EUROPEAN ELEVATOR ASSOCIATION

ELA
European
Lift Association

INTRODUCTION OF (EN) ISO 8100-1/2:2026

Main Differences in comparison with EN 81-20/50:2020 (ISO 8100-1/2:2019)

Overview of key updates, structural changes and technical clarifications

Disclaimer

The purpose of this document is to outline and introduce the main changes applied to *(EN) ISO 8100-1:2026* and (EN) ISO 8100-2:2026 standards.

While parts of the referred *(EN) ISO 8100-1:2026* and *(EN) ISO 8100-2:2026* standards may be quoted in the text of this document (acc. CEN and ISO rules), this document is purely designed as a supportive tool to allow readers gain a deeper understanding of the changes in the standards.

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Acknowledgement

This presentation was developed by the European Lift Association (CEN/TC 10/WG 1) as part of the **initiative on the introduction of (EN) ISO 8100-1/2:2026**.

We sincerely thank the **experts of CEN/ TC 10/WG 1** for their valuable technical input and collaborations through the project. Particular thanks to the TF leads and reviewers for their support in analysing and aligning the main changes between EN 81-20/50:2020 and (EN) ISO 8100-1/2:2026.

The consolidated presentation reflects the collaborative efforts and expertise shared across all Task Forces.

The consolidation and coordination of contributions were carried out by **Teuvo (Ted) Väntänen** and **Peipei Wang** (VFA-Interlift e.V., Germany).

Shorter standard names are used in this document

Version (year) in the name of a standard is relevant. For example, IS0 8100-1:2019 is dramatically different from ISO 8100-1:2025. It is important to use the whole id of the standard, including the year (date) marking.

However, to make this document shorter and easier to read, often used standard names are shown in a shorter format

- *(EN) ISO 8100-1:2026* → *ISO 8100-1*
- *(EN) ISO 8100-2:2026* → *ISO 8100-2*
- *EN 81-20:2020* → *EN 81-20*
- *EN 81-50:2020* → *EN 81-50*

Furthermore, if the clause number is written without specific standard next to it, the clause refers to ISO 8100-1, e.g.

- *4.10* means chapter *4.10 Electric installations and appliances* in *ISO 8100-1*

If clause number refers to other standards than (EN) ISO 8100-1:2026, it is clearly written, e.g.

- *ISO 8100-2, 4.7.6*
- *EN 81-20, 4.7.1*

Content according to the ISO 8100-1 structure

Introduction and background

Key editorial and content updates

2 Normative references

3 Terms and definitions (both 1and 2)

4.2 Well, machinery spaces and pulley rooms

4.3 Landing doors and car doors

4.4 Car, counterweight and balancing weight

4.5 Suspension means, compensation means and related protection means

4.6 Precautions against free fall, excessive speed, unintended car movement and creeping of the car

4.7 Guide rails

4.8 Buffers

4.9 Lift machinery and associated equipment

4.10 Electric installations and appliances

4.11 Protection against electric faults; failure analysis; electric safety devices

4.12 Electrical Controls

5 Verification of the safety requirements and/or protective measures

6 Information for use

7 Building-related boundary conditions

Annex A (normative) List of the electric safety devices

Annex B (normative) Information on the building-related conditions in which the lift is installed

Annex C (normative) Pit access ladder

Annex D (informative) Relationship between this document and ISO 8100-20:2018

Annex E (informative) Operations overview

Annex ZA (informative) Relationship between this European Standard and the essential requirements of Directive 2014/33/EU aimed to be covered (note, covers both parts)

Content according to the ISO 8100-2 structure

4.2 Verification of landing and car door locking devices

4.4 Verification of overspeed governors

4.6 Verification of safety circuits and SIL-rated circuits

4.7 Verification of ascending car overspeed protection means

4.8 Verification of unintended car movement protection means

4.10 Guide rails calculation

4.13 Verification of suspension means, compensation means and their terminations

4.15 Calculations of rams, cylinders, rigid pipes and fittings

4.17 Electrical and electronic components - Fault exclusion

4.18 Design rules for SIL-rated circuits

Annex A (normative) - SIL-rated circuits

Annex ZA (content is in part 1 of Annex ZA)

Appendixes

Machinery Regulation impact assessment

(EN) ISO 8100-1:2026

Introduction and Background

Summary of the main changes

- Newly coated suspension means, ropes, and belts – or those that are not steel wire ropes
- Traction lifts with increased available car area
- Specification of electrical means tripping the safety gear (electronic speed governor + electrical tripping)
- Reduced stroke buffer for the whole speed range
- Increased requirements for the machine brake and its control
- Safe access to the well pit (ladders) including work platforms in the well pit
- Protection of hands at the doors
- Vertically sliding doors
- Fire classification of electrical cables
- Inspection travel beyond the limits of normal car travel
- Automatic rescue operation system (emergency evacuation)
- PESSRAL completely revised (SIL rated safety circuit)

See also: Main changes described in *EN ISO 8100-1:2026, Foreword* and *EN ISO 8100-2:2026, Foreword*

Introduction & Background

ISO 8100-1/2:2026 publication schedule

- ISO publication is expected by March 2026

EU transition and applicability

- CEN will publish the standard at the same time as EN ISO 8100-1/2:2026 replacing EN 81-20/50:2020. Transition period will be 36 months after which the EN 81-20/50:2020 standards will be withdrawn (Date of Withdrawal) by CEN.
- After EN ISO 8100-1/2:2026 citation in the Official Journal of EU (OJEU), that is expected during 2026, both EN 81-20/50:2020 and EN ISO 8100-1/2:2026 give presumption of conformity to Lifts Directive 2014/33/EU for those EHSRs which are covered by those standards in their Annex ZA.
- From January 2027 lift installer needs to show conformance to the new and changed EHSRs of MR, which are already covered in the EN ISO 8100-1/2:2026.
- After Date of Withdrawal only EN ISO 8100-1/2:2026 will be valid in the EU.

(EN) ISO 8100-1:2026

Key editorial and content updates

Key editorial and content updates

The *(EN) ISO 8100-1:2026* and *(EN) ISO 8100-2:2026* standards were jointly prepared by the Technical Committee CEN/TC 10 and the Technical Committee ISO/TC 178 to ensure a set of globally agreed and aligned standards.

Both standards have been re-structured as per ISO/IEC directives Part 2, improving the technical requirements and removing ambiguity, i.e. use of expressions / verbs like *"can", "may", "should"* and instead using *"shall"* to give clear and concise requirements.

The standards were further reworked to improve the use of, and safety of, lifts for maintenance and installation personnel, customers, owners and end users. Examples:

- Requirements for automatic rescue operation have been added, and requirements for emergency operation revised
- Requirements to avoid the dragging of hands in doors have been extended
- Requirements for cybersecurity have been added
- SIL levels of the electric safety devices (*Annex A*) have been revised

None specific lift requirements i.e., building requirements, were removed from the main body of the clauses and moved to a new *Annex B - Information on the building-related conditions in which the lift is installed*.

The standards have been also updated to include latest available lift technologies. Examples:

- Requirements for suspension means other than steel wire ropes have been added
- Requirements for tripping the safety gear by electrical means have been added

Building-related information - Clauses 6 and 7 and Annex B -General provisions of modification

Harmonized standards which are cited in the EU Official Journal cannot impose requirements concerning buildings, because the building requirement fall under national legislation of the member states.

The building related information are listed in the Annex B (normative) as information that the installer shall communicate to the building contractor.

The requirements concerning lifts - items relate to essential health and safety requirements (EHSRs) of the Lifts Directive and therefore with a specific technical requirements in the clause 5 of EN 81-20 that impact the building, have been added to clause 6.2.2 of ISO 8100-1 as part of the instructions

Items which are critical for the safety but cannot relate to EHSRs, have been moved to the new clause 7.

ISO 8100-1 structure

EN 81-20:2020	*EN ISO 8100-1:2025*	*Notes*
Contents	Contents	
European foreword	European foreword	
	Foreword	ISO foreword
0. Introduction	Introduction	
1.Scope	1. Scope	
2. Normative references	2. Normative references	
3. Terms and definitions	3. Terms and definitions	
4. List of significant hazards	-	Obsolete by detailed Annex ZA
5. Safety requirements and/or protective measures	4. Safety requirements and/or protective measures	
6. Verification of the safety requirements and/or protective measures	5. Verification of the safety requirements and/or protective measures	
7. Information for use	6. Information for use	
-	7. Building related boundary conditions	Building requirements that are not referenced in Annex ZA
Annex A (normative) List of electric safety devices	**Annex A** (normative) List of electric safety devices	
Annex B (informative) Technical compliance documentation	-	Removed, is not a technical requirement for the product
Annex C (informative) Periodic examinations and tests, examinations and tests after an important modification or after an accident	-	Removed, is not a technical requirement for the product
Annex D (informative) Machinery spaces — Access	-	Removed. Not necessary anymore, machinery space concept is well established.
Annex E (informative) Building interfaces	**Annex B** (normative) Information on the building-related conditions in which the lift is installed	Building requirements that are not referenced in Annex ZA
Annex F (normative) Pit access ladder	**Annex C** (normative) Pit access ladder	
-	**Annex D** (informative) Relationship between this document and ISO 8100-20:2018	ISO GESR equivalent to Annex ZA
-	**Annex E** (informative) Operation modes overview	
Annex ZA (informative) Relationship between this European Standard and the essential requirements of Directive 2014/33/EU aimed to be covered	**Annex ZA** (informative) Relationship between this European Standard and the essential requirements of Directive 2014/33/EU aimed to be covered	
Bibliography	Bibliography	

(EN) ISO 8100-1:2026

2. Normative References

ISO 8100-1/2 → Mandate M/599 Objective of the revision

Meeting the **requirements** of the European Commission for **harmonized** and **cited** standards:

- Performance principle: only measurable and verifiable technical requirements
- Compliance with today's EHSRs (Essential Health and Safety Requirements)
- Building requirements now in a separate *Annex B*
- Terminology changes: only terms which are used in the document are listed in the 'Terms and definitions clause' and a definition shall not take the form of, or contain a requirement

Adaptation to the **state of the art:**

- Inclusion of several new technologies and solutions (e.g. increased functionality, improved safety, etc.)

Further adjustments:

- New EHSRs of the new Machinery Regulation (2023/1230), which replaces the Machinery Directive
- Improvement of the testability of safety functions - including cybersecurity (*ISO 8102-20:2022*)
- Integration of interpretations and questions
- Analysis of accidents
- Error-free standard and better applicability

(EN) ISO 8100-1:2026

3. Terms and Definitions

Terms and Definitions

The chapter provides exact, unambiguous definitions for key concepts used in the standards ISO 8100-1 and ISO 8100-2, so everyone (manufacturers, inspectors, designers and users) “speak the same language”.

It helps avoid interpretational disputes when applying safety, performance and compliance criteria. When you design or audit against ISO 8100-1/2, you must use these exact definitions – not colloquial industry terms, otherwise your interpretations may be noncompliant.

The definitions have been reworked to reflect modern lift technologies, safety practices and clarity in regulatory alignment. Terms have been added, removed, or updated to cover new cases (e.g. non-steel suspension, new door types, updated resilience criteria, etc.).

For instance, the term “Safety component” is no longer used and all references to “laboratory” removed. “type examination” is now referred to as “verification”, “type examination certificate” referred to as “instructions”, “Rp0,2” is now referred to as yield strength instead of proof stress.

The following slides provide a list of examples for deleted, revised and new terms and definitions.

Note: Topic relevant definitions are given in the specific chapters for context reason.

Terms and definitions

Chapter 3 - *Terms and definitions* in *ISO 8100-1* and *-2* contain changes

Terms and Definitions have been updated for both ISO 8100-1 and ISO 8100-2, for example:

- EN 81-20/50 “authorized person” and “competent person” are used, these terms have been removed or replace conceptually .
- ISO 8100-1/2 uses the concept of access by a key rather than by „authorisation“ or „competence“

→ EN 81-20/50: Machinery spaces shall be accessible only to authorised person.

→ ISO 8100-1/2: Machinery spaces shall be accessible only by use of a key.

Examples of deleted definitions
EN 81-20
3.2 authorized person
3.7 competent person (in EN 81-50: 3.7 competent person)
3.40 programmable electronic system in safety related applications for lifts (PESSRAL)
3.50 safety component
3.61 type examination certificate

Examples of new definitions
ISO 8100-1
3.31 machinery cabinet fully enclosed volume outside of the well and machine room where the machinery as a whole or parts of it are placed
3.34 mission time maximum time interval between manufacturing date and replacement date
3.36 normal operation automatic operation wherein the lift is used for transport of passenger or goods, and wherein the car is stopped automatically at the landings
3.51 residual breaking force, RBF Force that the suspension means can withstand at the end of the lifetime
3.59 SIL-rated circuit circuit based on electrical (E), and/or electronic (E), and/or programmable electronic (PE) components 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.
3.62 tension member load-bearing structural element

Terms and definitions

Examples of changed definitions

EN 81-20	ISO 8100-1
3.5 buffer resilient stop at the end of travel, and comprising a means of braking using fluids or springs (or other similar means)	**3.7 buffer** device with characteristics to dissipate or store kinetic energy
3.12 electrical anti-creep system combination of precautions for hydraulic lifts against the danger of creeping	**3.14 electrical anti-creep system** measure for hydraulic lifts against the danger of the car moving slowly away from the floor level
3.27 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 machine room** fully enclosed machinery space outside of the well with ceiling, walls, floor and access door(s) in which machinery as a whole or in parts is placed

EN 81-20	ISO 8100-1
3.28 machinery equipment such as: control cabinet(s) and drive system, lift machine, main switch(es), and means for emergency operations	**3.29 machinery** control cabinet(s) and drive system, lift machine, main switch(es), and devices for emergency and test operation
3.29 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	**3.30 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
3.33 overspeed governor device which, when the lift attains a predetermined speed, causes the lift to stop, and if necessary causes the safety gear to be applied	**3.38 overspeed governor** device to detect excessive speed of the lift and to trigger the operation of devices to stop the lift

Note: All terms and definitions shown in this presentation are only selected examples.
To see all changed, deleted and new definitions, see the relevant standards *EN 81-20/50 and ISO 8100-1/2.*

(EN) ISO 8100-1:2026

4.2 Well, machinery spaces and pulley rooms

Well - overview of main changes

- Access to well (doors, trap doors, ladders)
- Pit access and equipment
- Refuge spaces (pit and headroom)
- Protection (screens, ledges, glazing)
- Lighting and services in well

Well

ISO 8100-1/2 covers only lifts that are indoor or weather-protected (*1 Scope*)

- Furthermore: wind loads are removed

4.2.2 Access to the pit, *n*ew section, specifying

- Pit platforms
- Access to pit
- Access to pit platforms

  Note: Gives also requirements to ladders. For further requirements for pit access ladders, see *Annex C*

Inspection switch

- Required at the pit access door (instead of "*stop switch*"), *4.2.1.3.1 a*)

Alert initiation

- Required in pit and on car roof if there is no access door to the pit, *4.2.1.4*)

Trap door

- New: Trap door handling force specified ≤ 150 N, *4.2.3.2*

Well

Refuge spaces and clearances

- Deleted: *EN 81-20, 5.2.6.3.2.3* Clear vertical distance above unprotected rotating parts (was 0,30 m). Instead, requirements extended to cover more specified rotating parts shall be protected, *4.9.1.2 and Table 14*
- Rules for flexible elements (like compensation chains) entering refuge space defined, *4.2.5.8.1 a)* and *Figure 8*
- Kneeling added as a possible refuge space (*Table 3)*
- Max gap well-to-sill reduced to 0,12 m (was 0,15 m); for vertically sliding doors reduced to 0,15 m (was 0,20 m) (see detailed drawing in the door section), *4.2.5.3.1*
- Partition between lifts in same well: instead of "*sufficient as to prevent access",* now specified more clearly: max gap 0,15 m, *4.2.5.5.2 c*)

Well surface in case of short floor to floor distance

- *EN 81-20* did not specify how to create the vertical continuous and smooth well surface, in case of short floor to floor distance. *ISO 8100-1* gives those requirements, *4.2.5.3.2*

Well

Luminaire strength

- New: Mechanical strength requirements for luminaires has been specified, *4.2.1.2*

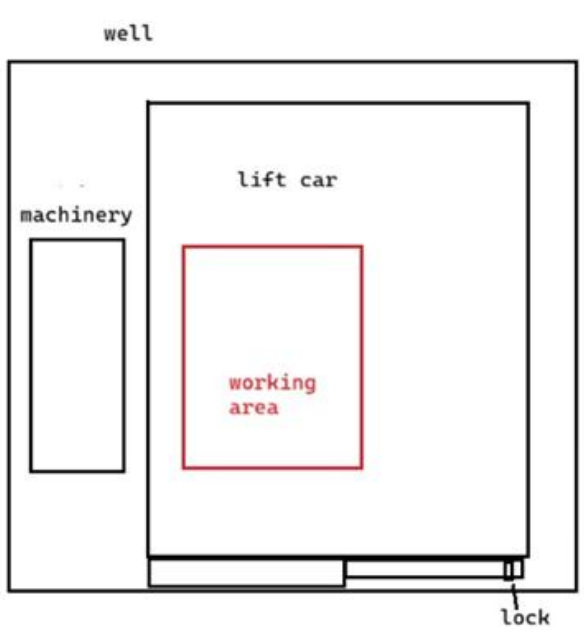
Requirements are defined in a way that they can be verified (like in many other parts of *ISO 8100-1/2*), e.g.

