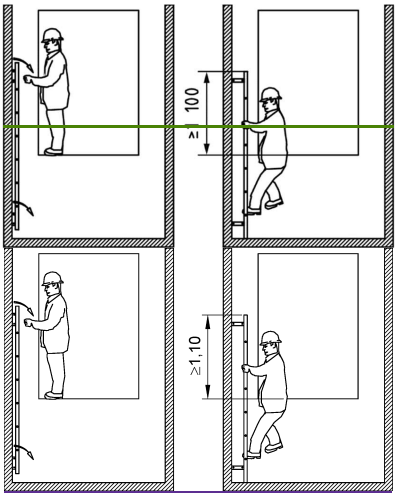
Commented [SD1540]: Combined comments N2055 and N2163

Dimensions in ~~milli~~metres

Commented [SD1541]: Dimensions in meters



a) Type 1 — Fixed pit ladder



b) Type 2a — Retractable pit ladder

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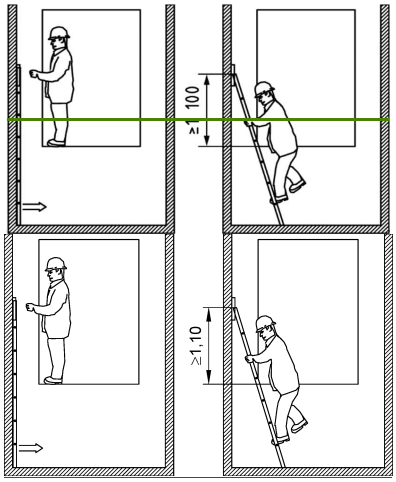
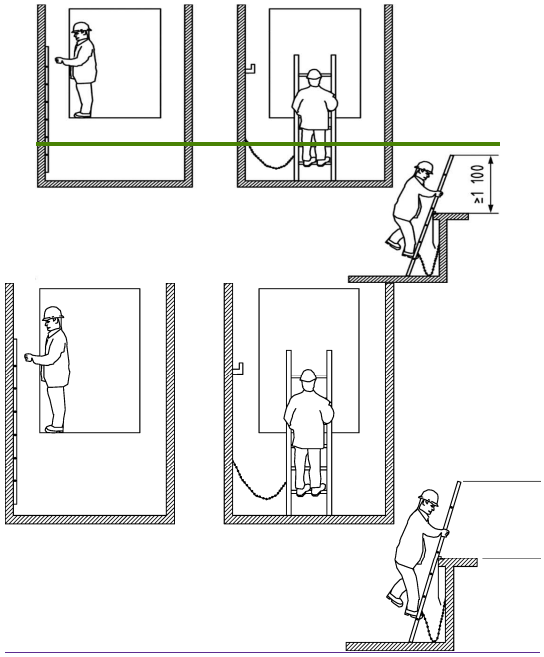


c) Type 2b — Retractable pit ladder



d) Type 3~~a~~ — Movable pit ladder

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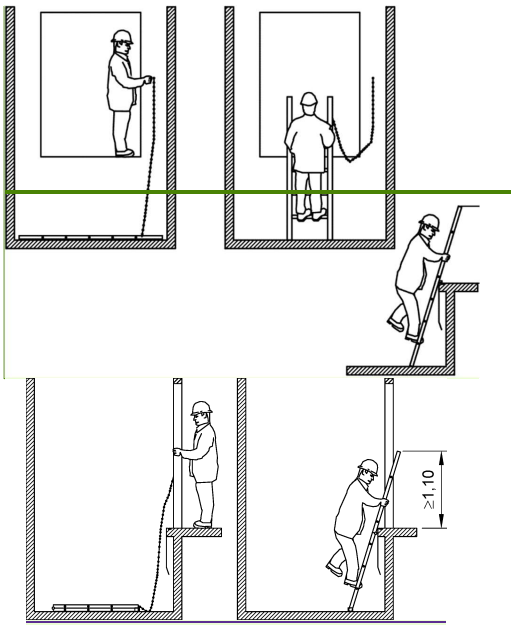
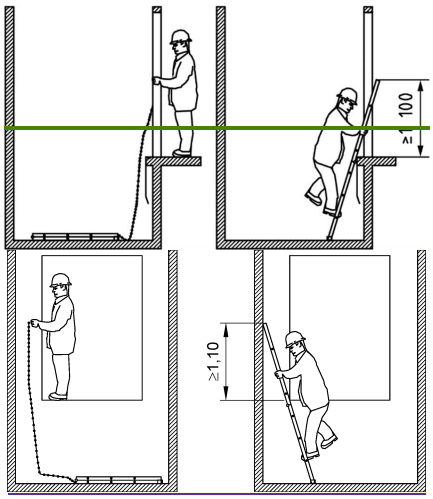
Commented [SD1544]: Updated figures to from ≥1.100 to ≥1,10 to align with F.2.3



e) Type ~~3b~~ 4a ~~— Movable~~ Foldable pit ladder



f) Type 4b — Foldable pit ladder

Figure ~~F.1~~ ~~3~~C.3 — Types of pit access ladder

Commented [SD1546]: Combined comments N2055 and N2163

~~Annex F~~Annex D~~Annex G~~
(informative)

Relationship between this document and ISO 8100-20

The requirements of this document are not intended to prevent the use of systems, methods, devices or components of equivalent or superior safety, strength, effectiveness, durability, etc. to those prescribed by this document, provided that the equivalency of the system, method, device, or component can be verified.

ISO 8100-20:2018 and national regulations can be consulted for further information.

Table D.1 shows the relation between the GESRs of ISO 8100-20 and this document based on ISO 8100-20: Table C.4.

Table D.1 — Relationship between this document and the GESRs of ISO 8100-20

ISO 8100-20 GESRs	EHSR of the Lifts Directive 2014/33/EU	EHSR of the Machinery Directive 2006/42/EC	Clause(s)/sub-clause(s) of this document
6.2 Common GESRs related to persons at different locations			
6.2.1 Supports for lift equipment	1.3		4.4.11.2, 4.5.1, 4.5.2, 4.5.4, 4.5.5, 4.5.8 a)
	4.8		4.4.10
		1.3.2	4.3.1.4, 4.3.3.3, 4.3.5, 4.4.3.2, 4.5.2, 4.5.6.3, 4.6.2.2.1.3, 4.7, 4.9.3.2.1, 4.9.3.2.2, 4.9.3.2.3, 4.9.3.2.6.6, 4.9.3.3, 4.9.3.5.3, 6.2.4
		4.1.2.3	4.5.3, 4.9.2.2.2.1, 5.2.4, 5.2.5, 5.2.7
6.2.2 Lift maintenance and repair instructions	6.1		not covered
	6.2		6.2, 6.3
		1.3.2	4.3.1.4, 4.3.3.3, 4.3.5, 4.4.3.2, 4.5.2, 4.5.6.3, 4.6.2.2.1.3, 4.7, 4.9.3.2.1, 4.9.3.2.2, 4.9.3.2.3, 4.9.3.2.6.6, 4.9.3.3, 4.9.3.5.3, 6.2.4