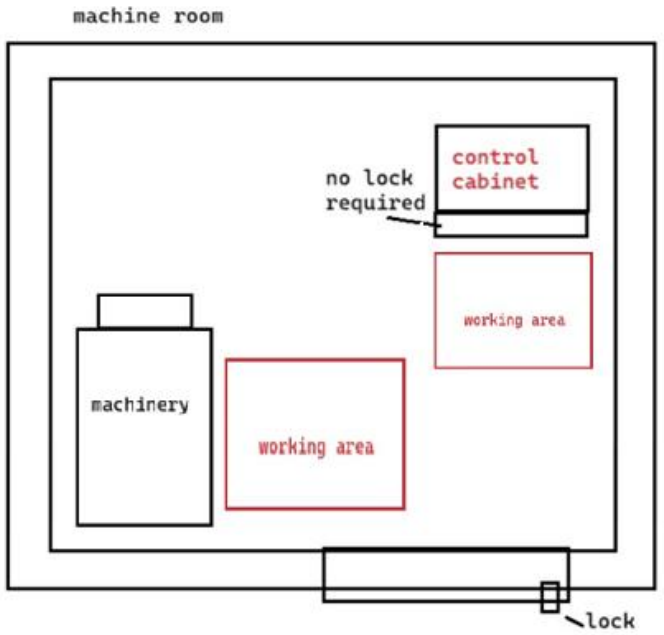
- Well mechanical strength: "*Without permanent deformation*" is replaced by ≤ 15 mm elastic deformation and ≤ 1 mm permanent deformation, *4.2.5.2.4*
- Max opening size in slabs is defined < 150 mm, *4.2.6.3.3*

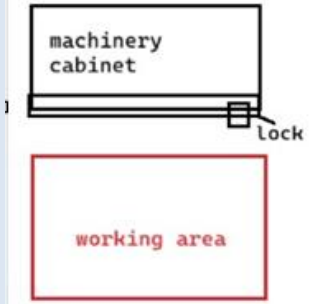
Machinery spaces and access

- Clear height for working areas is reduced to 2,0 m (was 2,1 m) (for example *4.2.6.4.2*)
- Mechanical device to block car movement during maintenance/inspection on the machinery, shall be provided, if uncontrolled car movement is not excluded in the lift's instructions, 4.2.6.4.3.1, 4.2.6.4.4.1
- Manual effort to operate retractable working platform reduced to 150 N (was 250 N), 4.2.6.4.5.4 b)

Machinery spaces - definitions







3.28
machine room
fully enclosed machinery space outside of the well with ceiling, walls, floor and access door(s) in which machinery as a whole or in parts is placed

3.29
machinery
control cabinet(s) and drive system, lift machine, main switch(es), and devices for emergency and test operation

3.30
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

3.31
machinery cabinet
fully enclosed volume outside of the well and machine room where the machinery as a whole or parts of it are placed

(EN) ISO 8100-1:2026

4.3 Landing doors and car doors

Landing doors and car doors

Summary of main changes regarding doors

- Changed finger safety
- Allowed spaces where child could go, are made smaller
- Requirements for clearances/gaps are more strict
- Vertical sliding doors are added (previously covered only partly)

Changed finger safety

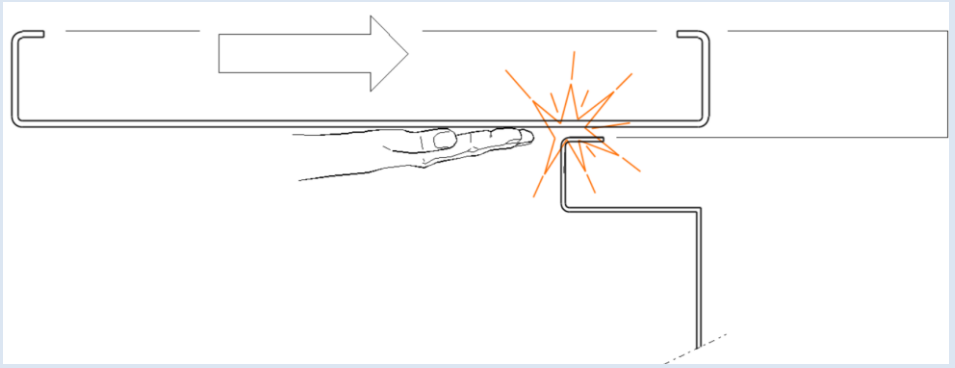
Background

Opening doors, both car and landing doors, create risk of fingers dragging between door panels and between door and wall panels / door uprights. Sharp edges inside the panels increase severity of the risks.

Safety, especially child safety, has up-dated requirements

- Smaller clearances
- Improved opening force limiter functionality
- Removal of sharp edges inside door panels and walls / uprights

Following 3 slides give overview of the changes.



Landing doors and car doors
Finger safety 1/3

Smaller clearances

- Design clearance (unused lift) is max 6 mm as in *EN 81-20* (no change)
- Due to wear maximum clearance has been reduced from 10 mm to 8 mm

Clearances depend on

- Door panel type (steel / glass / mirrored surface)
- Door type (car / landing)
- If other protective means are used

See *4.3.1.4* and *Table 4 – Door clearances*

Table 4 with modifications: underlined texts are added for clarity

Type of panel	Type of door	According to	Design clearances	Clearances due to wear
Steel panel	Horizontal and vertical Car and and landing door	General clearances 4.3.1.4	6	8
Glass panel	*Horizontal* Car and and landing door	Object detector 4.3.6.2.2.1 i) 1) ➔ j) 1)	6	8
		Reduced clearance 4.3.6.2.2.1 i) 2)	4	5
		Glass is made opaque 4.3.6.2.2.1 i) 3)	6	8
Mirrored steel surface	Horizontal Car and and landing door	Object detector 4.3.6.2.2.1 i) 1) ➔ j) 1)	6	8
		Reduced clearance 4.3.6.2.2.1 i) 2)	4	5
Steel panel	Horizontal Car door	Object detector 4.3.6.2.2.1 j) 1)	6	8
		Reduced clearance 4.3.6.2.2.1 j) 2)	5	6

Note: *"Clearances due to wear"* values are applicable after tests like:

- 1000 N static test, *4.3.5.2.1.b)*
- Shock pendulum test according to *EN 81-71*, Vandal resistant lifts, *5.4.1.2*: *"The door assemblies shall remain operative after the test"*

Landing doors and car doors
Finger safety 2/3

Opening force limiter, *4.3.6.2.2.1 h)*

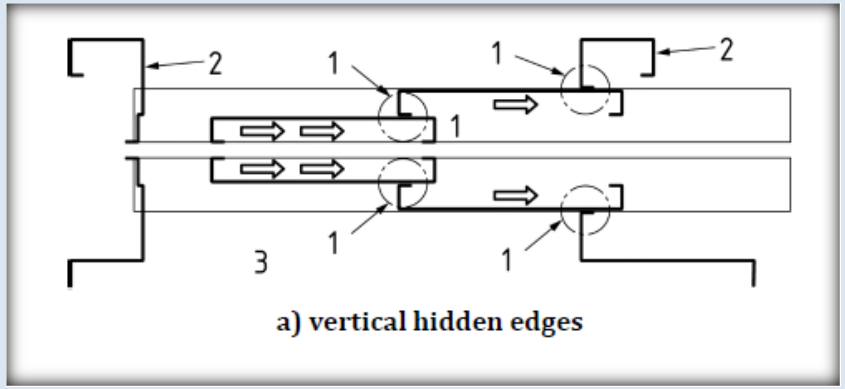
- *EN 81-20* requires that glass doors have max 150 N opening force limiter
- *ISO 8100-1* gives 150 N limit to all panel types
- Additionally, door movement shall be prevented for at least 20 seconds (door motor torque is removed), *4.3.6.2.2.1*

Landing doors and car doors
Finger safety 3/3

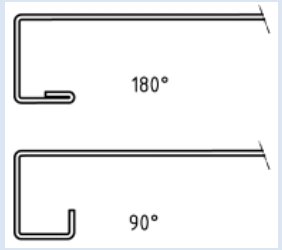
Removal of sharp vertical hidden edges, *4.3.6.2.2.1 k)*
Sharp edges must be removed from car and landing door panels and from car and landing uprights by *(Figure 21)*

- Bending or
- Rounding / chamfering the edges or
- Closed structure or
- Rounding the cladding

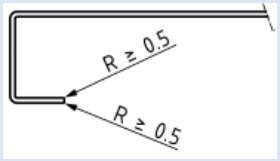
Note: These requirements are valid for automatic horizontally sliding car and landing doors



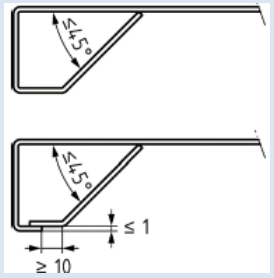
a) vertical hidden edges



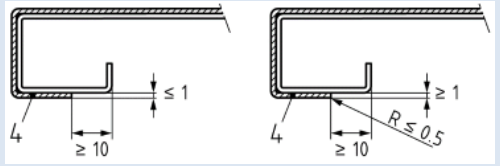
Bending



Rounding



Closed structure



Rounding the cladding

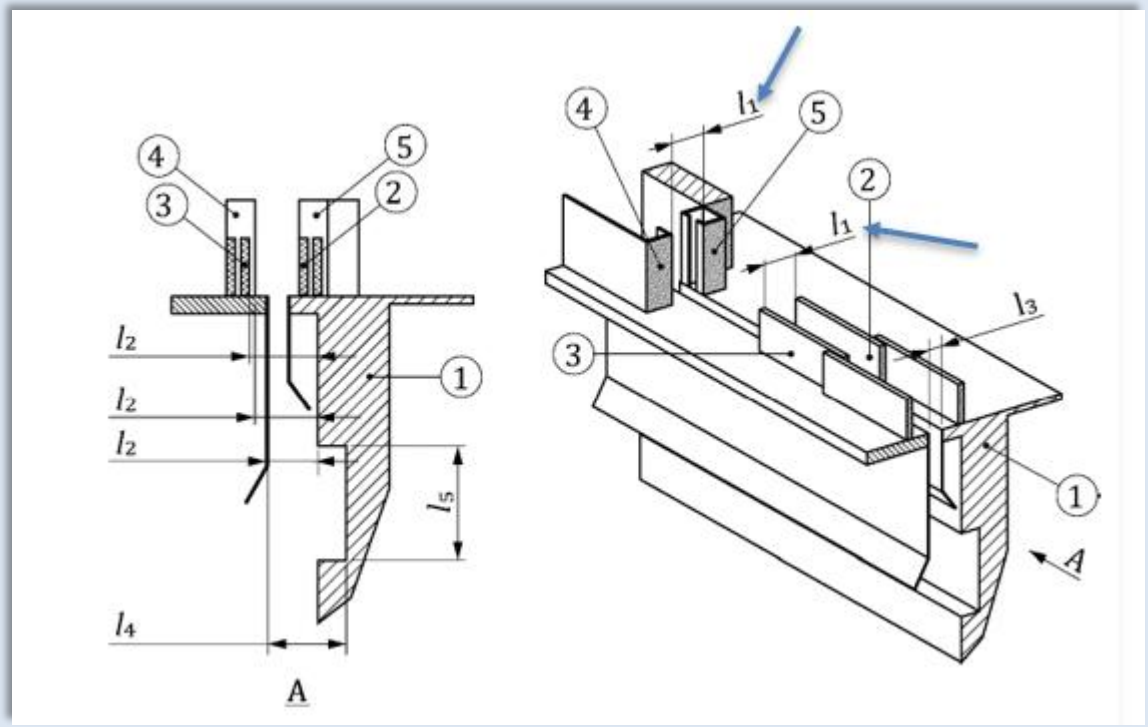
Landing doors and car doors

Horizontal distance

Distance between

- Car door and landing door panels
- Door uprights

has been reduced (from 0,12 m and 0,15 m) to 0,10 m (distance l_1), *4.3.4.2* and *Figure 5* in *4.2.5.3.1*



Key

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

Figure 5 — Clearances between car and wall facing the car entrance

Landing doors and car doors

Gaps between closed car and hinged landing doors

When there is a risk child can go between car and landing door (e.g. in case of hinged landing door and horizontally sliding or folding car door), free space is reduced from max 0,15 m to 0,12 m, *4.3.4.3*

- For vertical doors space is max 0,15 m (is a new requirement)
- Furthermore, requirements have been added to *ISO 8100-1* regarding door opening and locking sequences *4.3.6.2.1.2*

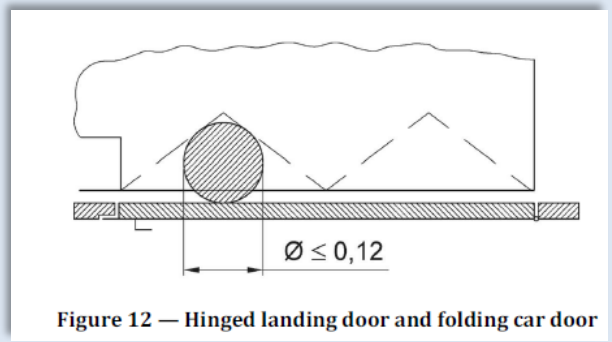
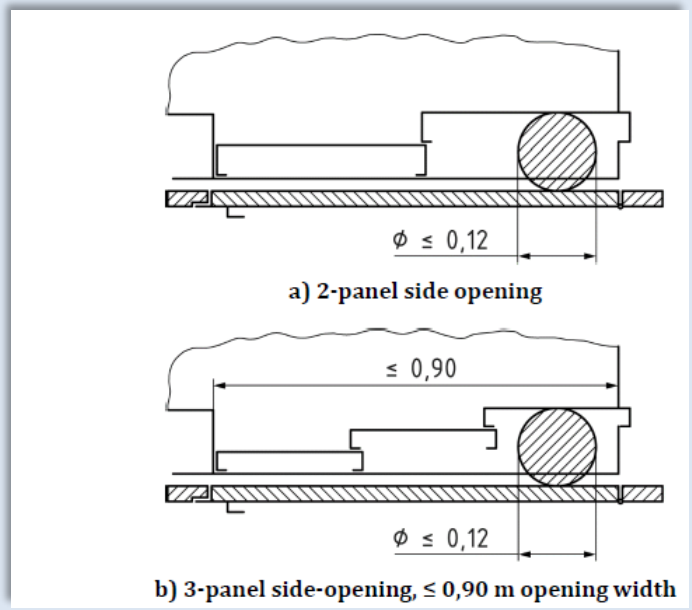


Figure 12 — Hinged landing door and folding car door



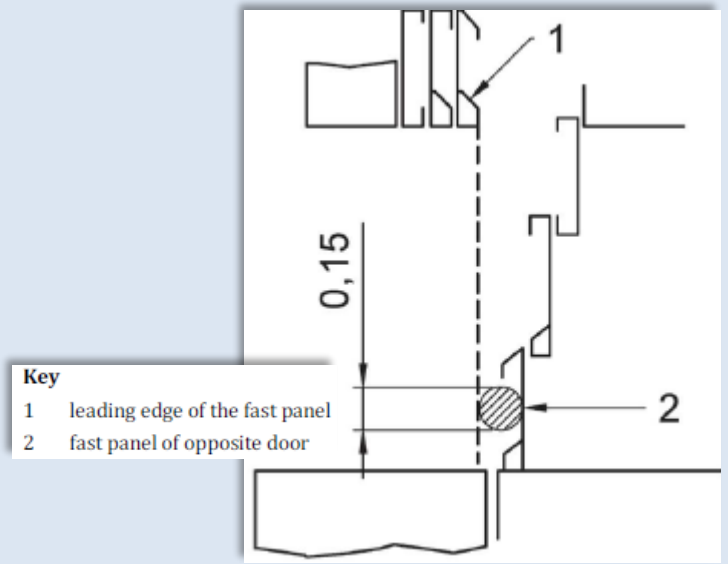


Figure 16 — Vertically sliding landing door and vertically sliding car door, not mechanically coupled

Landing doors and car doors

Door mechanical strength, *4.3.5.2.2*

New requirements have been added, and existing requirements are defined more detailed, e.g.

- Retainers need to be metallic, structural part of door panel, secured against self-loosening and marked indicating correct engagement
- Folding door are clearly mentioned, requirements being the same as for the horizontal sliding doors

(Note: Vertical sliding door mechanical strength requirements have been added to *ISO 8100-1*. *Table 6*, *Figure 19*.)