ISO 8100-20 GESRs	EHSR of the Lifts Directive 2014/33/EU	EHSR of the Machinery Directive 2006/42/EC	Clause(s)/sub-clause(s) of this document
		1.6.1	4.12.1.5, 4.12.1.7, 4.12.1.8, 4.12.1.11.1, 6.2.2, 6.2.4
6.2.3 Equipment inaccessible to users and non-users	1.5.2		4.2.1.1.1, 4.2.3.3 b), 4.2.5.2, 4.2.6.4.3.2 d), 4.2.6.5.1.2, 4.2.6.5.1.3°c), 4.2.6.6, 4.3.9.1.1, 4.3.9.3
	2.1		4.2.1.3.1 a), 4.2.3.3, 4.2.5.2.2.1, 4.2.5.2.3, 4.2.5.5.2, 4.2.6.4.4.1 d), 4.3.1, 4.3.4, 4.3.5, 4.3.8, 4.3.9, 4.3.10, 4.3.11, 4.3.14, 4.4.8 b)
		1.7.1.2	4.1.4, 4.2.5.7.1, 4.2.5.8.1, 4.4.2.2.1 f), 4.10.1.2.1
6.2.4 Floors of the LCU and working areas		1.3.4	4.2.5.3.2 c), 4.2.5.3.2 d), 4.3.6.1, 4.3.6.2.2.1 g), 4.3.6.2.2.1 i) 3), 4.4.4, 4.4.5.1
		1.5.15	4.2.2.1, 4.4.7.1 b), 4.4.7.2, 4.4.7.3, 4.4.7.4, 4.12.1.1.4
6.2.5 Hazards due to relative movement	2.3		4.3.1.1, 4.3.1.2, 4.3.3, 4.3.5.2.1, 4.3.5.2.2, 4.3.5.2.3, 4.3.5.2.4, 4.3.5.2.5, 4.3.5.2.6, 4.3.8, 4.3.9.1, 4.3.9.3, 4.3.9.4, 4.3.10, 4.3.11, 4.12.1.4, 4.12.1.8
	3.1		4.2.5.3.1°c), 4.2.6.4.3.2, 4.3.1, 4.3.9.2, 4.3.13, 4.3.14, 4.3.15.2, 4.4.3.1
	4.3		4.2.5.5.3, 4.4.11.2, 4.7

ISO 8100-20 GESRs	EHSR of the Lifts Directive 2014/33/EU	EHSR of the Machinery Directive 2006/42/EC	Clause(s)/sub-clause(s) of this document
		1.3.7	4.2.5.5, 4.2.6.3.2.3, 4.2.6.4.4.2, 4.4.7.4 d), 4.5.6.2 d), 4.5.7, 4.6.2.1.6.3, 4.9.1.2, 4.9.2.3.4 a) 1), 4.9.3.2.6.6 b)
		1.3.8.1	4.2.5.5, 4.4.7.6, 4.4.11.3, 4.5.7
		1.3.8.2	4.1.3, 4.2.5.5, 4.5.7
		1.4.1	4.2.3.4, 4.2.5.5, 4.2.6.4.3.2 f), 4.3.4.3, 4.4.5, 4.4.7.4, 4.5.7
		1.4.2.1	4.1.3, 4.3.9.1.9
		1.4.2.2	4.2.3.3, 4.2.6.4.3.2 d), 4.2.6.4.3.2 e), 4.4.6.3
		4.1.2.2	-
6.2.6 Locking landing doors and closing LCU doors	2.3		4.3.1.1, 4.3.1.2, 4.3.3, 4.3.5.2.1, 4.3.5.2.2, 4.3.5.2.3, 4.3.5.2.4, 4.3.5.2.5, 4.3.5.2.6, 4.3.8, 4.3.9.1, 4.3.9.3, 4.3.9.4, 4.3.10, 4.3.11, 4.12.1.4, 4.12.1.8
	3.1		4.2.5.3.1°c), 4.2.6.4.3.2, 4.3.1, 4.3.9.2, 4.3.13, 4.3.14, 4.3.15.2, 4.4.3.1
6.2.7 Evacuation	4.4		4.2.3.1, 4.2.3.2 d), 4.2.6.2.3, 4.2.6.6, 4.3.9.3, 4.3.15.1, 4.3.15.3, 4.4.5, 4.4.6.2, 4.4.6.3, 4.9.2.3, 4.9.3.9, 4.12.1.6
	5.2		not covered

ISO 8100-20 GESRs	EHSR of the Lifts Directive 2014/33/EU	EHSR of the Machinery Directive 2006/42/EC	Clause(s)/sub-clause(s) of this document
		1.5.14	4.2.1.4, 4.2.3.3 c), 4.2.6.4.3.1 c), 4.3.9.3.5, 4.12.3.1
6.2.8 Sharp edges		1.3.4	4.2.5.3.2 c), 4.2.5.3.2 d), 4.3.6.1, 4.3.6.2.2.1 g), 4.3.6.2.2.1 i) 3), 4.4.4, 4.4.5.1
6.2.9 Hazards arising from the risk of electrical shock		1.5.1	4.10
6.2.10 Electromagnetic compatibility		1.5.10	4.10.1.1.1
		1.5.12	4.10.1.1.1
6.2.11 Illumination of the LCU and the landings	4.8		4.4.10
		1.1.4	4.2.1.2, 4.2.1.3.1 d), 4.2.6.2.1, 4.2.6.6.3, 4.4.10, 4.10.5.1.1, 4.10.7, 4.10.8
6.2.12 Effects of earthquakes			not covered
6.2.13 Hazardous materials		1.1.3	4.9.3.1.4, 4.2.1.5.3, 4.4.4, 4.9.2.2.2.6, 4.9.3.2.5.1, 4.9.3.2.5.2, 4.9.3.7, 4.9.3.11
		1.5.6	4.4.4, 4.9.3.11, 4.10.4.1, 4.10.4.2
		1.5.13	-
6.2.14 Environmental influences	4.6		
		1.5.11	4.10.1.1.1
6.3 GESRs related to persons adjacent to the lift			
6.3.1 Falling into the well (hoistway)	2.3		4.3.1.1, 4.3.1.2, 4.3.3, 4.3.5.2.1, 4.3.5.2.2, 4.3.5.2.3, 4.3.5.2.4, 4.3.5.2.5, 4.3.5.2.6, 4.3.8, 4.3.9.1, 4.3.9.3, 4.3.9.4, 4.3.10, 4.3.11, 4.12.1.4, 4.12.1.8
6.4 GESRs related to persons at the entrances			
6.4.1 Access and egress	4.1		4.3.6.2, 4.3.6.3

ISO 8100-20 GESRs	EHSR of the Lifts Directive 2014/33/EU	EHSR of the Machinery Directive 2006/42/EC	Clause(s)/sub-clause(s) of this document
		4.1.2.8.2	4.2.3, 4.12.1.1.4
		6.4.3	-
6.4.2 Horizontal sill-to-sill gap		1.5.15	4.2.2.1, 4.4.7.1 b), 4.4.7.2, 4.4.7.3, 4.4.7.4, 4.12.1.1.4
6.4.3 Alignment of the LCU and the landing		1.5.15	4.2.2.1, 4.4.7.1 b), 4.4.7.2, 4.4.7.3, 4.4.7.4, 4.12.1.1.4
		4.1.2.8.2	4.2.3, 4.12.1.1.4
		6.4.3	-
6.4.4 Self-evacuation from the LCU	5.2		not covered
6.4.5 Gap between the landing doors and the LCU doors		1.5.15	4.2.2.1, 4.4.7.1 b), 4.4.7.2, 4.4.7.3, 4.4.7.4, 4.12.1.1.4
6.4.6 Means to reopen doors when the LCU is at the landing	4.1		4.3.6.2, 4.3.6.3
6.5 GESRs related to persons in the LCU			
6.5.1 Size and strength	1.2		4.2.6.4.3.2, 4.3.3, 4.3.5.2.1, 4.3.5.2.2, 4.3.5.2.4, 4.3.5.2.5, 4.3.5.2.6, 4.4.1, 4.4.2, 4.4.3.2, 4.4.3.2.1, 4.4.3.2.2, 4.4.3.2.3, 4.4.3.2.4, 4.4.3.3
	1.3		4.4.11.2, 4.5.1, 4.5.2, 4.5.4, 4.5.5, 4.5.8 a)
6.5.2 LCU support/suspension	1.3		4.4.11.2, 4.5.1, 4.5.2, 4.5.4, 4.5.5, 4.5.8 a)
		4.1.2.4	4.5.1, 4.5.2, 4.5.3, 4.5.4, 4.5.6
		6.1.1	-
6.5.3 Overloaded LCU	1.4.1		4.12.1.2
6.5.4 Falling from the LCU	3.1		4.2.5.3.1°c), 4.2.6.4.3.2, 4.3.1, 4.3.9.2, 4.3.13, 4.3.14, 4.3.15.2, 4.4.3.1
		6.3.2	4.2.6.4.3.2, 5.4.6

ISO 8100-20 GESRs	EHSR of the Lifts Directive 2014/33/EU	EHSR of the Machinery Directive 2006/42/EC	Clause(s)/sub-clause(s) of this document
6.5.5 LCU travel path limits	3.3		4.2.5.6.1, 4.8.1.1, 4.8.1.3, 4.8.1.4, 4.8.2.1.1, 4.8.2.1.2.2, 4.8.2.2.1
6.5.6 Uncontrolled movement of the LCU	1.4.2		4.6.1.1 b), 4.6.2.2.1.1, 4.6.3.1, 4.6.4.1
	1.4.3		4.6.6.10, 4.8.2.2.1 b), 4.12.1.3
	3.2		4.6.1, 4.6.2, 4.6.3, 4.6.4, 4.6.6, 4.6.7, 4.7
		1.2.1	4.9.2.2.2.3 a), 4.9.2.5, 4.9.3.4, 4.10.3, 4.11, 4.12, Annex A
		4.1.2.8.2	4.2.3, 4.12.1.1.4
		6.4.1	-
6.5.7 LCU collision with objects in or beyond the travel path	4.3		4.2.5.5.3, 4.4.11.2, 4.7
		4.2.1	4.12.1.5.2.3, 4.12.1.6.1 a)
		4.1.2.6	-
		6.4.1	-
6.5.8 LCU horizontal or rotational motion	6.3.2	6.3.2	4.2.6.4.3.2, 5.4.6
		4.1.2.2	-
6.5.9 Change of speed or acceleration	1.4.2		4.6.1.1 b), 4.6.2.2.1.1, 4.6.3.1, 4.6.4.1
	1.4.3		4.6.6.10, 4.8.2.2.1 b), 4.12.1.3
	3.2		4.6.1, 4.6.2, 4.6.3, 4.6.4, 4.6.6, 4.6.7, 4.7
		1.2.1	4.9.2.2.2.3 a), 4.9.2.5, 4.9.3.4, 4.10.3, 4.11, 4.12, Annex A

ISO 8100-20 GESRs	EHSR of the Lifts Directive 2014/33/EU	EHSR of the Machinery Directive 2006/42/EC	Clause(s)/sub-clause(s) of this document
		6.3.1	-
6.5.10 Objects falling on the LCU	1.3.3	1.3.3	4.2.5.4, 4.2.6.3.3, 4.2.6.7.2, 4.4.7.2 a), 4.5.8 a)
		6.4.1	-
6.5.11 LCU ventilation	4.7		4.4.9
6.5.12 Fire/smoke in the LCU		1.5.6	4.4.4, 4.9.3.11, 4.10.4.1, 4.10.4.2
6.5.13 LCU in flooded areas			not covered
6.5.14 Stopping means inside the LCU			not covered
6.5.15 Landing and controls indication	1.6.2		4.10.10, 4.12.1.1.1, 4.12.1.1.2
6.6 GESRs related to persons in working areas			
6.6.1 Working area(s) or space(s)		1.1.6	4.2.2.1, 4.2.6.3.2, 4.2.6.4.1.1, 4.2.6.4.2, 4.12.1.5.2.3, Annex C
6.6.2 Accessible equipment	2.1		4.2.1.3.1 a), 4.2.3.3, 4.2.5.2.2.1, 4.2.5.2.3, 4.2.5.5.2, 4.2.6.4.4.1 d), 4.3.1, 4.3.4, 4.3.5, 4.3.8, 4.3.9, 4.3.10, 4.3.11, 4.3.14, 4.4.8 b)
		1.6.2	4.2.2.1, 4.2.3.2, 4.2.3.3, 4.2.6.3.2.1, 4.2.6.4.1.1, 4.2.6.4.2, 4.2.6.4.3.1 c), 4.2.6.4.3.2, 4.2.6.4.4, 4.2.6.4.5, 4.2.6.4.6, 4.2.6.7.1
6.6.3 Access to and egress from working spaces in the well (hoist-way)		1.6.2	4.2.2.1, 4.2.3.2, 4.2.3.3, 4.2.6.3.2.1, 4.2.6.4.1.1, 4.2.6.4.2, 4.2.6.4.3.1 c), 4.2.6.4.3.2, 4.2.6.4.4, 4.2.6.4.5, 4.2.6.4.6, 4.2.6.7.1
6.6.4 Strength of working area(s)		4.1.2.3	-
6.6.5 Restrictions on equipment in lift spaces			Annex B