Glass door markings

- Door glass panel marking requirement have been revised and aligned with other lift glass parts, *4.3.5.2.7*

Folding doors

Modified requirements for folding door design, *4.3.6.2.2.1* and *Figure 20*

- Min 15 mm distance has been increased to
  - 25 mm for chamfered recess and
  - 35 mm for 90˚ recess

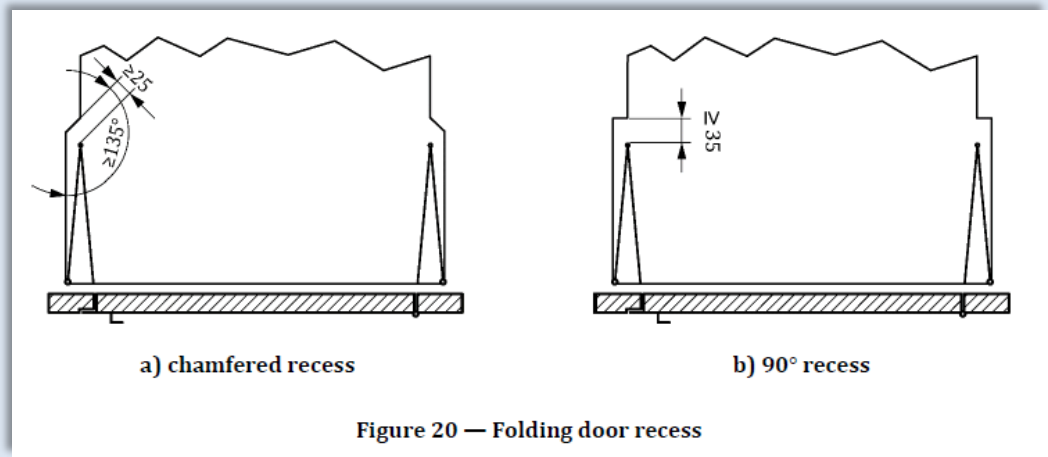


Figure 20 — Folding door recess

Landing doors and car doors

Protection against misuse of door locks

Requirement for locking element *“shall be protected against deliberate misuse”* in *EN 81-20* has been defined more clearly:

- *“straight round object 300 mm long and with a diameter of 1 mm”, 4.3.9.1.1*

Definition of the locking device, *4.3.9.1*

Clarification what is a locking device has been added:

“*Each component specified in 4.3.9, 4.3.10, 4.3.11, 4.3.14 forms part of the locking device.*“

- Locking element = lock hook / pin + counter part
- Locking device = all components which are ensuring the locking of a door (entire railing /top track)

Landing doors and car doors

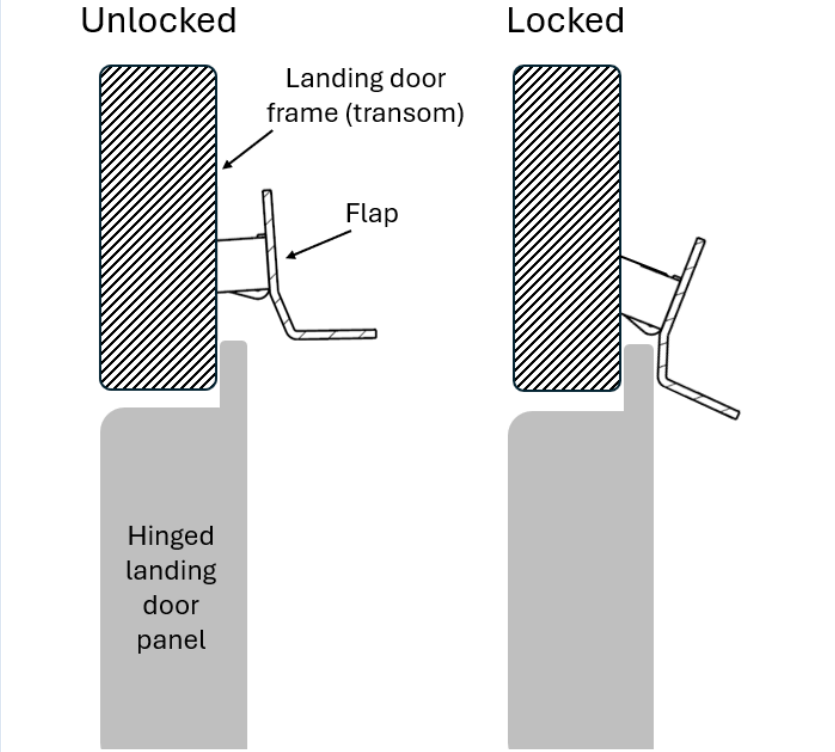
Flap type hinged landing door lock, *4.3.9.1.12*

Certain applications use a flap type landing door lock in lifts that transport forklifts (or other material handling equipment).

Flap type landing door lock has a force limiter which protects doors and locking devices from damage, in case of unintended opening without unlocking (e.g. forklift hits against landing door).

Flap type locks are allowed only for goods-passenger lifts.

ISO 8100–2, "4.2.2.2. Flap type locking device for hinged doors" defines verification requirements.



Example of a flap type locking device (side view)

Landing doors and car doors

Summary of main changes regarding doors

- Finger safety
- Allowed spaces where child could go, are made smaller
- Requirements for clearances/gaps are more strict
- Vertical sliding doors are added (previously covered only partly)

Finger safety

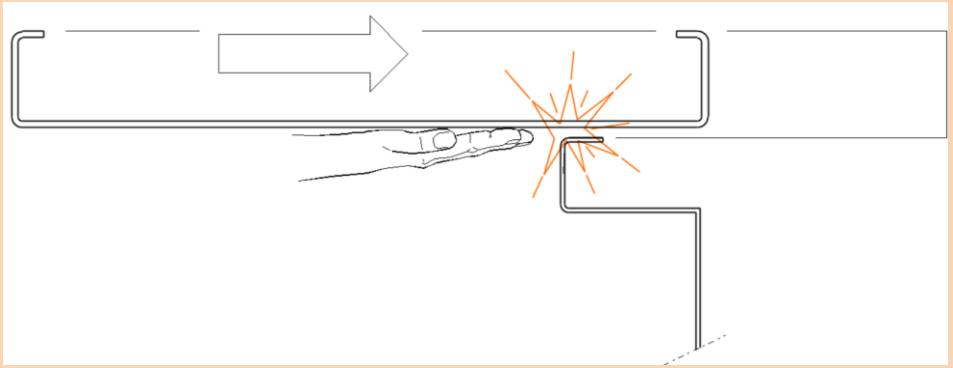
Background

Opening doors, both car and landing doors, create risk of fingers dragging between door panels and between door and wall panels / door uprights. Sharp edges inside the panels increase severity of the risks.

Safety, especially child safety, has up-dated requirements

- Smaller clearances
- Improved opening force limiter functionality
- Removal of sharp edges inside door panels and walls / uprights

Following slide gives overview of the changes.



Landing doors and car doors

Finger safety, up-dated requirements

Smaller clearances

- Design clearance (unused lift) is max 6 mm as in *EN 81-20* (no change). Due to wear maximum clearance has been reduced from 10 mm to 8 mm
- Clearances depend on (*4.3.1.4* and *Table 4 – Door clearances)*
  - Door panel type (steel / glass / mirrored surface)
  - Door type (car / landing)
  - If other protective means are used

Opening force limiter, *4.3.6.2.2.1 h)*

- *EN 81-20* requires that glass doors have max 150 N opening force limiter
- *ISO 8100-1* gives 150 N limit to all panel types
- Additionally, door movement shall be prevented for at least 20 seconds (door motor torque is removed), *4.3.6.2.2.1*

Removal of sharp vertical hidden edges, *4.3.6.2.2.1.k)*

- Sharp edges must be removed by alternative ways from car and landing door panels and from car and landing uprights by *(Figure 21)*

Landing doors and car doors

Door mechanical strength, *4.3.5.2.2*

New requirements have been added, and existing requirements are defined more detailed, e.g.

- Retainers need to be metallic, structural part of door panel, secured against self-loosening and marked indicating correct engagement
- Folding door are clearly mentioned, requirements being the same as for the horizontal sliding doors

(Note: Vertical sliding door mechanical strength requirements have been added to *ISO 8100-1*. *Table 6*, *Figure 19*.)

Glass door markings

- Door glass panel marking requirement have been revised and aligned with other lift glass parts, *4.3.5.2.7*

Gaps between closed car and hinged landing doors

When there is a risk child can go between car and landing door (e.g. in case of hinged landing door and horizontally sliding or folding car door), free space is reduced from max 0,15 m to 0,12 m, *4.3.4.3*

- For vertical doors space is max 0,15 m (is a new requirement)
- Furthermore, requirements have been added to *ISO 8100-1* regarding door opening and locking sequences, *4.3.6.2.1.2*

Landing doors and car doors

Vertical sliding doors, general information

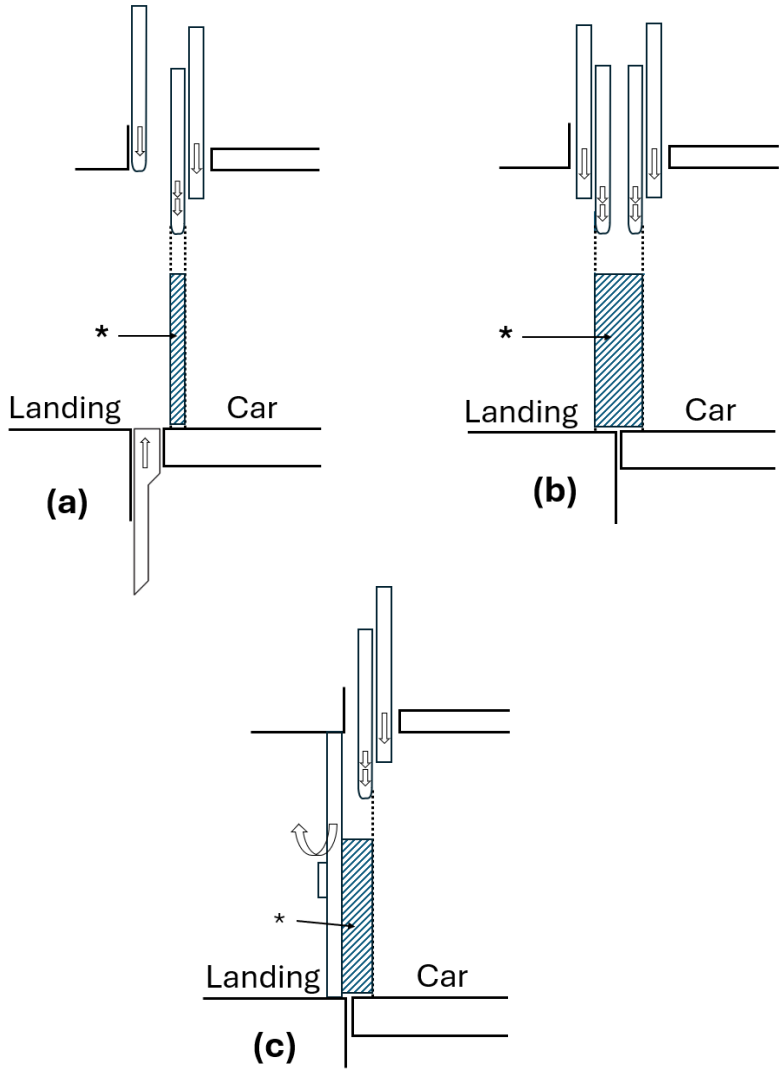
EN 81-20/50 did not give many requirements for vertical doors. To align with North American codes (*ASME A17.1/CSA B44*), *ISO 8100-1* includes typical vertical doors.

Most of the vertical sliding door requirements in *ISO 8100-1* are incorporated with other door type requirements. Additionally, *4.3.6.2.3* is vertical door specific.

Vertical doors can only be used for goods passenger lifts

Figure 24 shows typical vertical sliding door types, and related protection / detection area (*) of:

- Bi-parting landing doors sequence operation including shutter doors (a)
- Slide-up-to-open doors parallel operation (b)
- Vertical car door in combination with hinged landing door (c)



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4.4 Car, counterweight and balancing weight

Counterweight

- Clarification on determining car area, *4.4.2.1*
- Goods passenger lifts include solution for traction and hydraulic, *4.4.2.2*
  - 1. Lifts with car being loaded with equipment which is not part of the rated load
  - 2. Lifts with car area bigger than required for the number of persons
- Changed requirements for balustrade / car roof floor slip resistance / inspection / emergency lightening, *4.4.6.2, 4.4.7.1, 4.4.10*
- Updated requirements for counterweight, *4.4.11*
  - Added requirements for non metalic filler bits

Car - Area & Structure

Changes/Additions:

- Special cases for goods-passenger lifts, *4.4.2.2*
  - Bigger car sizes allowed for traction lifts (prev. only hydraulic lifts)
  - Handling devices not in rated load → downward movement limited ≤ 20 mm by a mechanical device, prevent doors opening before device extended
  - Overload monitoring before device retraction: SIL 3 (new)
- Rated load label at landing, ≥ 50 mm character height, *4.4.2.3.3*

Car

Safety & Rescue

- Inspection doors allowed in car, *4.4.3.1.c)*
  - “Empty car” load case added, *4.4.3.2.1*
  - Rescue bridge deflection limits defined, *4.4.6.2*
  - Balustrade required if standing position outside car roof possible, *4.4.7.2.d)*
  - Fall protection check point added, *Figure 29*
  - Glass markings harmonized; referenced standard, *4.4.7.5*
  - Inspection switch ≤ 0,75 m from roof access point (was stopping device at 1 m), *4.4.8*
  - Strength test & requirements for non-metallic filler bits added, *4.4.11.3*

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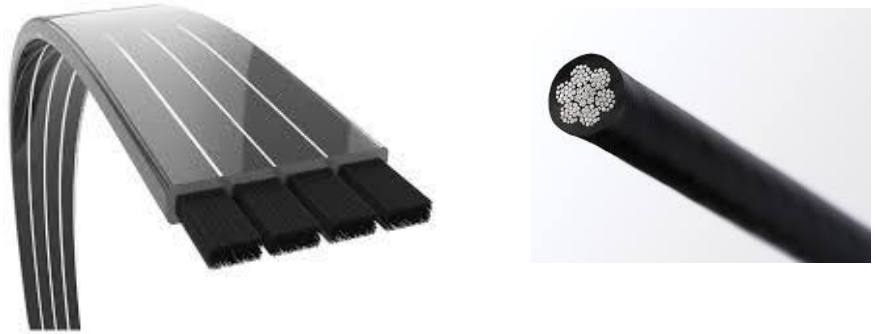
4.5 Suspension means, compensation means and related protection means

Suspension means - Summary

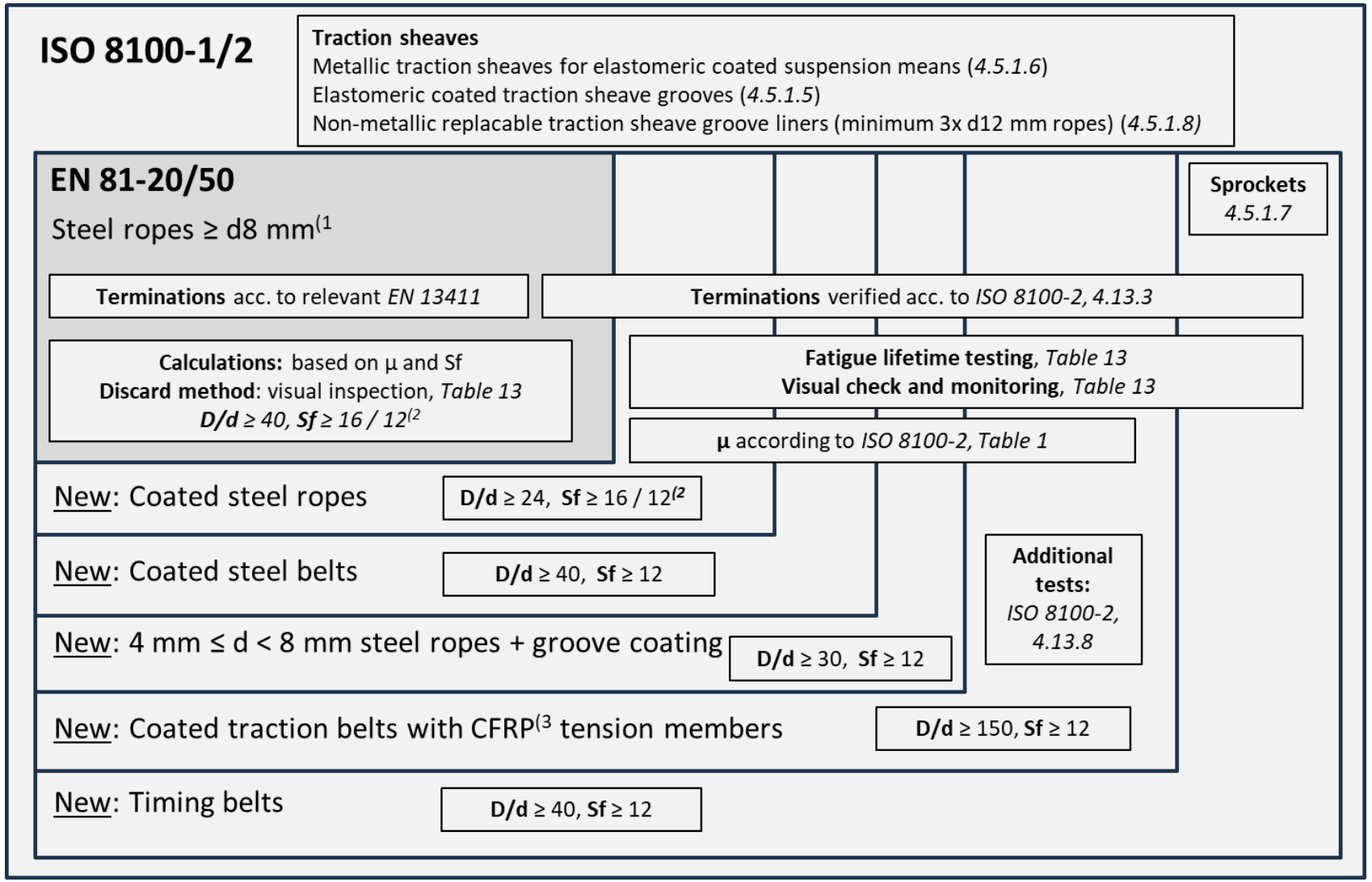
Suspension means (ropes, belts) have relatively big changes compared to *EN 81-20/50*.
Most relevant changes *in ISO 8100-1/2* are:

- Steel wire ropes with diameter ≥ 4 mm and < 8 mm are included
- Elastomeric coated ropes (steel wire) and
  elastomeric coated belts (steel wire or carbon fiber) are normative
- Requirements are defined for
  - Material, construction, dimensions, strengths
  - Safety factor depending on type, number and design
  - D/d ratio(*) depending on type
  - Discard criteria (lifetime)
  - Traction



*) D/d ratio means ratio between two diameters:
D = Pitch diameter of sheave, pulley, drum or sprocket
d = Nominal diameter of steel wire rope or
diameter/thickness of the tension member of the coated suspension means

Suspension means – extended technologies



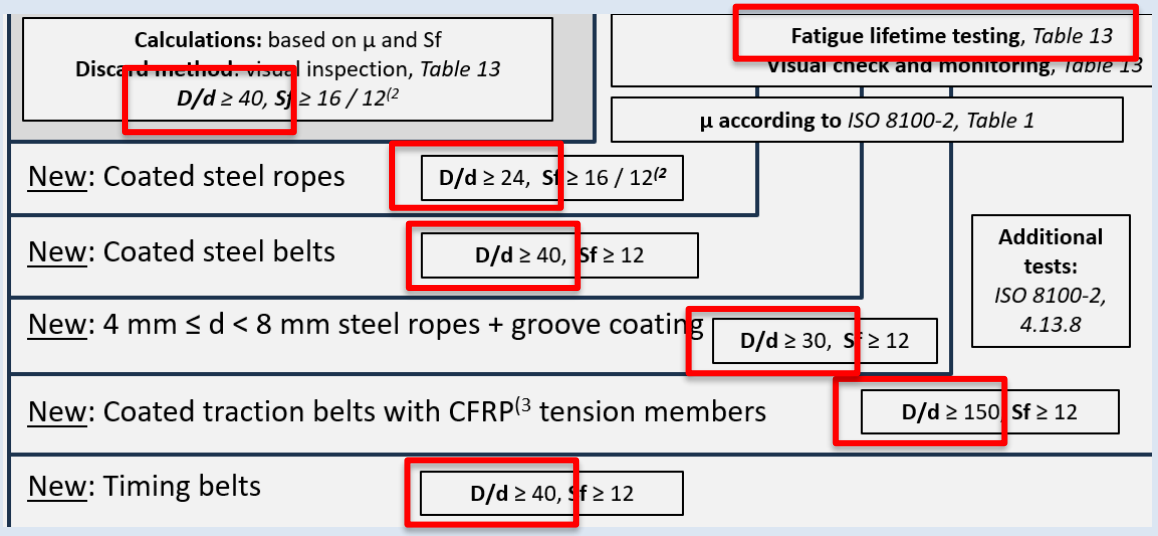
Sf = safety factor

μ = friction coefficient

D/d = Diameter ratio, see *Table 12*

1) According to ISO 4344
2) Sf ≥16 / 12 means: Safety factor min. 12 for more than 2 suspension members (ropes), otherwise Sf min. 16
3) CFRP = carbon fibre reinforced polymer

Suspension means

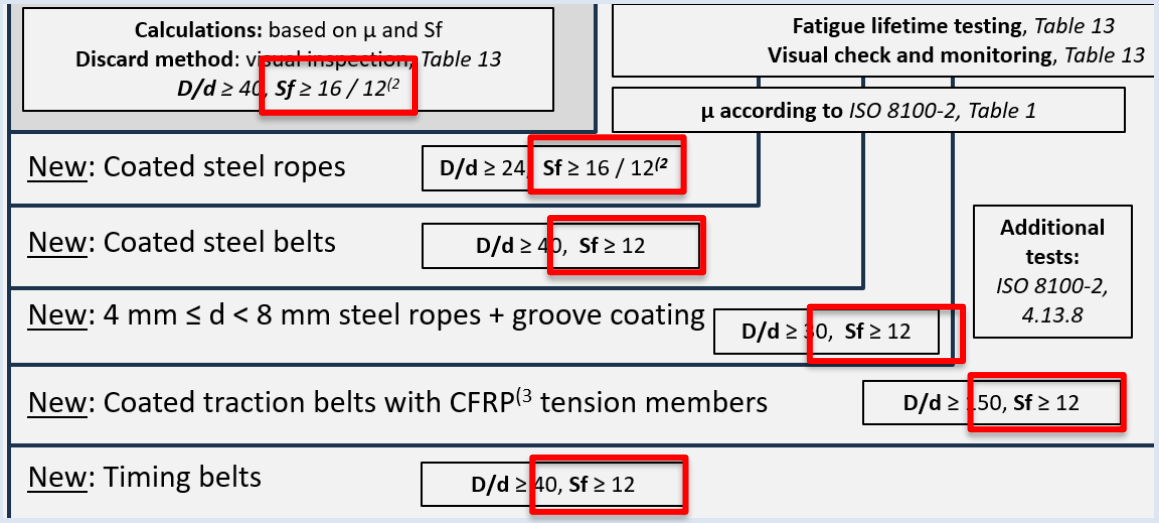


4.5.2.1 Bending diameter definition for tension members

- The minimum D/d ratios are based on today's market available and certified products, to ensure the failure mechanism can properly be reproduced with the fatigue lifetime tests defined in *ISO 8100-2*. This is to prevent possible early failures due to excessive bending.

- For standardized steel wire ropes according *ISO 4344* the old rule of D/d ≥ 40 is applicable without fatigue bending tests
- For steel wire ropes with smaller D/d ratio and for all other types of suspension means, fatigue lifetime testing, as described in *ISO 8100-2*, is required

Suspension means



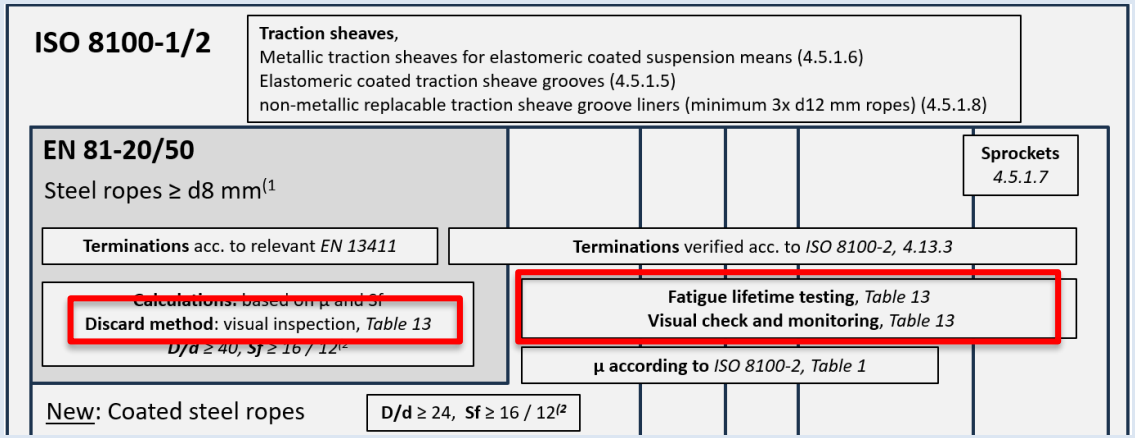
4.5.2.2 Safety factor of the suspension means

- For standardized steel wire ropes according to *ISO 4344* that are applied without fatigue lifetime testing, *4.5.2.2.2* (requirements have not changed)

- For elastomeric coated suspension means and for steel wire ropes with fatigue lifetime testing as per *ISO 8100-2*, the number of suspension means, safety factor and RBF(* shall be considered, *4.5.2.2.3*
  - The RBF(* limit is validated in the bending fatigue test according to *ISO 8100-2*
  - In the unlike event of a suspension means breakage at the end of the lifetime, the defined combinations of number of suspensions, safety factor and RBF ensure a safe margin for the remaining suspension means

*) RBF = Residual breaking force the suspension means can withstand at the end of its lifetime

Suspension means

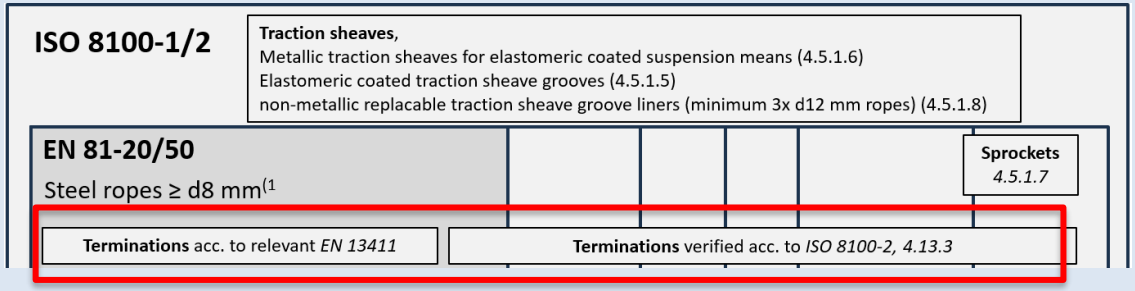


4.5.2.3 Fatigue lifetime

- Steel wire ropes according to *ISO 4344,* having D/d ≥ 40 and safety factor according to *ISO 8100-1/2,* can be discarded based on a visual inspection and criteria of the *ISO 4344* (not changed)
- For other suspension means types the visual discarding criteria are defined in *ISO 8100-1* and fatigue lifetime testing and monitoring is required, to ensure a timely replacement before RBF limit is infringed

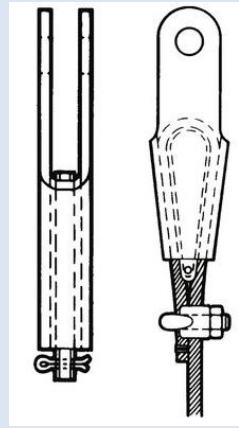
- Dependent on the suspension means type and application scope, different methods (or combination of methods) for fatigue lifetime monitoring are applicable *(Table 13)*
- For steel wire ropes d <= 6mm it is required:
  - Diameter reduction check with special tool and
  - Bending counter or physical strength monitoring
- For elastomeric coated traction sheave grooves a dedicated verification is defined in *ISO 8100-2, 4.13.2* to prove the fatigue lifetime limit

Suspension means



4.5.2.4 Connection between suspension means and termination

- The junction between the suspension means and its termination, shall be able to resist at least 80% MBF(* of the suspension means (*4.5.2.4.1*). This is also consistent with the RBF(** requirement applicable as fatigue lifetime limit.
- New requirement: eye-bolt is part of the junction, needs to withstand 80% of MBF, *4.5.2.4.3*



- As earlier, steel wire ropes shall be fixed with means according to EN 13411 standards, *4.5.2.4.2*
  - New: If *EN 13411* is not followed, terminations must be verified according to *ISO 8100-2, 4.13.3*
- Terminations for elastomeric coated steel wire ropes and for elastomeric coated traction belts, shall
  - Be verified according to *ISO 8100-2, 4.13.3*
  - Be made from metal using as self-tightening wedge style design
  - Have marking for the correct matching of the suspension and the different parts and the admissible MBF
  - Have wedge that is protected against falling out of the socket in case of slack suspension
- For elastomeric coated timing belts, fixing can be done with
  - Termination following the requirement for elastomeric coated traction belts terminations or
  - Positive secured termination (min. 7 teeth must be clamped)

  Timing belt terminations need to be verified according to *ISO 8100-2, 4.13.3*

*) MBF = Minimum breaking force
**) RBF = Residual breaking force

Suspension means

4.5.5 Distribution of load between the suspension means

- For all new types of suspension means the same old requirements as for steel wire ropes are applicable to ensure a tension equalization
- Also, the protection in the case of abnormal extension or slack suspension means is the same to all new suspension means
- In that sense the elastomeric timing belt is handled like an application with chains

4.5.6 Compensation means

- New suspension types can be used as compensation
  - Same safety factor as suspension means
  - Same D/d ratios as suspension means
  - Same monitoring as suspension means
  - Tensioning is required (as in *EN 81-20*)

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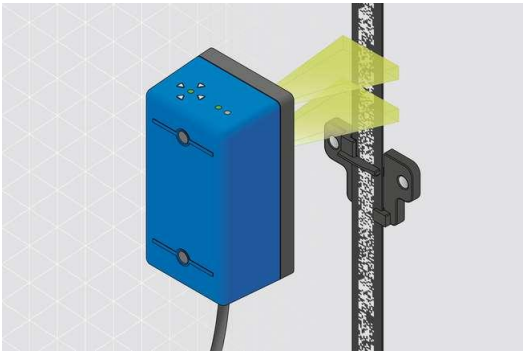
4.6 Precautions against free fall, excessive speed, unintended car movement and creeping of the car

Safety gear and its tripping means

Overspeed governor

- Tripping speed in free fall determines tripping speed for safety gear
- Distance between tripping points changed
  - 100 mm for instantaneous safety gears (see formula *ISO 8100-2, 4.3.2.3.1*)
  - 250 mm for progressive safety gears (original *EN 81-20* value)
- Governor rope reference is changed to *ISO 4344:2022*



4.6.2.2.5 Tripping by electrical means

NEW: to accomodate devices that are presently on the market

- Speed monitoring element
  - SIL 3 device
  - Tripping speed:
    - Governor tripping speed
    - Freefall detection (additional requirement, by detecting acceleration)
- Tripping element to operate safety gear
  - SIL 3 for electrical parts
  - Special considerations for active parts, e.g. monthly self test
  - Failure rate (SIL 3) for mechanical parts
  - Test according to *ISO 8100-2, 4.19*

ACOP

ACOP (Ascending car overspeed protection) has new and changed requirements

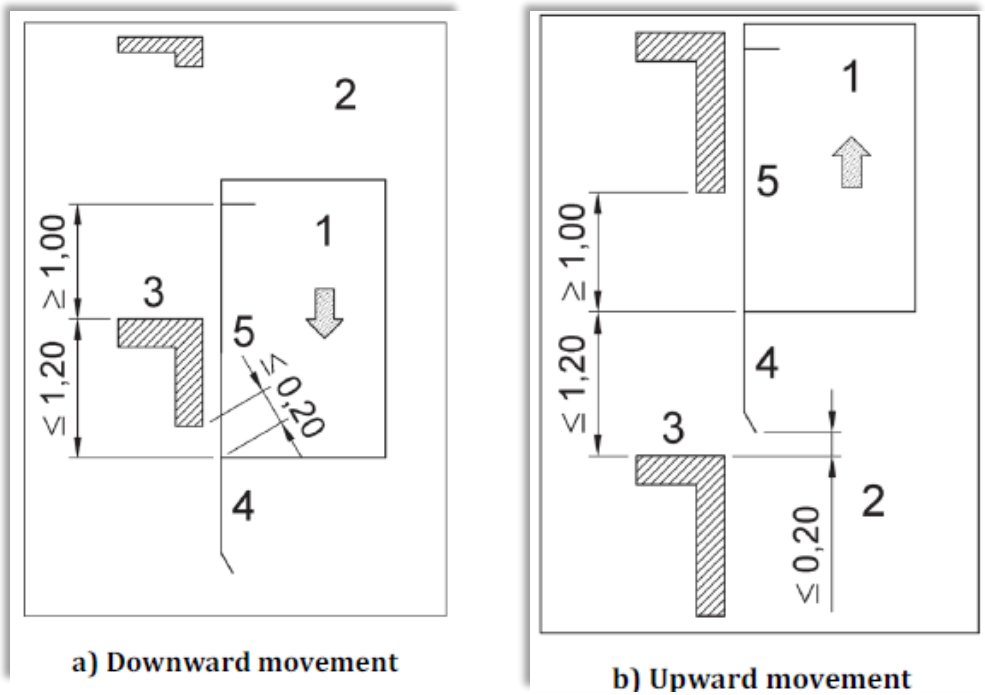
- According to *EN 81-20*, ACOP shall be active in
  - *Normal operation*
  - *Manual rescue operation* (with some exceptions)
- ISO 8100-1: ACOP shall function in *4.6.6.1*
  - *Automatic operation* (compared to EN 81-20: *"normal operation")*
  - *Emergency operation* (except in case brake release is according to *4.9.2.3.9*
  - *Emergency electrical operation* (except if "*there is a direct visual observation of the lift machine or the speed is limited by other means"*)
  - *Inspection operation*
- If ACOP acts on suspension or compensation means, those must be steel wire ropes (i.e. newly introduced suspension means are excluded,) *4.6.6.4 c)*
- Better description has been added for monitoring, *4.6.6.5*
- An alternative speed monitoring element has been added:
  - Tripping by electrical means as per 4.6.2.2.5 (EN 81-20, *4.6.6.10)*

Note: ACOP verification, see part ISO 8100-2 in this document.