ISO 8100-20 GESRs	EHSR of the Lifts Directive 2014/33/EU	EHSR of the Machinery Directive 2006/42/EC	Clause(s)/sub-clause(s) of this document
6.6.6 Falling from working areas		1.5.15	4.2.2.1, 4.4.7.1 b), 4.4.7.2, 4.4.7.3, 4.4.7.4, 4.12.1.1.4
6.6.7 LCU movement under control of an authorized person	1.5.2		4.2.1.1.1, 4.2.3.3 b), 4.2.5.2, 4.2.6.4.3.2 d), 4.2.6.5.1.2, 4.2.6.5.1.3°c), 4.2.6.6, 4.3.9.1.1, 4.3.9.3
		1.2.2	4.2.1.3.1, 4.4.8, 4.10.1.1.2, 4.12.1.5, 4.12.1.6, 4.12.1.7, 4.12.1.8
		4.1.2.6	-
		4.2.1	4.12.1.5.2.3, 4.12.1.6.1 a)
		6.4.1	-
6.6.8 Uncontrolled or unintended equipment movement inside the Well (hoist-way)		1.2.1	4.9.2.2.2.3 a), 4.9.2.5, 4.9.3.4, 4.10.3, 4.11, 4.12, Annex A
		1.3.7	4.2.5.5, 4.2.6.3.2.3, 4.2.6.4.4.2, 4.4.7.4 d), 4.5.6.2 d), 4.5.7, 4.6.2.1.6.3, 4.9.1.2, 4.9.2.3.4 a) 1), 4.9.3.2.6.6 b)
		6.4.1	-
6.6.9 Means of protection from various hazards	1.7.1.2		
	2.2		4.2.5.6, 4.2.5.7, 4.2.5.8, 4.5.3°c), 4.8.1.2
		1.5.5	4.1.2, 4.10.1.1.4
6.6.10 Falling objects in the well (hoistway)		1.3.3	4.2.5.4, 4.2.6.3.3, 4.2.6.7.2, 4.4.7.2 a), 4.5.8 a)
6.6.11 Electric shock in working spaces	1.5.2		4.2.1.1.1, 4.2.3.3 b), 4.2.5.2, 4.2.6.4.3.2 d), 4.2.6.5.1.2, 4.2.6.5.1.3°c), 4.2.6.6, 4.3.9.1.1, 4.3.9.3
		1.5.1	4.10

ISO 8100-20 GESRs	EHSR of the Lifts Directive 2014/33/EU	EHSR of the Machinery Directive 2006/42/EC	Clause(s)/sub-clause(s) of this document
6.6.12 Illumination of working spaces		1.1.4	4.2.1.2, 4.2.1.3.1 d), 4.2.6.2.1, 4.2.6.6.3, 4.4.10, 4.10.5.1.1, 4.10.7, 4.10.8

Annex ZA
(informative)

Relationship between this European Standard and the essential requirements of Directive 2014/33/EU aimed to be covered

Commented [IJ1547]: This will need to be amended to include all new work

This European Standard has been prepared under a Commission's standardization request "M/549 C(2016) 5884 final" to provide one voluntary means of conforming to essential requirements of Directive 2014/33/EU of the European Parliament and of the Council of 26 February 2014 on the harmonization of the laws of the Member States relating to lifts and safety components for lifts (recast).

Once this standard is cited in the Official Journal of the European Union under that Directive, compliance with the normative clauses of this standard, given in Table ZA.1and Table ZA.2, confers within the limits of the scope of this standard, a presumption of conformity with the corresponding essential requirements of that Directive and associated EFTA regulations.

Table ZA.1 — Correspondence between this European Standard and Annex I of Directive 2014/33/EU

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Essential health and safety requirements of Annex I to Directive 2014/33/EU	Clause(s)/sub-clause(s) of this EN	Remarks/Notes
1.1	See below Table ZA.2	
1.2	5.2.6.4.3.34.2.6.4.3.2, 5.3.34.3.3, 5.3.5.1, 5.3.5.3.14.3.5.2.1, 5.3.5.3.24.3.5.2.2, 5.3.5.3.44.3.5.2.4, 5.3.5.3.54.3.5.2.5, 5.3.5.3.64.3.5.2.6, 5.4.14.4.1, 5.4.24.4.2, 5.4.3.24.4.3.2, 5.4.3.2.14.4.3.2.1, 5.4.3.2.24.4.3.2.2, 5.4.3.2.34.4.3.2.3, 5.4.3.2.44.4.3.2.4, 5.4.3.34.4.3.35.4.4	The first indent is covered. The second indent is not covered.
1.3	5.4.11.24.4.11.2, 5.5.14.5.1, 5.5.24.5.2, 5.5.44.5.4, 5.5.54.5.5, 5.5.6, 5.5.7,5.5.84.5.8 a)	Counterweight, suspension, safety factors, terminations, positive drive, distribution, compensation, pulleys and sprockets
1.4.1	5.12.1.24.12.1.2	Load control
1.4.2	5.6.1.14.6.1.1 b), 5.6.2.2.1.14.6.2.2.1.1, 5.6.34.6.3.1, 5.6.44.6.4.1 ,5.6.6	General provisions, governor, rupture valve, restrictor, ACOP
1.4.3	5.6.1, 5.6.2.2.1.15.6.64.6.6.10, 5.8.2.2.24.8.2.2.1 b), 5.12.1.34.12.1.3	General provisions, governor, rupture valve, restrictor, ACOP
1.4.4	5.5.34.5.3, 5.5.7.14.5.7.1 b)	Traction
1.5.1	5.2.5.1, 5.9.1.14.9.1.1	Single machines
1.5.2	5.2.1.1.14.2.1.1.15.2.1.2, 5.2.1.5, 5.2.1.8, 5.2.1.9, 5.2.2, 5.2.34.2.3.3 b),5.2.4, 5.2.5.24.2.5.2,5.2.5.3, 5.2.5.5.2, 5.2.6.3, 5.2.6.4.3.34.2.6.4.3.2 d), 5.2.6.54.2.6.5.1.2, 5.2.6.5.1.34.2.6.5.1.3°c), 5.2.6.64.2.6.6, 5.2.6.7, 5.3.94.3.9.1.1, 5.3.9.34.3.9.3	Accessibility, pit equipment, building fabric,

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Essential health and safety requirements of Annex I to Directive 2014/33/EU	Clause(s)/sub-clause(s) of this EN	Remarks/Notes
1.6.1	Not covered	
1.6.2	5.1.2, 5.2.4, 5.2.6.2, 5.2.6.4.1.3, 5.4.2.3.2, 5.10.104.10.10, 5.12.1.1.14.12.1.1.1, 5.12.1.1.24.12.1.1.2, 5.12.1.1.3, 5.12.1.5, 5.12.1.10	Clear indication of control function
1.6.3	5.10.5.34.10.5.3, 5.12.4.3	Shared controls
1.6.4	5.2.1.1.24.2.1.1.2, 5.9.2.54.9.2.5, 5.9.3.44.9.3.4, 5.104.10, 5.114.11, 5.12, Annex A	Main switches, Fault protection, Electric Safety Devices, Controls
2.1	5.2.1.1, 5.2.1.2, 5.2.1.54.2.1.3.1 a), 5.2.1.8, 5.2.2, 5.2.3.34.2.3.3, 5.2.4, 5.2.5.2.24.2.5.2.2.1, 5.2.5.2.34.2.5.2.3, 5.2.5.2.4, 5.2.5.3,5.2.5.5.24.2.5.5.2, 5.2.6.4.4.14.2.6.4.4.1 d), 5.34.3.1, 5.3.44.3.4, 5.3.54.3.5, 5.3.84.3.8, 5.3.94.3.9, 5.3.104.3.10, 5.3.114.3.11, 5.3.144.3.14, 5.4.84.4.8 b)5.12.1.11	Access to the well, stopping devices
2.2	5.2.5.64.2.5.6, 5.2.5.74.2.5.7, 5.2.5.84.2.5.8, 5.5.34.5.3°c), 5.8.1.24.8.1.2	Refuge spaces
2.3	5.34.3.1.1, 5.3.1.24.3.1.2, 5.3.34.3.3, 5.3.5.1, 5.3.5.3.14.3.5.2.1, 5.3.5.3.24.3.5.2.2, 5.3.5.3.34.3.5.2.3, 5.3.5.3.44.3.5.2.4, 5.3.5.3.54.3.5.2.5, 5.3.5.3.64.3.5.2.6, 5.3.84.3.8, 5.3.9.14.3.9.1, 5.3.9.34.3.9.3, 5.3.9.44.3.9.4, 5.3.104.3.10, 5.3.114.3.11, 5.12.1.44.12.1.4, 5.12.1.84.12.1.8	Landing and Car doors, general provisions, dimensions, guidance, clearances, strength, protection, indication, locking, unlocking, multiple panels, closing, electrical safety,
3.1	5.2.5.3.14.2.5.3.1°c), 5.2.6.4.3.34.2.6.4.3.2, 5.3.14.3.1, 5.3.9.24.3.9.2, 5.3.134.3.13, 5.3.144.3.14, 5.3.15.24.3.15.2, 5.4.34.4.3.15.4.4	General requirements, opening, walls/floor/roof of car, finishes
3.2	5.64.6.1, 5.6.24.6.2, 5.6.34.6.3, 5.6.44.6.4, 5.6.64.6.6, 5.6.74.6.7, 5.74.7, 5.9.2.4	Precautions against free fall, excessive speed, unintended car movement and creeping of the car, guides
3.3	5.2.5.6.14.2.5.6.1, 5.84.8.1.1, 5.8.1.34.8.1.3, 5.8.1.44.8.1.4, 5.8.2.1.14.8.2.1.1, 5.8.2.1.2.24.8.2.1.2.2, 5.8.2.2.14.8.2.2.1	Buffers

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Essential health and safety requirements of Annex I to Directive 2014/33/EU	Clause(s)/sub-clause(s) of this EN	Remarks/Notes
3.4	5.6.2.1.54.6.2.1.5, 5.6.2.2.1.64.6.2.2.1.6 b), 5.6.2.2.1.64.6.2.2.1.6°c), 5.6.2.2.34.6.2.2.3 e), 5.6.2.2.4.24.6.2.2.4.2 g)?h)?, 5.6.34.6.3, 5.6.44.6.4, 5.6.5.9, 5.6.5.10, 5.6.6.54.6.6.5, 5.6.74.6.7.78	Monitoring of safety components
4.1	5.3.6.24.3.6.2, 5.3.6.34.3.6.3	Door protection
4.2	5.3.54.3.5.321, 5.3.124.3.12	Fire protection of landing doors
4.3	5.2.5.5.1 h)4.2.5.5.3, 5.4.114.4.11.2, 5.74.7	Counterweight guidance
4.4	5.2.2.3, 5.2.34.2.3.1, 5.2.3.24.2.3.2 d), 5.2.6.24.2.6.2.3, 5.2.6.64.2.6.6, 5.3.6.3, 5.3.9.34.3.9.3, 5.3.15.1 a)4.3.15.1, 5.3.15.34.3.15.3, 5.4.54.4.5, 5.4.64.4.6.2, 5.4.6.34.4.6.3, 5.9.2.2.2.7, 5.9.2.34.9.2.3, 5.9.3.94.9.3.9, 5.12.1.64.12.1.6	Evacuation of trapped persons
4.5	5.12.34.12.3.1	Alarm device
4.6	5.9.3.4, 5.9.3.114.9.3.11, 5.10.4.34.10.4.3, 5.10.4.44.10.4.4	Over temperature operations
4.7	5.4.94.4.9	Car ventilation
4.8	5.3.7, 5.4.104.4.10	Car and landing lighting
4.9	5.4.10.44.4.10.4, 5.12.34.12.3.1	Communications
4.10	Not covered	
5.1	5.2.6.2, 5.2.6.4.5.84.2.6.4.5.7, 5.3.9.1.134.3.9.1.11, 5.4.2.2.1 b) 5)4.4.2.2.1 f), 5.4.2.3.24.4.2.3.2, 5.4.2.3.34.4.2.3.3, 5.6.2.1.1.34.6.2.1.1.3, 5.6.2.2.1.84.6.2.2.1.8, 5.6.3.94.6.3.9, 5.6.4.74.6.4.7, 5.6.6.124.6.6.12, 5.6.7.144.6.7.14, 5.8.1.84.8.1.8, 5.11.2.3.54.11.2.3.5	Load plate
5.2	5.3.15not covered	Self-rescue
6.1	7.1, 7.2, 7.3not covered	Safety Components data
6.2	7.1, 7.26.2, 7.36.3	User manual