UCMP

UCMP (Unintended car movement protection)

- Additional explanation when a full UCMP system is required, *4.6.7.1, e.g.*
  - Two stop lift without re-levelling needs to have machine brake that is monitored
- UCMP paragraph *4.6.7.3* refers to *4.9.2.2.2.8*, which gives requirements for brakes that are used to stop the lift when unintended car movement happens
- If UCMP acts on suspension or compensation means, those must be steel wire ropes (i.e. newly introduced suspension means are excluded), *4.6.7.4*
- Better descriptions have added for monitoring the stopping elements, *4.6.7.8*



UCMP stopping distances, shown in *Figure 36.*
No change in dimensions.

Note: UCMP verification, see part ISO 8100-2 in this document.

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4.7 Guide rails

Guide Rails

- **“Hanging rails” configuration** (fixed at top of well) **deleted**
- **Wind loads references removed**, *4.7.2.3.1.a)*, *4.7.3*, *Table 17*:
  - Following HAS comment 331 and WG 1 decision, wind loads were deleted due to a lack of a harmonized calculation method and because ISO 8100-1 only applies to indoor or weather-protected lifts
- For buildings > 5 years, settlement no longer required, except timber, *4.7.2.3.5*
- Reference to ***ISO 8100-33:2022*** added for dimensions & properties
- **Load case *bouncing* added**, *4.7.2.2:*
  - Counterweight/balancing weight bounce and car bounce
  - New permissible deflections: δ_{perm}*= 10 mm in both directions, 4.7.5.2 d)*
- **Force calculation changed**
  - $k_3 \cdot M_{aux}$ replaced with F_{aux} (as k_3 was not defined in tables)
  - Resulting F_{aux} is same as before, now directly defined

Clause Migration & Method Shift

Topic	EN 81-20	ISO 8100-1	Note
Windloads	5.7.2.3.1 a) 2)	Removed in 4.7.2.3.1	Not applicable anymore
Windloads	Table 13	Removed in Table 17	Not applicable anymore
Windloads	5.7.2.3.8	N/A	Not applicable anymore
Bouncing scenarios	5.7.4.3	4.7.2.3.4 and 4.7.2.3.8	New clauses for clarification
Guide rail configuration	5.7.2.3.5	Deleted from 4.7.2.3.5	Hanging rails (fixed at the top of the well) removed
Force calc (impact)	5.7.4.3	$\mathbf{k_3}$ deleted in 4.7.2.3.7	Now uses $\mathbf{F_{aux}}$ instead of $\mathbf{k_3 \cdot M_{aux}}$
Force calc (impact)	Table 14	$\mathbf{k_3}$ deleted in Table 18	$\mathbf{k_3}$ Not referred anymore

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4.8 Buffers

Car and counterweight buffers

4.8 Buffers

- *EN 81-20* allows reduced stroke buffers to be used in lifts having min 2,5 m/s nominal speed. *ISO 8100-1* removes the speed limit.
- 1,0 m/s rated PU buffers can be used as reduced stroke buffers up to lift's nominal speed of 1,75 m/s, *4.8.1.5.b*)

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4.9 Lift machinery and associated equipment

Lift machine - Summary

- Higher brake torque requirements as minimum braking torque of the machine brake shall decelerate, stop and hold the car in case of one brake set is not working when:
  - The car is empty in upwards direction, and
  - The car is loaded with the higher of either, the rated load or the load corresponding to the overload detection setting, in downwards direction (latest at 110 %)
  - Manual brake release shall be independent for each brake set if machine brake is used as stopping means for ACOP or UCMP
- Hydraulically actuated brakes have been added
- Significant changes for interruption of the current to the brake (brake controller)
- Monitoring of machine brake, either wear or brake torque, when the machine brake used to deceleration the lift: in normal operation, in ACOP, in UCMP or in case of reduced stroke buffer.
- Possibility to operate each brake set independent form outside of the well
- Changes at emergency operation
- Static motor supply extended by SIL-rated circuits
- Brake examinations and tests on installed lifts have been extended

Lift machine

General changes at machines

- No speed limits for elastomeric coated ropes and belts, *4.9.2.1.1.a*)
- Speed for elastomeric coated timing belts is limited to 1,75 m/s, *4.9.2.1.1.b*)
- Transmission from motor to brake shaft can be only one belt if belts are used (previous minimum two belts if belts are used), *4.9.2.1.2*

General changes at braking system

- Braking part of brake system is called machine brake , *4.9.2.2.2*
- New wording for operation of brakes: release (change to not braking) or application (change to braking), *4.9.2.2.2.1*
- Extensive requirements for hydraulically released machines brakes have been added, *4.9.2.2.2.1*
- At **minimum** braking torque of the brake shall decelerate, stop and hold the car in case of one brake set is not working when:
  - the car is empty in upwards direction, and
  - The car is loaded with the higher of either, the rated load or the load corresponding to the overload detection setting, in downwards direction (latest at 110 %), *4.9.2.2.2.1*
- Manual release of the machine brake shall be independent for each brake set if machine brake is used as stopping means for ACOP or UCMP, *4.9.2.2.2.1*
- Means shall be provided to prevent lubricants from the lift machine penetrating the machine linings, 4.9.2.2.2.3.*h*)

Lift machine

Changed requirements to the controller of the machine brake

- Interruption of the current to the brake according to *4.9.2.2.2.3.a*) shall be made by one of the following

	EN 81-20	ISO 8100-1
Two independent electromechanical devices with any monitoring	**X**	**-**
Safety circuit according to *4.11.2.3 and 4.9.2.2.2.3 a)1)*	**X**	**X**
SIL-rated circuit fulfilling SIL 3 according to *4.11.2.4*, PFH* ≤ 2,5 x 10^{-8}, 4.9.2.2.2.3 a)2)	**-**	**X**
Directly by the electric safety devices (current < 50 % of capabilities), 4.9.2.2.2.3 a)3)	**-**	**X**

*) PFH = Average frequency of a dangerous failure per hour

- If the machine brake is used as stopping means for ACOP, or UCMP, or reduced buffer stroke, an additional and independent switching element shall be used to interrupt the brake current. This additional switching element can be a semiconductor, *4.9.2.2.2.3 f)*

Lift machine

Machine brake monitoring

- Release of each brake set shall be monitored for all machine brakes, *4.9.2.2.2.3 g*)
- If the machine brake is used to decelerate the car in *4.9.2.2.2.8*
  - Normal operation (e.g. AC2 - IEC 60947-4-1 – starting/stopping of induction motors), or
  - ACOP, or
  - UCMP, or
  - Reduced buffer stroke,

  the machine brake shall be monitored by one of the following means:
  a) Automatic detection of the maximum wear of the brake lining material, or
  b) Automatic static verification of machine brake holding capability at least once every day
    - The brake torque after the failing of each brake set shall be tested
    - Capability for static holding of empty car and full loaded car shall be tested
    - In case of a balancing factor of 0,5 no motor torque is required

In case of a detected failure at any brake monitoring above listed
- no further car movement, and
- intentional reset on-site needed, and
- stuck-at failure shall also prevent any further movement and require reset, 4.9.2.2.2.3 g) and 4.9.2.2.2.8

Lift machine

Further new requirements for the machine brake:

- It shall be possible to operate each brake set independent form outside of the well to test the remaining brake set(s), 4.9.2.2.2.7
- Machine brakes, which are used to decelerate the car in normal operation shall not be used as stopping means for ACOP or UCMP, 4.9.2.2.2.8

Changes at motor requirements:

- Requirements to Ward-Leonard-Systems have been removed
- For Safe Torque Off (STO) SIL 3 and PFH ≤ 2,5 x 10^{-8} are required, 4.9.2.5.3 d)
- Motor supplied by static elements is extended by the possibility of using a SIL-rated circuit fulfilling SIL 3 and PFH ≤ 2,5 x 10^{-8}, 4.9.2.5.3 e)

Lift machine

Changes at emergency operation:

- Protection of emergency operation against involuntary action, 4.9.2.3.1
- If at electrical operation a fault in the brake releasing circuit combined with another fault can lead to a dangerous situation, automatic operation, inspection operation and emergency electrical operation of the lift shall be prevented after occurrence of the first fault. (For fault exclusions see details in ISO 8100-1/-2.), 4.9.2.3.1
- Warning sign for emergency operation in case of reduced buffer stroke, 4.9.2.3.2
- Requirements for hydraulic released machine brakes are added, 4.9.2.3.1
- More details to the conditions on the movement of the car in case of natural movement at emergency operation, 4.9.2.3.3
- With the machine brake manually released, the car speed shall be limited to the speed for which the buffers are designed, unless the brake is released mechanically and there is direct visual observation of the lift machine, 4.9.2.3.9

Hydraulic lifts

Changed references to other standards, e.g.

- Request to avoid abnormal stress for fastening and mechanical damage to piping is removed. Instead, reference to *ISO 4413* is added, *4.9.3.3.1.1*
- Deleted the reference to *EN 10305* for dimensions and tolerances on tubes used for piping and jack, *EN 81-20: 5.9.3.2.1.1.c) and 5.9.3.3.2.1; now ISO 8100-1: 4.9.3.3.2.1*

Updated technical information regarding hydraulic devices and their installation

Location of rupture valve and restrictor is defined more precisely

- EN 81-20 defines location as "*shall be accessible".* *ISO 8100-1* gives clear dimension limits from the pit floor and from the car roof, *4.6.3.2 and 4.6.4.2*

Jacks extending into the ground

- Request for protective tube has been moved to *Annex, B.2.5.3* (like many other building related conditions)

Pipes passing through wall or floor

- Deleted the request to use ferrules to protect the piping, *EN 81-20: 5.9.3.3.1.2*

Hydraulic lifts

Changed calculations/tests/requirements of hydraulic devices

Jack buckling shall be calculated according to *ISO 8100-2*

- Deleted permission to use "*more complex calculation methods", EN 81-20, 5.9.3.2.1.2 c*)

Pressure tests of flexible hose and couplings

- The pressure test responsibility is not given to manufacturer, *4.9.3.3.3.2*

Flexible hose bending radius

- Deleted the requirement to fix the pipe according to manufacturer's instructions, EN 81-20, 5.9.3.3.3.4

Relief valve setting

- The maximum pressure of 50 MPa has been moved to 4.9.3.5.3.2 (EN 81-20, 1.3 b.2)

Motor run time limiter shall not prevent emergency electrical operation

- "4.9.3.10.4 The motor run time limiter, even if tripped, shall not prevent the inspection operation, 4.12.1.5, the emergency electrical operation, 4.12.1.6, and the electrical anti-creep system, 4.12.1.10."

For hydraulic lifts having more that two levels

- Deleted the exception allowed not to check whether car is in unlocking zone, in case lift is "fitted with mechanical anti-creeping device". (EN 81-20, 5.9.3.9.3)

Stopping lift machine

- Alternative ways to stop upwards and downwards movement has been updated, to match with other electrical and SIL requirements / possibilities in *ISO 8100-1, 4.9.3.4.2 and 4.9.3.4.3*

(EN) ISO 8100-1:2026

4.10 Electric installations and appliances

Electric installations and appliances

- EMC standards *EN 12015* and *EN 12016* replaced with *EN ISO 8102-1* and *EN ISO 8102-2*
- Higher requirements for temperature limits of heat emitting surfaces at normal operating conditions
  - Example: parts accessible by passengers, metallic surface 55°C, non-metallic surface 65°C
- Higher requirements for protection against electric shock. IPXXB is now required when enclosure is opened for resetting, adjusting or to operate controls
- New: to cover Machinery Regulation (MR) EHSR protection against corruption 1.1.9, interface components to external equipment shall be in accordance with *ISO 8102-20:2022*
- New: the position of the control mechanism for the “remote” main switch utilizing a contactor shall be checked by an electric safety device or it shall interrupt the supply to the electric safety chain when in off-position
- New: minimum fire classification of electric conductors and cables specified
- New: monitoring required for all emergency power supplies

Temperature limits of accessible parts

Two new categories

- Parts which are accessible without the use of a key or tool => parts accessible by passengers
- Parts located in the lift well or machine room, no need to touch and warning sign => example braking resistor touch cover with warning sign

EN 81-20 referred to *HD 60364-4-42 Table 42.1*.

Table 42.1 – Temperature limits in normal service for accessible parts of equipment within arm's reach

Accessible parts	Material of accessible surfaces	Maximum temperatures °C
Hand-held means of operation	Metallic	55
	Non-metallic	65
Parts intended to be touched but not hand-held	Metallic	70
	Non-metallic	80
Parts which need not be touched for normal operation	Metallic	80
	Non-metallic	90

Temperature limit are now in *ISO 8100-1, 4.10 Table 20*

Table 20 — Temperature limits of heat emitting surfaces

Accessible surfaces of	Material of accessible surfaces	Maximum temperatures °C
Parts which are accessible without the use of a key or a tool	Metallic	55
	Non Metallic	65
Hand-held means of operation	Metallic	55
	Non-metallic	65
Parts intended to be touched but not hand-held	Metallic	70
	Non-metallic	80
Parts which need not be touched	Metallic	80
	Non-metallic	90
Parts located in the lift well or in the machine room, which do not need to be touched and which are marked with the warning sign ISO 7010:2019-W017 with a minimum height of 50 mm	Metallic	100
	Non-metallic	110

NOTE 1 Source of temperature limits IEC 60364-4-42:2024, Table 1 modified.

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).

Cybersecurity

- To cover Machinery Regulation (MR) EHSR protection against corruption 1.1.9, interface components to external equipment shall be in accordance with *ISO 8102-20:2022*

  "4.10.1.1.5 The lift and the lift components, capable of connectivity to external equipment:

  — which is not powered by the main switch as per 4.10.5.1 or by a supply disconnecting device as per 4.10.5.3; and

  — which is not located in a machine room, a pulley room, a machinery cabinet or the well as per 4.2.1.1.1;

  shall be in accordance with ISO 8102-20:2022 Clause 5 and Clause 6."

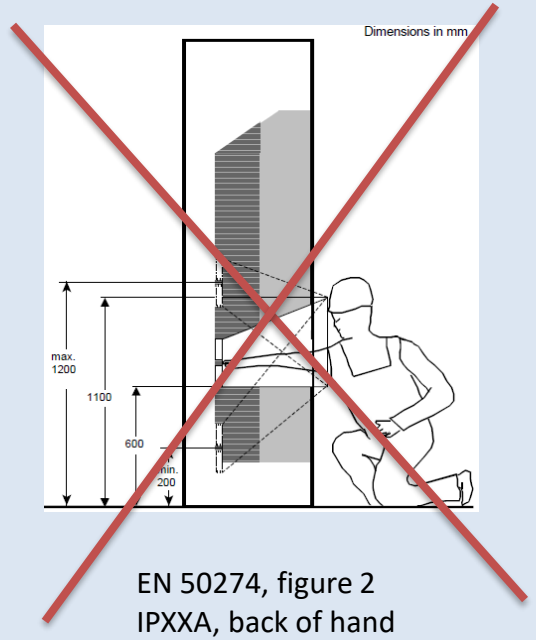
- To cover new Cyber Resilience Act (CRA), *ISO 8102-20* is currently been revised as *EN ISO 8102-20:2027*

Protection against electric shock

- Higher requirements when enclosure is opened for resetting, adjusting or to operate controls, 4.10.1.2

- *EN 81-20, 5.10.1.2.2.d)* reference to *EN 50274* is deleted
  - Reference permitted back of hand protection in certain conditions.

- IPXXB is now required when enclosure is opened for resetting, adjusting or to operate controls
  - IPXXB is protection against access **to hazardous parts** with a finger



EN 50274, figure 2
IPXXA, back of hand protection in gray areas

Main switch, supply disconnecting devices and isolating devices

- If after opening of the main switch, some circuit remain live, and voltage exceeds 25 VAC or 60 VDC:

  - the conductors of these circuits shall be identified by the colour ORANGE, or

  - these circuits shall be separated from other circuits; or

  - connections terminals of these circuits shall be identified by warning signs as per ISO 7010-W012, , 4.10.5

Main switch, supply disconnecting devices and isolating devices

- The control mechanism for the main switch shall be accessible without obstruction from the entrance(s) to the machine room.
    - "Directly accessible" replaced with "accessible without obstruction"

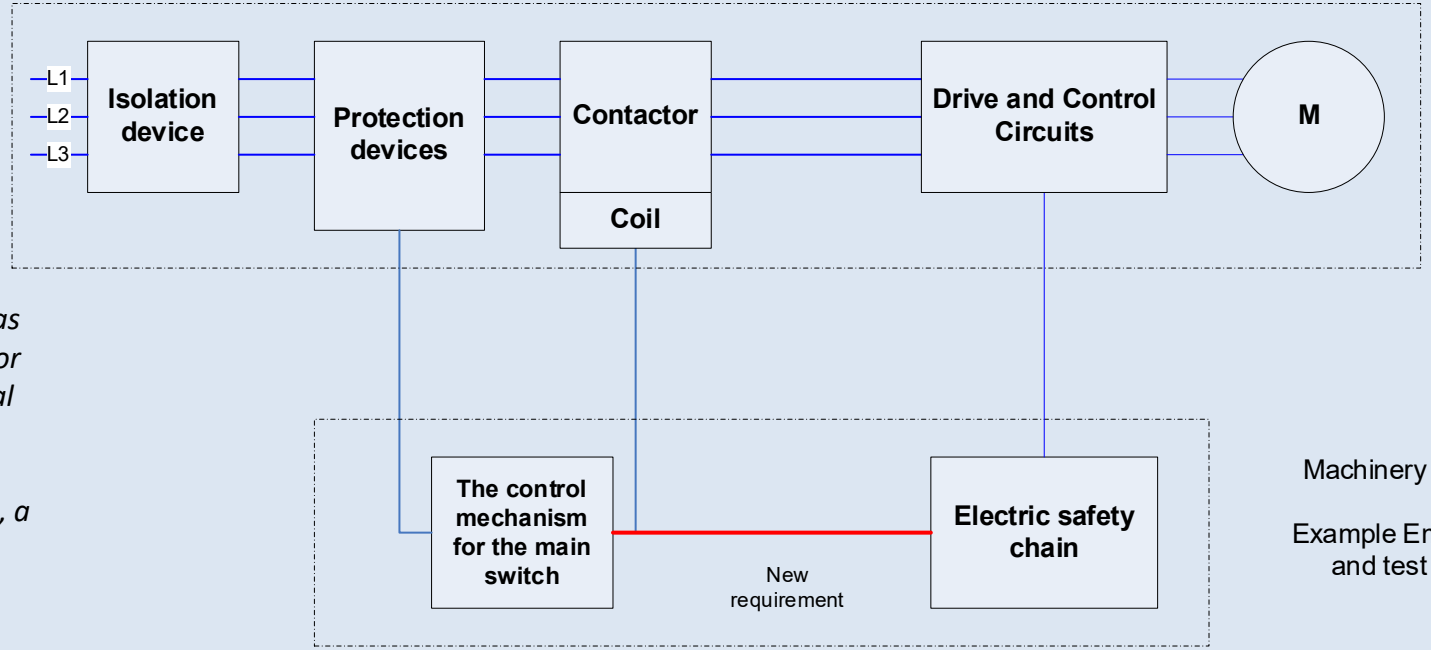
- More clear requirement also for additional isolating devices:

4.10.5.1.3 Where the main switch cannot be accessed, without moving the car from the locations of the following components:
- the control cabinet(s);
- the drive control system;
- the lift machine,
an additional device for isolating electrical equipment in accordance with IEC 60204-1:2016+A1:2021, 5.5 shall be provided at the location of that component.