Commented [AD1551]: Clause is deleted

Commented [AD1552]: 5.9.2.2.2.7 content is moved to 4.9.2.3.1

Table ZA.2 — Correspondence between this European Standard and Annex I of Directive 2006/42/EC

Essential health and safety requirements of Annex I to Directive 2006/42/EC	Clause(s)/sub-clause(s) of this EN	Remarks/Notes
1.1.2 (a)	54, 65, 765.2.1.3, 5.2.1.4, 5.2.1.6, 5.2.1.7, 5.2.5.4, 5.2.6.1, 5.3.9.3.2, 5.4.7, 5.4.8, 5.6.2.1.6.3, 5.9, 5.11.2.6, 7.2.2, 7.2.3	Principals of safety integration, Ventilation, Lighting, Entrapment in the well, Handling of equipment, Protection below the well, Environmental influences, working on car roof, lift machinery, special equipment and accessories
1.1.2 (c)	54, 65, 76	
1.1.2 (d)	54, 65, 76	
1.1.2 (e)	54, 65, 76	
1.1.3	4.9.3.1.40.4.22, 5.2.1.8.34.2.1.7.34.2.1.5.3?, 5.2.1.9, 5.4.44.4.4, 5.9.2.2.2.64.9.2.2.2.6, 5.9.3.2.5.14.9.3.2.5.1, 5.9.3.2.5.24.9.3.2.5.2, 5.9.3.74.9.3.7, 5.9.3.114.9.3.11	Materials and Products
1.1.4	5.2.1.2.1, 5.2.1.44.2.1.2, 5.2.1.54.2.1.3.1 d), 5.2.2.2, 5.2.6.24.2.6.2.1, 5.2.6.6.34.2.6.6.3, 5.3.7.1, 5.4.104.4.10, 5.10.5.1.14.10.5.1.1, 5.10.74.10.7, 5.10.84.10.8	Lighting
1.1.5	5.2.1.74.2.1.5, F.4C.4 a)	Handling
1.1.6	5.2.1.5.1, 5.2.1.6, 5.2.2.44.2.2.1, 5.2.2.5, 5.2.5.7, 5.2.5.8, 5.2.6.3.24.2.6.3.2, 5.2.6.4.1.24.2.6.4.1.1, 5.2.6.4.24.2.6.4.2, 5.4.8, 5.12.1.5.2.34.12.1.5.2.3, Annex FAnnex C	Ergonomics
1.2.1	5.9.2.2.2.34.9.2.2.2.3 a), 5.9.2.54.9.2.5, 5.9.3.44.9.3.4, 5.104.10.3, 5.114.11, 5.124.12, Annex A	Safety and reliability of control systems
1.2.2	5.2.1.5.14.2.1.3.1, 5.4.84.4.8, 5.10.1.1.44.10.1.1.2,5.12.1.1, 5.12.1.54.12.1.5, 5.12.1.64.12.1.6, 5.12.1.74.12.1.7, 5.12.1.84.12.1.8	Control devices

Commented [AD1553]: Text according template

Commented [AD1554]: Does not exist anymore, building requirement

Commented [AD1555]: Does not exist anymore, building requirement

Commented [AD1556]: Does not exist anymore, building requirement

Commented [AD1557]: clause is moved to building annex N2237

Commented [AD1558]: Does not exist anymore, building requirement

Essential health and safety requirements of Annex I to Directive 2006/42/EC	Clause(s)/sub-clause(s) of this EN	Remarks/Notes
1.2.3	5.2.6.4.4.1 4.2.6.4.4.1 g), 5.6.2.1.4.34.6.2.1.4.3, 5.6.2.2.1.64.6.2.1.1.6 b), 5.6.5.9.24.6.5.9, 5.6.6.74.6.6.7, 5.6.6.24.6.6.2, 5.6.7.34.6.7.3, 5.6.7.94.6.7.9, 5.9.2.7.34.9.2.7.3, 5.9.3.10.34.9.3.10.3, 5.11.1.44.11.1.4, 5.12.1.54.12.1.5, 5.12.1.64.12.1.6, 5.12.2.3.24.12.2.3.25.9.2.5, 5.10, 5.11, 5.12, Annex A	Starting
1.2.4.1	5.9.2.5, 5.10, 5.11, 5.12, Annex A5.12.1.114.12.1.11	Normal stop
1.2.4.2	5.9.2.5, 5.10, 5.11, 5.12, Annex A5.12.1.44.12.1.4	Operational stop
1.2.4.3	5.9.2.5, 5.10, 5.11, 5.12, Annex Anot covered	Emergency Stop
1.2.4.4	5.9.2.5, 5.10, 5.11, 5.12, Annex A5.12.1.11.14.12.1.11.1	Assembly of machinery
1.2.5	5.12.1.54.12.1.5, 5.12.1.64.12.1.6, 5.12.1.74.12.1.75.9.2.5, 5.10, 5.11, 5.12, Annex A	Selection of control or operating modes
1.2.6	5.9.2.5, 5.10, 5.114.11, 5.12, Annex A	Failure of the power supply
1.3.1	5.4.3.25.2.1.84.2.1.5	Risk of loss of stability
1.3.2	5.3.1.44.3.1.4, 5.3.3.34.3.3.3, 5.3.54.3.5, 5.4.3.24.4.3.2.1, 5.5.24.5.2, 5.5.6.34.5.6.3, 5.6.2.2.1.34.6.2.2.1.3, 5.74.7, 5.9.3.2.14.9.3.2.1, 5.9.3.2.24.9.3.2.2, 5.9.3.2.34.9.3.2.3, 5.9.3.2.6.64.9.3.2.6.6, 5.9.3.34.9.3.3, 5.9.3.5.34.9.3.5.3, 7.2.3, 7.2.46.2.4	Risk of break-up during operation
1.3.3	5.2.5.44.2.5.4, 5.2.6.34.2.6.3.3, 5.2.6.7.24.2.6.7.2, 5.4.7.24.4.7.2 a), 5.5.84.5.8 a)	Risks due to falling or ejected objects
1.3.4	5.2.5.3.24.2.5.3.2 c), 5.2.5.3.24.2.5.3.2 d), 5.3.6.14.3.6.1, 5.3.6.2.2.14.3.6.2.2.1 g), 5.3.6.2.2.14.3.6.2.2.1 i) 3), 5.4.44.4.4, 5.4.5.14.4.5.1	
1.3.7	5.2.5.54.2.5.5, 5.2.6.3.2.34.2.6.3.2.3, 5.2.6.4.2.24.2.6.4.4.2, 5.4.7.44.4.7.4 d), 5.5.6.24.5.6.2 d), 5.5.74.5.7, 5.6.2.1.6.34.6.2.1.6.3, 5.9.1.24.9.1.2, 5.9.2.3.14.9.2.3.4 a) 1), 5.9.3.2.6.64.9.3.2.6.6 b)	Risks related to moving parts

Essential health and safety requirements of Annex I to Directive 2006/42/EC	Clause(s)/sub-clause(s) of this EN	Remarks/Notes
1.3.8.1	5.2.5.54.2.5.5, 5.4.7.64.4.7.6, 5.4.11.34.4.11.3, 5.5.74.5.7	Moving transmission parts
1.3.8.2	0.4.214.1.3, 5.2.5.54.2.5.5, 5.5.74.5.7	Moving parts involved in the process
1.4.1	5.2.3.44.2.3.4, 5.2.5.54.2.5.5, 5.2.6.4.3.34.2.6.4.3.2 f), 5.3.4.34.3.4.3, 5.4.54.4.5, 5.4.7.44.4.7.4, 5.5.74.5.7	General requirements for guards
1.4.2.1	0.4.214.1.3, 5.3.9.1.114.3.9.1.95.5.7	Fixed guards
1.4.2.2	5.2.34.2.3.3, 5.2.6.4.3.34.2.6.4.3.2 d), 5.2.6.4.3.34.2.6.4.3.2 e), 5.35.4.6.34.4.6.3	Interlocking movable guards
1.4.2.3	5.2.3	Adjustable guards restricting access
1.4.3	5.9.2.5, 5.10, 5.11, 5.12, Annex A	Special requirements for protective devices
1.5.1	5.9.2.5, 5.104.10, 5.11, 5.12, Annex A	Electricity supply
1.5.2	5.9.2.5, 5.10, 5.11, 5.12, Annex A	Static electricity
1.5.3	5.9.34.9.3	Energy supply other than electricity
1.5.4	5.6.2.2.1.14.6.2.2.1.1 c), 5.9.2.3.54.9.2.3.8, 5.10.6.3.6, 5.10.6.44.10.6.4	Commented [AD1559]: Clause is removed by TFHAS
1.5.5	0.4.164.1.2, 5.2.1.3, 5.2.6.1, 5.9.2.11, 5.10.4.3, 5.10.1.1.64.10.1.1.4, 5.11.4.2	Extreme temperatures Commented [AD1560]: to be verified
1.5.6	1.2, 5.2.1.2.1, 5.3.12, 5.2.2.3, 5.2.3.3, 5.3.5.3, 5.3.125.4.44.4.4, 5.9.3.114.9.3.11, 5.10.4.14.10.4.1, 5.10.4.24.10.4.2	Fire
1.5.7	Not covered	
1.5.8	1.3	Noise
1.5.9	1.3, 5.9.3.3.1.1	Vibrations
1.5.10	5.10.1.1.34.10.1.1.1	Radiation
1.5.11	5.10.1.1.34.10.1.1.1	External radiation
1.5.13	5.2.1.9, 5.9.3.2.5.2,	Emissions of hazardous materials and substances
1.5.14	5.2.1.64.2.1.4, 5.2.3.34.2.3.3 c), 5.2.6.4.3.14.2.6.4.3.1 c), 5.3.9.3.54.3.9.3.5, 5.12.3.14.12.3.1	Risk of being trapped in a machine

Essential health and safety requirements of Annex I to Directive 2006/42/EC	Clause(s)/sub-clause(s) of this EN	Remarks/Notes
1.5.15	5.2.1.9, 5.2.2.44.2.2.1, 5.4.74.4.7.1 b), 5.4.7.24.4.7.2, 5.4.7.34.4.7.3, 5.4.7.44.4.7.4, 5.12.1.1.44.12.1.1.45.9	Risk of slipping, tripping or falling
1.5.16	5.9.2.5, 5.10, 5.11, 5.12, Annex A	Lightning
1.6.1	5.12.1.54.12.1.5, 5.12.1.74.12.1.7, 5.12.1.84.12.1.8, 5.12.1.11.14.12.1.11.1, 7.2.26.2.2, 7.2.36.2.4	Machinery maintenance
1.6.2	5.2.1.4, 5.2.1.5, 5.2.24.2.2.41, 5.2.34.2.3.2, 5.2.3.34.2.3.3, 5.2.4, 5.4.8 5.2.6.3.2.14.2.6.3.2.1, 5.2.6.4.1.24.2.6.4.1.1, 5.2.6.4.24.2.6.4.2, 5.2.6.4.3.14.2.6.4.3.1 c), 5.2.6.4.3.34.2.6.4.3.2, 5.2.6.4.44.2.6.4.4, 5.2.6.4.54.2.6.4.5, 5.2.6.4.64.2.6.4.6, 5.2.6.7.14.2.6.7.1	Access to operating positions and servicing points
1.6.3	5.2.6.2.24.2.6.2.2, 5.10.1.2.44.10.1.2.4, 5.10.54.10.5, 5.10.6.3.54.10.6.3.5	
1.6.4	5.2.1.4, 5.2.1.5, 5.2.2, 5.2.3, 5.2.4, 5.4.8	Operator intervention
1.6.5	5.2.1.4, 5.2.1.5, 5.2.2, 5.2.3, 5.2.4, 5.4.8	Cleaning of internal parts
1.7.1	5.1.24.1.4, 5.2.45.2.5.7.14.2.5.7.1, 5.2.5.8.14.2.5.8.1, 5.4.2.2.1 b) 5)4.4.2.2.1 f), 5.10.1.2.14.10.1.2.1	Information and warnings on the machinery
1.7.1.2	5.3.6.2.1.1	Warning devices
1.7.2	5.2.44.2.4, 5.2.6.24.2.6.2, 5.2.5.7.14.2.5.7.1, 5.2.5.8.14.2.5.8.1, 5.2.6.4.1.34.2.6.4.1.2, 5.3.6.2.2.1 b) 4)4.3.6.2.2.1 b) 3), 5.3.7.2.14.3.7.1, 7.2.2 h),4.3.9.3.2, 5.10.1.2.14.10.1.2.1, 5.10.6.3.54.10.6.3.5, 5.12.1.2.3 4.12.1.2.3 a), 5.12.1.8.3 g) 4.12.1.8.3 c), 5.12.1.104.12.1.10 b), 5.12.1.104.12.1.10 c),	Warning of residual risks
1.7.3	5.2.6.2, 5.4.2.3.2, 5.4.2.3.3see Table ZA.1, 5.1	Marking of machinery
4.1.2.1	6	Risks due to lack of stability
4.1.2.2	5.3.3.2	Machinery running on guide rails and rail tracks
4.1.2.3	0.4.3, 5.5.34.5.3, 5.9.2.2.2.14.9.2.2.2.1, 6.3.35.2.4, 6.3.45.2.5, 6.3.65.2.7	Mechanical strength
4.1.2.4	5.5.14.5.1, 5.5.24.5.2, 5.5.34.5.3, 5.5.44.5.4, 5.5.64.5.6	Pulleys, drums, wheels, ropes and chains
4.1.2.6	5.9.3.9	Control of movements