Control mechanism for the main switch

- New: the position of the control mechanism for the main switch using a contactor shall be checked by an electric safety device or it shall interrupt the supply to the electric safety chain when in off-position, 4.10.5.2
  - Ensures stopping of the machine even if the contactor fails to release

The contactor shall be used in conjunction with a manually controlled device for isolating electrical equipment...



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.

Electric wiring

- New revision of *EN 50214* traveling cable standard
  - *Travelling cables shall be in accordance with EN 50214:2024 or IEC 60227-6:2001, excluding insulation and outer sheath material type requirements of those standards, 4.10.6.1.2*

- New: Minimum fire classification of conductors and cables
  - *Minimum fire classification of conductors and cables installed outside enclosures shall be in accordance with EN 13501-6:2018+A1:2022 Class Eca or fire reaction shall be in accordance with minimum requirements set in IEC 60332-1-2:2004+AMD1:2015, Annex A,* 4.10.6.1.3

Emergency supply

- All emergency supplies listed in *4.10.11.1*

- Monitoring required for all emergency supplies
  - *The design of the emergency supply shall consider the combined power requirements of all connected devices. A monitoring system shall indicate if the capacity of the emergency supply is less than required, 4.10.11.2*

Electric installations and appliances Electromagnetic compatibility (EMC)

- EMC standards *EN 12015* and *EN 12016* will be replaced with
  - *EN ISO 8102-1:2026* emission (EMC directive)
  - *EN ISO 8102-2:2026* immunity (EMC, LD, MD/MR directives)

  Note: Current draft refers to ISO 8102-1:2020 and *ISO 8102-2:2021*

- Clarification that electric safety chain, safety circuits, SIL-rated circuits and “STO” as per IEC 61800-5-2 shall meet both
  - The “all circuits” and
  - The “safety circuit”

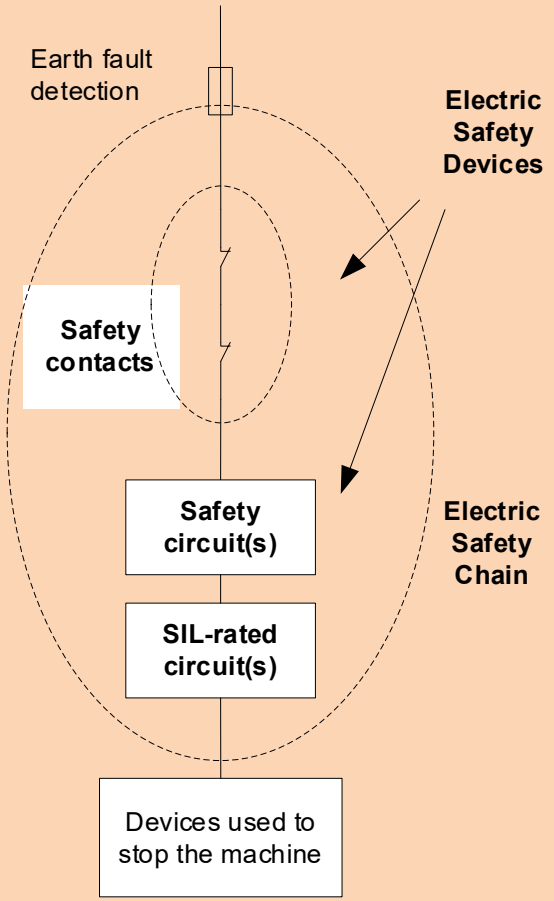
  EMC immunity requirements of *ISO 8102-2*.

(EN) ISO 8100-1:2026

4.11 Protection against electric faults; failure analysis; electric safety devices

Protection against electric faults; failure analysis; electric safety devices

- PESSRAL replaced with “SIL-rated circuits”, which extends the use of “SIL” to electric and electronic circuits (circuits without computer).
- Safety circuits utilizing computer for safety logic or for failure detection shall be considered as SIL-rated circuit.
- Higher requirements for development of SIL-rated circuits.
- Higher requirements for on-site modification of SIL-rated software and parameters.
- Maximum combined reaction time 1 s for electric safety device and devices used to stop the machine, to initiate stopping of the machine.



electric safety chain =>
- total of the electric safety devices

safety circuit =>
- one type of “safe circuit” which can be used as an electric safety device

Protection against electric faults; failure analysis

- **New** : Failure analysis shall consider short circuit between adjacent conductors of travelling cable, 4.11.1

- **New clarification**:
  - Short circuit between two conductors may be excluded when the conductors are insulated for the highest voltage to which any of the conductors can be subjected.
  - This does not apply to adjacent conductors of traveling cable.

Electric safety devices
General provisions

4.11.2.1.1 The electric safety devices shall consist of:

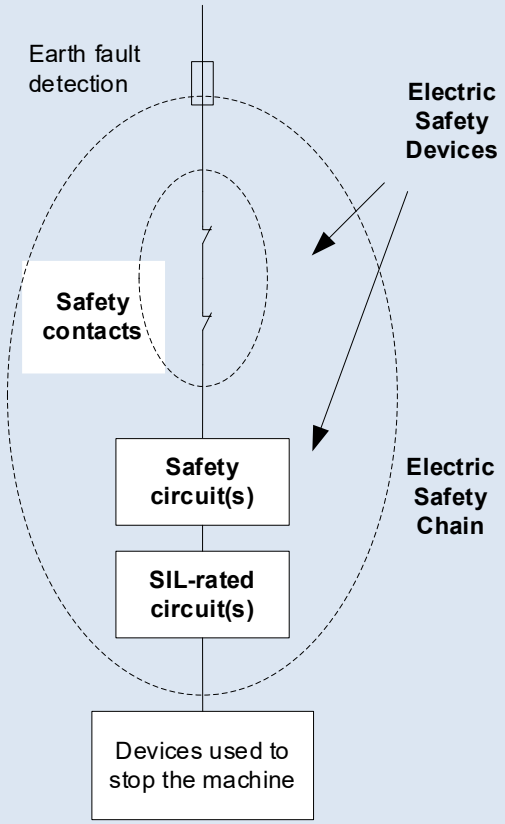
a) safety contact(s) as per 4.11.2.2, or

b) safety circuit(s) as per 4.11.2.3, or

c) SIL-rated circuit(s) as per 4.11.2.4

- This means that:
  - An electric safety device may consist any combination of safety contact(s), safety circuits(s) and SIL-rated circuit(s).
  - A safety circuit or a SIL-rated circuit may consist any number of electric safety devices.

Correct use of terms
Safety circuit and Safety chain



3.16 electric safety chain
total of the electric safety devices

In other words, electrical circuit consisting electric safety devices.

Electric safety devices
General provisions

Explanation of terminology used

- All electric safety devices have “condition for functioning”.
- “Condition for functioning” shall be checked by electric safety device
- When “condition” is not anymore true, electric safety device is operated, and it shall initiate stopping of the machine, unless it is bypassed.
- Example of condition for functioning: 7 mm engagement of the landing door lock shall be checked by electric safety device. When engagement is less that 7 mm electric safety device is operated.
- Electric safety device can be bypassed only by another electric safety device.
- Equivalent terms for bypassing is “made inactive” and “muting” (used in *ISO 13849-1*) .
- Opposite to stopping of the machine is permit running of the machine. This means that when electric safety device is not operated it permits running of the machine, but only from its own perspective.

Electric safety devices
General provisions

- Clarification: Electric safety device shall not be bypassed by other than:
  - Another electric safety device, or
  - Hold-to-Run control device in case inspection operation or emergency electrical operation
- New: Maximum combined reaction time of the electric safety device and the equipment controlling the supply to the lift machine, to initiate stopping of the machine, shall not exceed 1 s.

hold-to-run control device
control device which initiates and maintains machine functions
only as long as the manual control (actuator) is actuated

Safety contacts

- If the degree of protection is less than IP4X, the electrical clearances and creepage requirements increased:
  - Clearance increased from 3 mm to 5,5 mm
  - Creepage increased from 4 mm to 8 mm

  - IP less than IP4X is often used example for door contacts

Safety circuits

- All components of safety circuit shall be used within their operational limits at operating and environmental conditions indicated as per *6.2.2 k*)
- De-rating shall be applied on components of which fault can result to dangerous situation as per *4.11.2.3.3*
- The response time of the safety circuit shall not exceed 1 s
- Neither safety logic nor failure detection of safety circuit(s) shall contain electronic devices based on computer technology (see *3.54* and *3.59*)

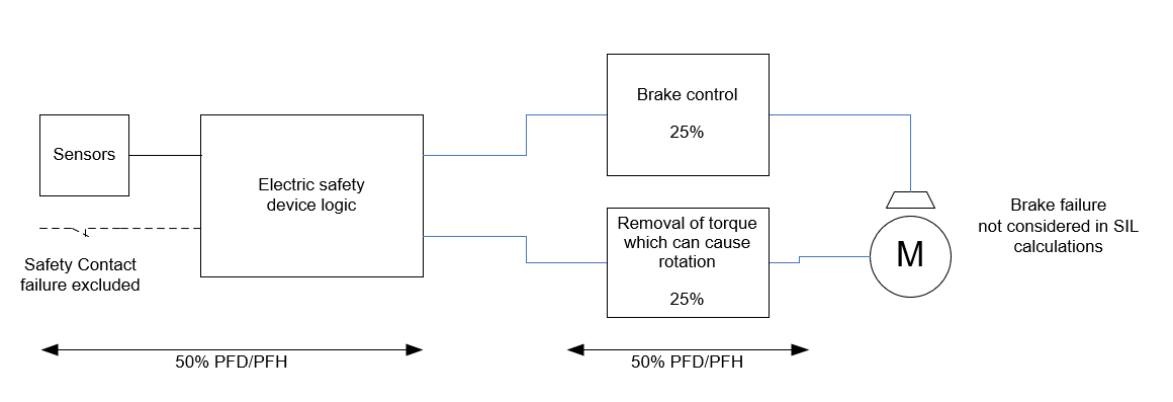
3.54 safety circuit
circuit based on electrical and/or electronic components

3.59 SIL-rated circuit
circuit based on electrical (E), and/or electronic (E), and/or programmable electronic (PE) components with a defined safety integrity level (SIL)

SIL-rated circuits

PESSRAL replaced with SIL-rated circuits, 4.11.2.4

- De-rating shall be applied on components that contribute to dangerous failure rate of SIL-rated circuit.
- Both PFD_{avg} and PFH values shall be calculated and shall use max 50% of the “SIL-limit”
- 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.



3.4 average probability of dangerous failure on demand, PFD_{avg}

mean unavailability of a E/E/PE safety-related system to perform the specified safety function when a demand occurs from the lift or lift control system

3.5 average frequency of a dangerous failure per hour, PFH

average frequency of a dangerous failure of a E/E/PE safety-related system to perform the specified safety
function over a given period of time

3.34 mission time

maximum time interval between manufacturing date and replacement date

SIL-rated circuits – Modification of software

- SIL-rated circuits shall be provided with measures to prevent replacement of the program code without authorization by the manufacturer, see *IEC 61508-1:2010, 7.16.2.2*
- Replacement of the program code shall only be possible if replacement is enabled by a manual action on site, 4.11.2.4.2
- 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 manual reset on site. A power cycle by itself shall not provide this reset.
- Maintenance instructions shall describe method to identify the software-version of SIL-rated circuits

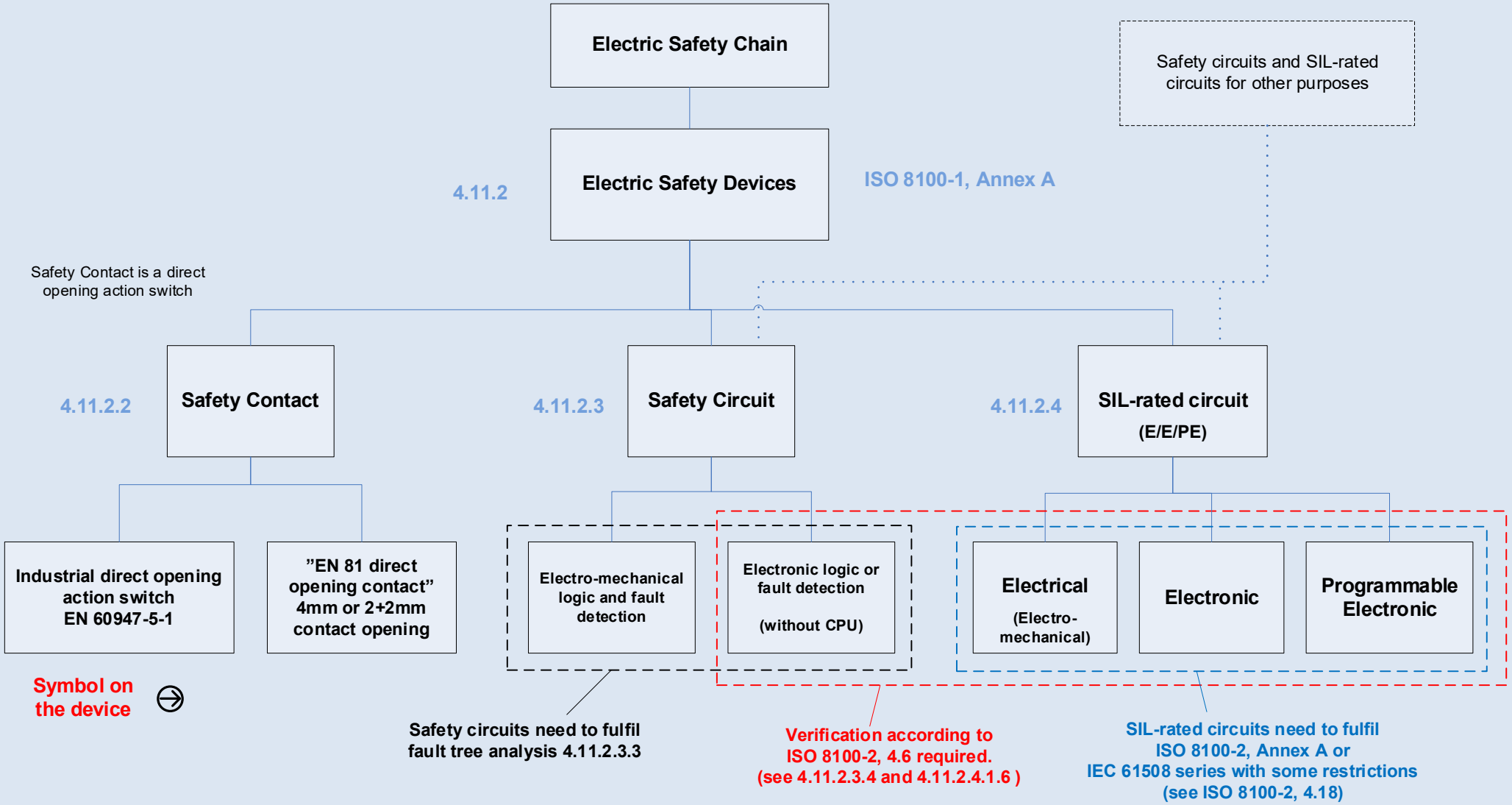
=> Remote (off-site) update of SIL-rated circuit software is prevented