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Essential health and safety requirements of Annex I to Directive 2006/42/EC	Clause(s)/sub-clause(s) of this EN	Remarks/Notes
4.1.2.8.2	~~5.2.2, 5.2.3~~4.2.3, ~~5.3~~ ~~5.12.1.1.4~~4.12.1.1.4	~~Access to carrier~~
4.2.1	~~5.12.1.5~~4.12.1.5.2.3, ~~5.12.1.6.1~~4.12.1.6.1 a)	~~Control of movement (hold to run)~~
6.3.2	~~5.2.3, 5.3, 5.4.7.2~~5.2.6.4.3.3~~4~~.2.6.4.3.2, 5.4.6	~~Falling from the carrier~~

WARNING 1 Presumption of conformity stays valid only as long as a reference to this European Standard is maintained in the list published in the Official Journal of the European Union. Users of this standard should consult frequently the latest list published in the Official Journal of the European Union.

WARNING 2 Other Union legislation may be applicable to the product(s) falling within the scope of this standard.

Bibliography

~~ISO 6743-4:2015, Lubricants, industrial oils and related products (class L) — Classification — Part 4: Family H (Hydraulic systems)~~

[1] ISO 7000:2019, *Graphical symbols for use on equipment — Registered symbols*

~~ISO 7010:20112019, Graphical symbols — Safety colours and safety signs — Registered safety signs~~

[2] ~~ISO 7465, *Passenger lifts and service lifts — Guide rails for lift cars and counterweights — T-type*[4]~~ —ISO 8100-33:2022, *Lifts for the transport of persons and goods. T-type guide rails for lift cars and counterweights*

[3] ISO 8100-20:2018, *Lifts for the transport of persons and goods — Part 20: Global essential safety requirements (GESRs)*

[4] ISO 12543-1:2021 Glass in building — Laminated glass and laminated safety glass — Part 1: Vocabulary and description of component parts

[5] ISO 13050:2022, *Synchronous belt drives. Metric pitch, curvilinear profile systems G, H, R and S, belts and pulleys*

[6] ISO 14122-2:2016, *Safety of machinery — Permanent means of access to machinery — Part 2: Working platforms and walkways*

~~ISO 14798:2009, *Lifts (elevators), escalators and moving walks — Risk assessment and reduction methodology*~~

[7] ISO 17396:2017, *Synchronous belt drives. Metric pitch. Tooth profiles T and AT endless and open ended belts and pulleys*

~~IEC 61508-1:2010, *Functional safety of electrical/electronic/programmable electronic safety-related systems — Part 1: General requirements*~~

~~[8] IEC 61508-2:2010, *Functional safety of electrical/electronic/programmable electronic safety-related systems — Part 2: Requirements for electrical/electronic/programmable electronic safety-related systems*~~

~~[9] IEC 61508-3:2010, *Functional safety of electrical/electronic/programmable electronic safety related systems — Part 3: Software requirements*~~

~~[11] IEC 61508-5:2010, *Functional safety of electrical/electronic/programmable electronic safety related systems — Part 5: Examples of methods for the determination of safety integrity levels*~~

~~[12] IEC 61508-6:2010, *Functional safety of electrical/electronic/programmable electronic safety-related systems - Part 6: Guidelines on the application of IEC 61508-2 and IEC 61508-3*~~

~~[13] IEC 61508-7:2010, *Functional safety of electrical/electronic/programmable electronic safety related systems — Part 7: Overview of techniques and measures*~~

~~[14] EN/TS 81-11:2011, *Safety rules for the construction and installation of lifts — Basics and interpretations — Part 11: Interpretations related to EN 81 family of standards*~~

Commented [SD1562]: ISO 7465 is superseded by ISO 8100-33

Commented [SD1563]: Added ref due to note in 5.5.1.2.4

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Commented [SD1565]: Added ref due to note in 5.5.1.2.4

Commented [SD1566]: Referenced in 5.5.1.2.4

Commented [SD1567]: Added as referenced in 5.10.1.1.6 Table 19

Commented [AD1568]: Only in a NOTE

Commented [SD1569]: No ref to this in EN 8100-1

~~[15] EN 81-21:2022, *Safety rules for the construction and installation of lifts — Lifts for the transport of persons and goods — Part 21: New passenger and goods passenger lifts in existing building*~~

~~[16] EN 81-70, *Safety rules for the construction and installation of lifts — Particular applications for passenger and goods passenger lifts — Part 70: accessibility to lifts for persons including persons with disability*~~

~~EN 81-70:2021+A1:2022, *Safety rules for the construction and installation of lifts — Particular applications for passenger and goods passenger lifts — Part 70: accessibility to lifts for persons including persons with disability*~~

[~~25218~~] ~~HD~~ IEC 60364-5-51:2005, *Electrical installations of buildings — Part 5-51: Selection and erection of electrical equipment — Common rules*

[~~119~~] IEC 60364-4-42:2010+AMD1:2014, *Low voltage electrical installations — Part 4-42: Protection for safety — Protection against thermal effects*

[10] IEC 61508-4:2010, *Functional safety of electrical/electronic/programmable electronic safety related systems — Part 4: Definitions and abbreviations*

[~~1211~~] ISO/TS 8100-21:2018, *Lifts for the transport of persons and goods — Part 21: Global safety parameters (GSPs) meeting the global essential safety requirements (GESRs)*

[~~1312~~] ISO/TS 8100-3:2019, *Lifts for the transport of persons and goods — Part 3: Requirements from other Standards (ASME A17.1/CSA B44 and JIS A 4307-1/ JIS A 4307-2) not included in ISO 8100-1 or ISO 8100-2*

Commented [SD1570]: Added as normative reference for (5.3.6.2.3.4)
AD: and removed again

Commented [AD1571]: Reference NOTE is deleted

Commented [KA1572]: Moved from normative reference to here because now standard is referenced only in informative note.

Commented [GE1573]: ISO Editor's comment

Commented [SD1574]: N2055 combined comments