SIL-rated circuits - Parametrization

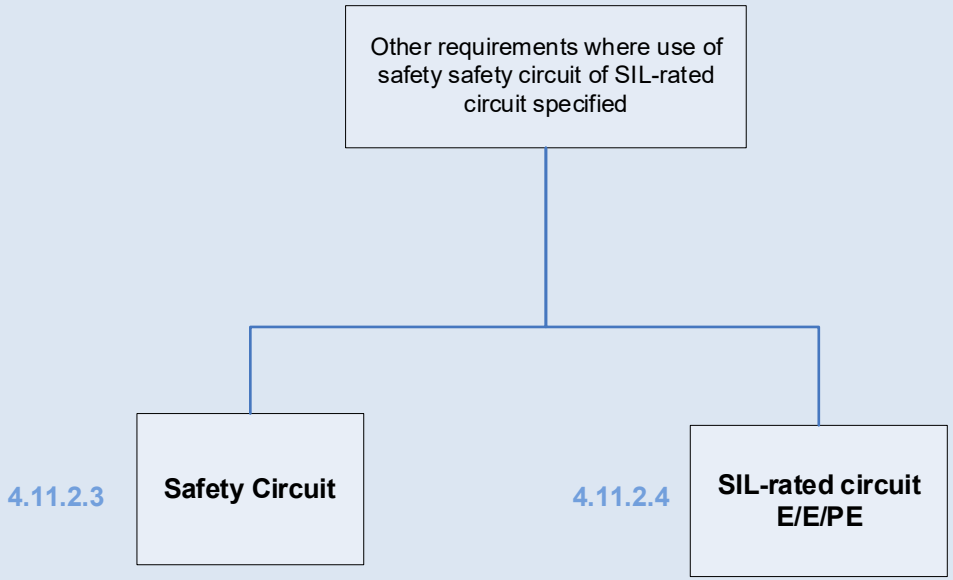
- Parameters shall have defined value ranges and be prevented from unintentional modification, 4.11.2.4.3
- Change of parameter shall only be possible if parametrization is enabled by a manual action on site with SIL-rated means
- When parametrization is enabled the SIL-rated circuit shall be in a safe state
- Unintentional deactivation of parametrization shall be prevented. Power interruption and restoration shall be considered as unintentional actions.
- Maintenance instructions shall describe
  - parameters, their value ranges, dependencies, safe use and safe verification process
  - method to compare actual parameter settings to configuration record
  - procedures to verify correctness of the parameter settings after change

  => Remote (off-site) update of SIL-rated circuit parameter is prevented

Electric safety device types



Safety circuits and SIL-rated circuits for other purposes



Clause	Function
4.4.2.2.1 d) iv)	Prevent extension of mechanical device if car is not stopped at unlocking zone.
4.4.2.2.1 e) 4.4.2.2.2 g) 3)	Interlocking of door operation and mechanical device position.
4.4.2.2.1 f) 4.4.2.2.2 h)	Load monitor preventing retraction of mechanical device in case of overload.
4.6.2.2.5.7	Over speed monitoring and electrical tripping of safety gear.
4.9.2.2.2.3 a) 1), 4.9.2.2.2.3 a) 2)	Interruption of machine brake current when stopping is electric initiated by electric safety device.
4.9.2.5.3 c), 4.9.2.5.3 d), 4.9.2.5.3 e)	Removing the power which can cause rotation of the motor (other than hydraulic lift) when stopping is electric initiated by electric safety device. Note: 4.9.2.5.3 d) is Safe Torque Off (STO) as per IEC 61800-5-2.
4.9.3.4.2 c), 4.9.3.4.2 d), 4.9.3.4.2 e)	Stopping the hydraulic lift machine in upwards direction when stopping is electric initiated by electric safety device. Note: 4.9.3.4.2 d) is Safe Torque Off (STO) as per IEC 61800-5-2.
4.9.3.4.3 b), 4.9.3.4.3 c)	Stopping the hydraulic lift machine in downwards direction when stopping is electric initiated by electric safety device.

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4.12 Electrical Controls

Controls and operations

4.12.1.1 Normal operation

- Normal operation is automatic operation wherein the lift is used for transport of passenger or goods, and wherein the car is stopped automatically at the landings
- Automatic operation is operation in which start of the movement of the car happens in response to the momentary actuation of operating devices or in response to any other automatic starting function
- New: The acoustic signal shall be activated (for 2 sec. min) before any re-start of the lift in automatic operation when stopping was initiated by an electric safety device

4.12.1.2 Load control

- The overload shall be detected at the latest when the rated load is exceeded by 10 %. 75 kg deleted. Affects lifts having rated load less than 750 kg.
- Acoustic signal sound volume and optical signal are now defined

4.12.1.3 Monitoring of slowdown in case of reduced stroke buffers

- Once monitoring is activated, the electric safety device shall keep the lift out of automatic operation. The return of the lift to automatic operation shall require intentional reset on site.

Inspection operation

Revised requirements clearly specify conditions for functioning when inspection operation switch is at INSPECTION and NORMAL positions

- Focus on to describe what shall be bypassed and when bypasses shall be disabled, 4.12.1.5

Buttons are now called as “hold-to-run control device”

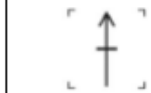
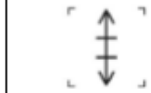
Optional Inspection operation travel beyond the final stop

- Automatic stop before reaching the final limit switch
- Continued travel after re-activation of the run and direction buttons
- Max. 0,15 m/s speed in the overrun area
- Limit switch and buffer switches are bypassed
- Different symbols on buttons when option is provided

Return to automatic operation after inspection operation

- An acoustic signal for at least 2 seconds just before the first start of the lift in automatic operation; or intentional reset outside of the well

Symbols on buttons when optional travel beyond the final stop is provided

Symbol reference	Symbol
IEC 60417:2002-2765	
IEC 60417:2002-2765	
IEC 60417:2002-2764	

Emergency electrical operation (EEO)

New device requirements

- Emergency electrical operation (EEO) switch shall be bi-stable and shall have positions “ON” and “OFF”, 4.12.1.6
- Hold-to-run control device(s) shall be used for car movement control and for bypassing the EEO-switch .

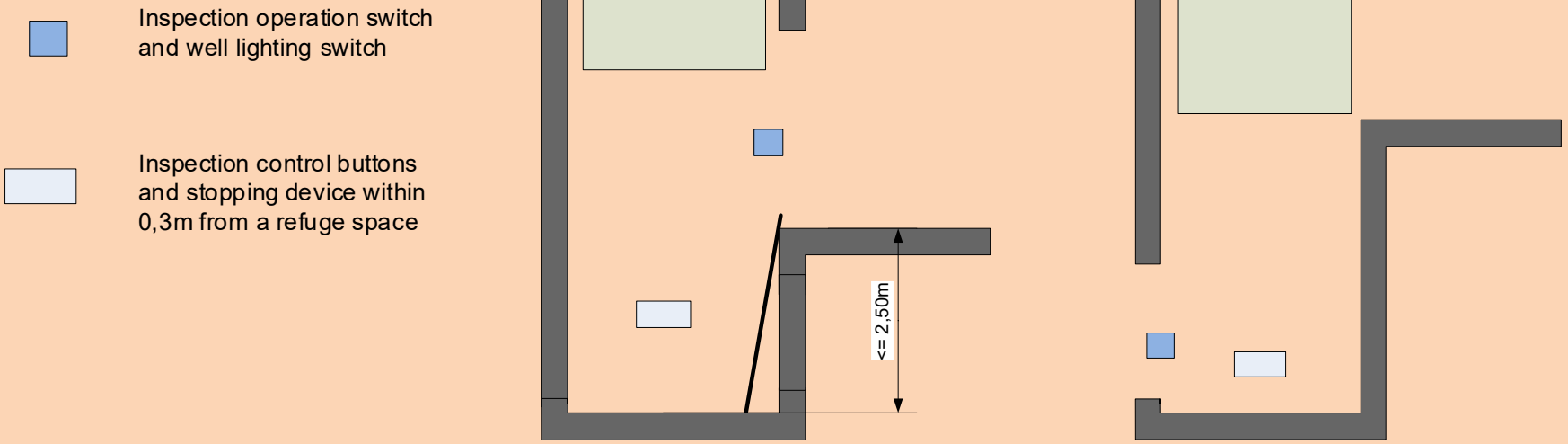
Revised requirements clearly specify conditions for functioning when EEO-switch is at ON and OFF positions

- Focus on to describe what shall be bypassed and when bypasses shall be disabled.

Automatic power-operated door closing and locking of the door(s) shall be controller by hold-to-run control device. This hold-to-run control device may be the same as for the car movement. Door protective device as shall be de-activated and door(s) closing shall be with limited energy (4 J) together with acoustic signal.

Stopping devices

- New: When entering the well, inspection operation switch is the first device to operate, not stopping device as earlier. See *4.2.1.3.1 a)* for pit and *4.4.8* for car roof.
- New: It is not mandatory to use red push button type stopping device
- Stopping device shall be bi-stable and such that a return to service cannot result from an involuntary action, 4.12.1.11



Control of automatic rescue operation

- New: optional automatic rescue operation that operates in case of failure or loss of power supply to move the lift car to a landing, 4.12.1.12
- The automatic rescue operation shall not bypass any electric safety device unless same safety function is provided by additional electric safety device
- Stopping accuracy after a car movement with automatic rescue operation shall be +/-20 mm. Relevelling is not required
- An acoustic signal shall operate at any time the doors are not closed, and the levelling accuracy exceeds 20 mm for more than 3 seconds

Normal operation

Devices to operate the lift by passengers

- The devices located in the lift car and on the landings shall be identified by their shape, with symbols, numbers, text, or any combination thereof, 4.12.1.1

Indication of the landing

- The designation of the landing at which the lift has stopped shall be displayed inside the car.
  - Sign at the landing, visible from within the car, is not anymore sufficient alone.

New: Delayed start

- The acoustic signal shall be activated (for 2 sec. min) before any re-start of the lift in automatic operation when stopping was initiated by an electric safety device.
- The same signal can be used for "*return to automatic operation after inspection operation*".

Load control

The overload shall be detected at the latest when the rated load is exceeded by 10 %, 4.12.1.2

- 75 kg deleted. Affects lifts having rated load less than 750 kg.

Acoustic signal sound volume is now defined

- Shall be adjustable between 35 dB(A) and at least 65 dB(A)
- For goods passenger lifts, it shall be adjustable up to at least 80 dB(A)
- The sound level shall be measured at 1,50 m height at the centre of the door opening when the door is fully open

Optical signal defined

- An optical signal in the car shall be provided, either in accordance with *ISO 4190-5:2006*, Table C.1 No.7 or as a word “OVERLOAD”

Monitoring the normal slowdown of the lift machine in case of reduced stroke buffer

- New: Once activated, the electric safety device shall keep the lift out of automatic operation. The return of the lift to automatic operation shall require intentional reset on site. A power cycle by itself shall not provide this reset, 4.12.1.3
- *The instructions shall include in particular the following information on emergency operations, 6.2.5:*

  a) instructions for emergency operation in different expected situations, in particular on the release of:

  …

  — the reduced stroke buffer;

  …

Inspection operation

- Revised requirements clearly specify conditions for functioning when Inspection operation switch is at INSPECTION and NORMAL positions, 4.12.1.5
  - Focus on to describe what shall be bypassed and when bypasses shall be disabled
- Buttons are now called as “hold-to-run control device”
- Optional Inspection operation travel beyond the final stop
  - Automatic stop before reaching the final limit switch
  - Continued travel after re-activation of the run and direction buttons
  - Max. 0.15 m/s speed in the overrun area
  - Limit switch and buffer switches are bypassed
  - Different symbols on buttons when option is provided
- Return to automatic operation after inspection operation
  - An acoustic signal for at least 2 seconds just before the first start of the lift in automatic operation; or
  - Intentional reset outside of the well

Symbol reference	Symbol
IEC 60417:2002-2765	
IEC 60417:2002-2765	
IEC 60417:2002-2764	

Emergency electrical operation (EEO)

New device requirements

- Emergency electrical operation (EEO) switch shall be bi-stable and shall have positions “ON” and “OFF”, 4.12.1.6
- Hold-to-run control device(s) shall be used for car movement control and for bypassing the EEO-switch

Revised requirements clearly specify conditions for functioning when EEO-switch is at ON and OFF positions

- Focus on to describe what shall be bypassed and when bypasses shall be disabled.

Automatic power-operated movement of the door(s) shall be prevented

- Door closing and locking of the door(s) shall be controller by hold-to-run control device. This hold-to-run control device may be the same as for the car movement
- Door protective device as shall be deactivated, and door(s) closing shall be with limited energy (4 J) together with acoustic signal

Landing and car door bypass device

Requirements are split in two clear groups

- Conditions for functioning which shall satisfy the requirements for electric safety devices, 4.12.1.8
  - Bypassing the electrical safety devices of the landing doors, the landing door locks, the car door(s) and the car door locks shall be possible.
  - It shall not be possible to bypass both car and landing door at the same time.
  - Movement of the car shall only be possible in inspection operation and emergency electrical operation.

Other conditions for functioning when any of bypass device(s) is in bypass state.

  - Separate monitoring signal to check that the car door(s) is/are in the closed position
  - Acoustic signal.
  - Flashing light under the car is deleted.

Stopping devices

- New: When entering the well, inspection operation switch is the first device to operate, not stopping device as earlier. See *4.2.1.3.1 a)* for pit and *4.4.8* for car roof
- New: It is not mandatory to use red push button type stopping device, 4.12.1.11
- It shall be bi-stable and such that a return to service cannot result from an involuntary action

Control of automatic rescue operation

- The automatic rescue operation shall not bypass any electric safety device unless same safety function is provided by additional electric safety device, 4.12.1.12
- Stopping accuracy after a car movement with automatic rescue operation shall be +/-20 mm. Relevelling is not required
- An acoustic signal shall operate at any time the doors are not closed, and the levelling accuracy exceeds 20 mm for more than 3 seconds

Example of additional electric safety device:
Check on retardation in case of reduced stroke buffers can be replaced with lower constant speed limit, which is also electric safety device.

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.

Alert initiation and intercom system

“Alarm” is renamed as “Alert”

- Alert means that someone needs assistance or wants to communicate. It’s more about establishing contact rather than immediate danger.

New option to use an acoustic device (e.g. bell, siren, buzzer) instead of EN 81-28 when Lifts Directive is not applicable

a) a two-way communication system in accordance with EN 81-28:2026; or

b) an acoustic device with a sound level of 80 dB(A) at 1,00 m distance, located on the car roof or at a landing.

Note: Lift Directive EHSR 4.5 ”*two-way communication system for contact with a rescue service*” is covered via *Annex ZA* of *EN 81-28*

Note: MD/MR EHSR 1.5.14 Risk of being trapped in a machine is covered by *ISO 8100-1, 4.12.3.1*

Identification of the software

- Software relevant for safety functions referenced in *Table 25* shall be identified, 4.12.4
- When replacement of software is possible, identification information shall be available on demand
- Software identification shall be available in human readable form, either by a built-in system or by an external tool. If this external tool is a special tool, it shall be provided with the lift.

Note: Related to MR, *1.1.9* Protection against corruption

Note: Functional test instruction requirement is related to MR, 1.1.2 (e)

Table 25 — List of safety functions

Clause	Safety function	Functional test procedure needed?
4.3.9	Locking and emergency unlocking of landing and car doors	No
4.4.2.2.1 c)	Prevent car falling during loading/unloading in case handling device is not included in the rated load (not more than 20 mm)	Yes
4.4.2.2.2 e)	Prevent car falling during loading/unloading in case car size as per Table 7 (not more than 120 mm)	Yes
4.6.2	Safety gear and its tripping means	No, unless operated by electrical means
4.6.3	Rupture valve	Yes, if other means than bypass valve are used
4.6.4	Restrictors	No
4.6.5	Pawl device	Yes, when pawl device is used for preventing unintended car movement downwards
4.6.6	Ascending car overspeed protection means	Yes
4.6.7	Protection against unintended car movement	Yes
4.8.1	Car and counterweight buffers	Yes, if test is done at high speed
4.11.1.5	An earth fault in a circuit in which there is an electric safety device,	Yes
4.11.2	Electric safety devices	Yes, for devices listed in Annex A
4.11.2	Electric safety devices including electronic components	Yes, for devices listed in Annex A which are safety components (certificate).
4.12.1.1.3	Stopping accuracy	No
4.12.1.2	Load Control	No
4.12.1.3	Limiting the speed of the lift machine in case of reduced stroke buffer	Yes
4.12.1.6	Control of emergency electrical operation	No
4.12.1.7	Protection for maintenance operations	No
4.12.1.8	Landing and car door bypass device	No
4.12.1.10 a)	Electrical anti-creep system	No
4.12.1.11	Stopping devices	No
4.12.1.12.2	Additional electric safety device for automatic rescue operation	Yes
4.12.2	Final limit switches	No
4.12.3	Alert initiation device and intercom system	Yes
4.12.1.1	Normal operation	No

(EN) ISO 8100-1:2026

5 Verification of the safety requirements and/or protective measures

Verification methods

5.1 Verification methods

- Technical compliance documentation requirement is removed (including *EN 81-20, Annex B*)
- Verification *Table 24 (*in *EN 81-20* as *Table 18)* is updated, e.g.
  - *EN 81-20, "5.12.4 Priorities and signals"* has been removed
  - Verification means *"Visual inspection"* has been changed to *"Inspection"*
  - *"4.10.11 Emergency supply"* has been added

Table 24 — Means of verification of the safety requirements and/or protective measures

Sub-clause	Safety requirements	Inspection[a]	Performance check / test[b]	Measurement[c]	Drawing / calculation[d]	User information[e]
4.1	**General**					
4.1.1	Non-significant hazards	✓				✓
4.1.2	Fixing system of guards					✓
4.1.3	Notices and Labels	✓				✓
4.10.10	Electrical identification	✓			✓	✓
4.10.11	Emergency supply	✓			✓	✓
4.11	**Protection against electric faults; failure analysis; electric safety devices**					

Specific examinations and tests

5.2 Specific examinations and tests on installed lift

5.2.5 Car safety gear

- There is no need to slip ropes anymore during the test, "*the car is stopped by the safety gear only*"
- Progressive safety gears are tested
  - At 125 % rated load and at rated speed or
  - At 100 % rated load and at overspeed governor's tripping speed

5.2.6 Counterweight or balancing weight safety gear

- Tests are performed with empty car and at rated speed (lower speeds are removed)
- There is no need to slip ropes anymore

5.2.8 Buffers

- There is no need no check buffer compression anymore

***5.2.12* ACOP**

- If ACOP (Ascending car overspeed protection) requires self-monitoring, it needs to be tested

***5.2.14 Protection against unintended car movement* (UCMP)**

- A check on activation means is added (if applicable)

Specific examinations and tests

5.2 Specific examinations and tests on installed lift

New test requirement to verify that vertically sliding doors are balanced correctly

- *"It shall be checked that a vertically sliding door does not start to open or to close by itself when the door is open with a gap of 100 mm.", 5.2.16*

New test requirement to verify counterweight / balancing weight is balanced correctly (has correct mass)

- Before performing tests like traction, machine brakes, safety gear, ACOP etc., it shall be verified
  - By practical tests using machine current measurement or
  - By weighting of the car and counterweight

  that the counterweight / balancing weight balance is as stated in the instructions, *5.2.17 and 5.2.18*

(EN) ISO 8100-1:2026

6 Information for use

Information for use

6.2 Instructions

New technical requirements in *ISO 8100-1* also require more detailed information in the instructions, e.g. for

- SIL-rated circuits (in *EN 81-20/50* as “PESSRAL”), *6.2.4 k)*
- Software and parameters, *6.2.4 v)*
- Automatic rescue operation, *6.2.4 i)*
- Discard/replacement criteria, *6.2.4.c), 6.2.4 j), 6.2.4 r), 6.2.4.y)*
- Resetting means, *6.2.4 f)*
- Emergency operations, *6.2.5*
- “Plans of the installation in the building” adds mandatory plan elements, 6.2.2 b)
  - Clause 6.2.2 b) expands the required information that must be included in the installation plans, specifically addressing openings, working areas, and force transmission.

Reference to *EN 13015 “Maintenance for lifts and escalators”* is removed, *EN 81-20, 7.2.2*

- Instead, requirements are listed in *6.2.4*

Basic data and characterics

Example regarding the key addition:
force/load applications to the building

Same content

EN 81-20

[calculations]

5.2.1.8 Strength of walls, floors and ceiling

The floor of the pit shall be able to support beneath:

- Each guide rails, 5.2.1.8.4
- Car buffers, 5.2.1.8.5
- Counterweight buffer supports. 5.2.1.8.6
- Each jack, 5.2.1.8.7

forces and efforts calculated as …… required in every clauses 5.2.1.8.x

ISO 8100-1

[calculations]

4.2.1.5 Forces

The vertical force beneath:

- Each guide rails, 4.2.1.5.1
- Car buffers, 4.2.1.5.2
- Counterweight buffer supports, 4.2.1.5.3
- Each jack, 4.2.1.5.4

shall be calculated as …… indicated in every clause 4.2.1.5.x

NEW

ISO 8100-1

[instructions for building structure]

6.2.2 Basic data and characteristics

The instructions shall include at least the following information:

b) Plans of the installation in the building including

- Indication of the calculated forces and loads and the point of application for:
  - The pit as per 4.2.1.5.1, 4.2.1.5.2, 4.2.1.5.3, 4.2.1.5.4

The same rationale applies to the other items.

Information for use

***6.3 Logbook* needs to show only the interventions**

- *"A logbook shall be provided for recording notes about repairs and periodic checks, including those specified in the instructions*."
- Other information earlier shown in the logbook (like basic characteristis of the lift, electrical schematics diagrams) is required now to be shown in the instructions

List of safety functions

***Table 25 – List of safety functions* in *ISO 8100-1, 6.2.4*, is new**

- Safety functions are defined in the new Machinery Regulation (EU) 2023/1230 Article 3 (4):
  - *'safety function' means a function that serves to fulfil a protective measure designed to eliminate, or, if that is not possible, to reduce, a risk, which, if it fails, could result in an increase of that risk*
- Therefore, a new *Table 25* in *ISO 8100-1* has been created to include the safety functions resulting from the EHSR(* of:
  - Machinery Directive 2006/24/EC
  - Machinery Regulation (EU) 2023/1230 and
  - Lift Directive 2014/33/EU
- This list is provided in support of the EHSR(* 1.1.2 (e) of the Machinery Regulation requiring, where appropriate, test instructions of the safety functions
- And where required by Lift Directive 2014/33/EU, some safety functions are fulfilled by safety components

Table 25 — List of safety functions

Clause	Safety function	Functional test procedure needed?
4.3.9	Locking and emergency unlocking of landing and car doors	No
4.4.2.2.1 c)	Prevent car falling during loading/unloading in case handling device is not included in the rated load (not more than 20 mm)	Yes
4.4.2.2.2 e)	Prevent car falling during loading/unloading in case car size as per Table 7 (not more than 120 mm)	Yes
4.6.2	Safety gear and its tripping means	No, unless operated by electrical means
4.6.3	Rupture valve	Yes, if other means than bypass valve are used
4.6.4	Restrictors	No

*) EHSR = Essential Health and Safety Requirements

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7 Building-related boundary conditions

Installer instructions for building safety

- New Clause 7 collects safety-relevant conditions that affect lift safety but fall outside EHSRs — thus not enforceable via harmonized standards. These are now “must-inform” obligations from the installer to the building contractor.

Example

- Accessible spaces below the well
- Working areas protected against environmental influences

Framing used

- Keeps standard compliant
- Ensures safety-critical interface is not lost due to legal separation

(EN) ISO 8100-1:2026

Annex B - Information on the building-related conditions in which the lift is installed

Annex B

- Building requirements are removed from clause 5 (technical content) and moved to the new *Annex B*
- New *Annex B* formalizes technical interfaces for building related boundary conditions in a normative framework
- The content of *Annex E* (informative) of the *EN 81-20* has been moved to the new *Annex B*
- Installer – Building contractor communication is formalized

→ These changes help clarify scope boundaries between lift and building design

Annex B – Normative technical interface info

EN 81-20
Clause 5 (technical content)
Requirements concern the building

It shall be instructed that …

EN 81-20
Annex B (informative)
Technical compliance documentation

Not considered

EN 81-20
Annex E (informative)
Building interfaces

It shall be instructed that …

NEW

ISO 8100-1
Annex B (normative)
Information on the building-related conditions in which the lift is installed

Structure of Annex B:

- B.1: General Provisions
- B.2: Technical Interfaces
  - Lift type/purpose
  - Layout & access
  - Forces
  - Electrical & lighting
  - Execution & notices

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Annex C (normative) Pit access ladder

Annex C - Pit access ladder

Summary of main changes

Safety and ergonomics improved in various ways

- Maximum handling distances have been shortened
- Less force is needed to handle ladders
- Ladder strength is defined clearly

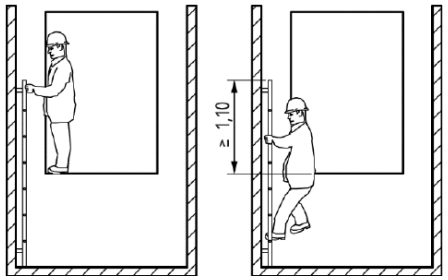
Especially safety of movable ladders is updated

- Ladder fixings (to sill, pit floor) in use position are defined
- Movable pit ladder stored in the pit floor is deleted (type 3b in EN 81-20, F.1.e).
    - Movable ladder shall be stored in upright position

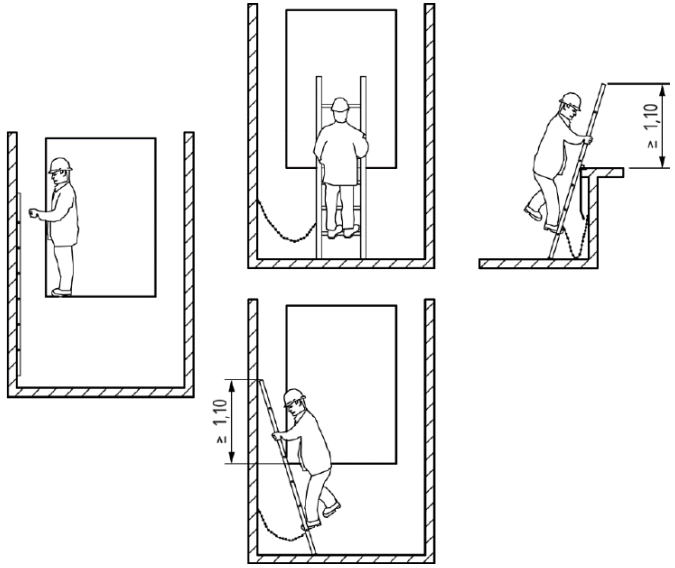
Annex C - Pit access ladder

Pit access ladder types, C.1

Type 1, fixed pit ladders standing upright for storage and use

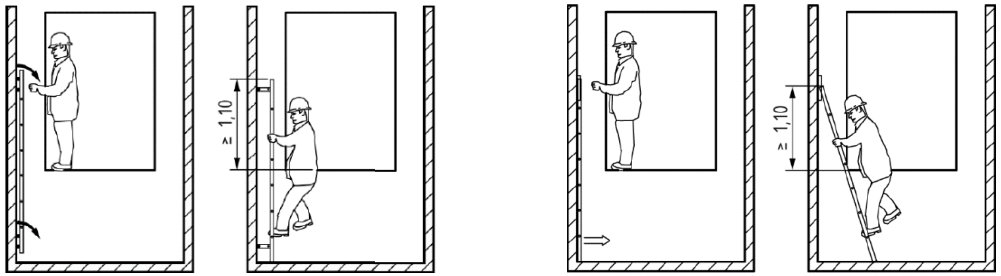


Type 3, movable pit ladder standing upright for storage and is manually put in an inclined position of use

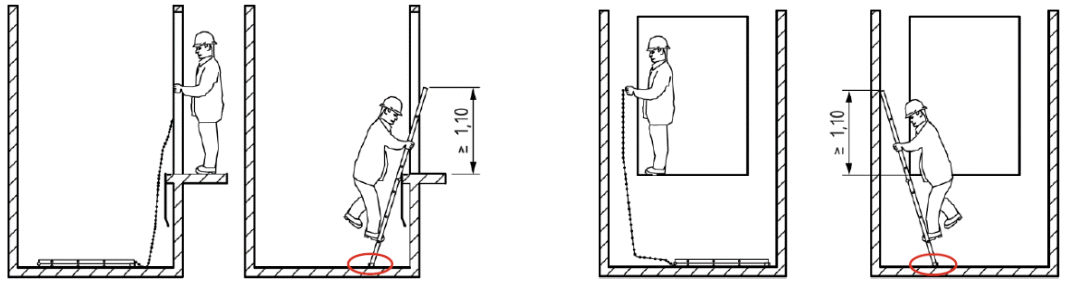


Note: Movable pit ladder stored in the pit floor is deleted,
type 3b in EN 81-20, F.1.e)

Type 2a and 2b, retractable pit ladders fixed to the wall of the well



Type 4a and 4b, foldable pit ladders fixed in the pit



Annex C - Pit access ladder

Pit access ladder strength

The ladder shall be (C.2.2):

a) able to withstand a vertical force of 1 500 N;

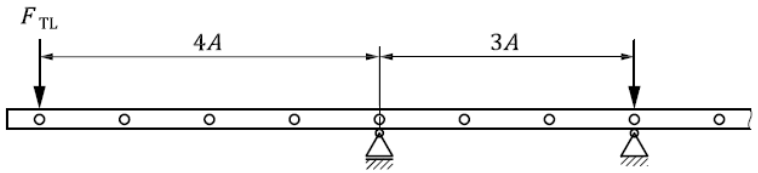
b) able to withstand a horizontal force of 300 N;

Note: 1 500 N and 300 N are requirements for complete ladder including its fixings.

***The mechanical strength shall be in accordance with ISO 14122-4:2016**, Clause 6 (C.3.1)*

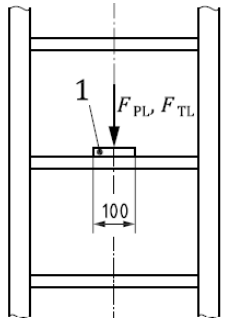
Test on stiles

- Bending test load F_{TL} shall be 700 N



Test for rungs

- Test load F_{TL} shall be 2 600 N
- Test load is applied to the middle of the rung



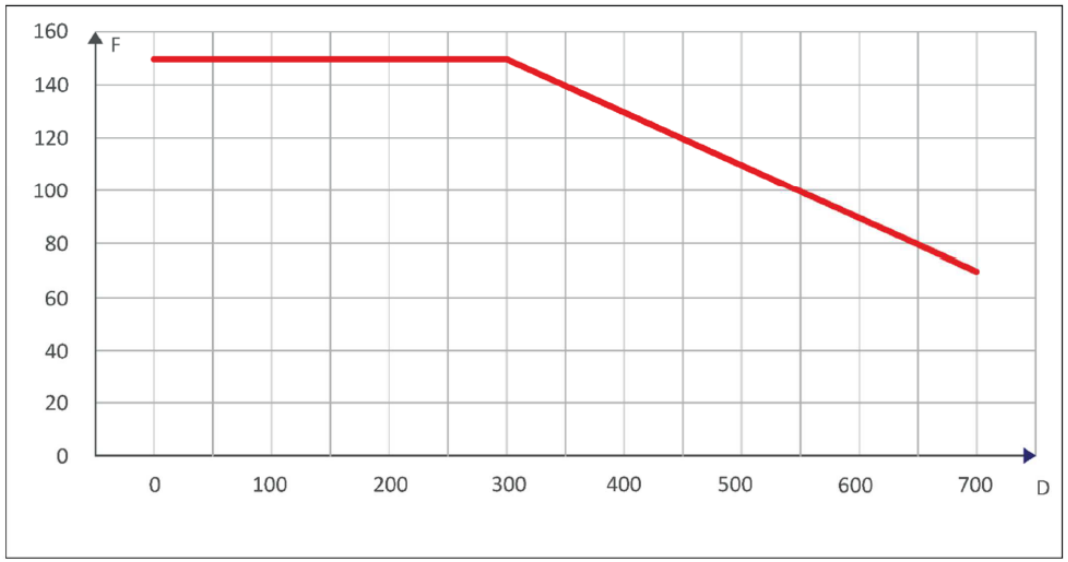
Note: Test standard EN 131-2 has been replaced with ISO 14122-4

Note: Test forces include safety factors

Annex C - Pit access ladder

Pit access ladder handling

- Maximum handling distance from the landing sill reduced from 800 mm to 700 mm (*C.4.a*)
- Maximum weight of movable ladder 15 kg replaced with distance dependent handling force
- Maximum handling force reduced to 70 N at 700 mm distance
- For other handling distances see *Figure C.2*



Key

F	handling force [N]
D	handling distance [mm]

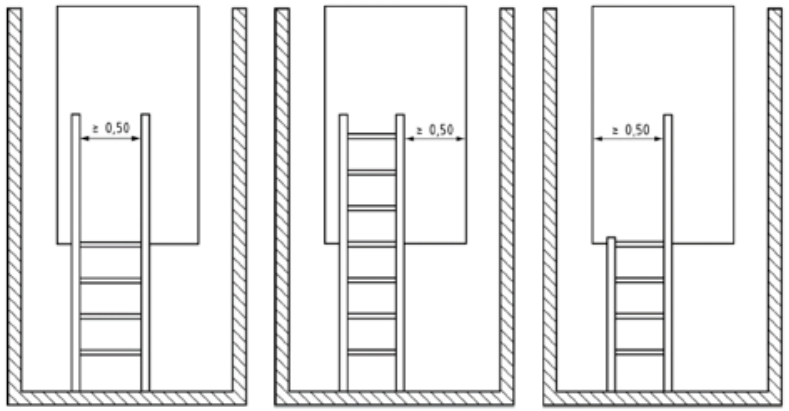
Figure C.2 — Handling force for movement of ladder

Annex C - Pit access ladder

Other changed requirements

- Pit access ladders, in their stored position, shall not interfere with the refuge space, *4.2.5.8.1*
- If the pit access ladder is not a fixed ladder (Type 1), its stored position shall be checked by an electric safety device as per *4.11.2; see 4.2.5.8.1*
- In its position of use the ladder shall be fixed to the landing sill, the bottom of the pit, or the wall of the well, *C.4 b)*
- Fixation shall prevent the ladder from tipping over when a person is standing or grasping the upper part of the ladder, *C.4 c)*
- Ladders Type 3 and Type 4a, positioned at the landing door sill, there shall be a free distance of at least 0,50 m, *C.4 e)*
  - Between the handholds, or
  - Between a stile or a handhold, and the door frame

Note: 300 N horizontal withstand force (*C.2.2*) is applicable here.



Annex E (informative) Operation modes overview

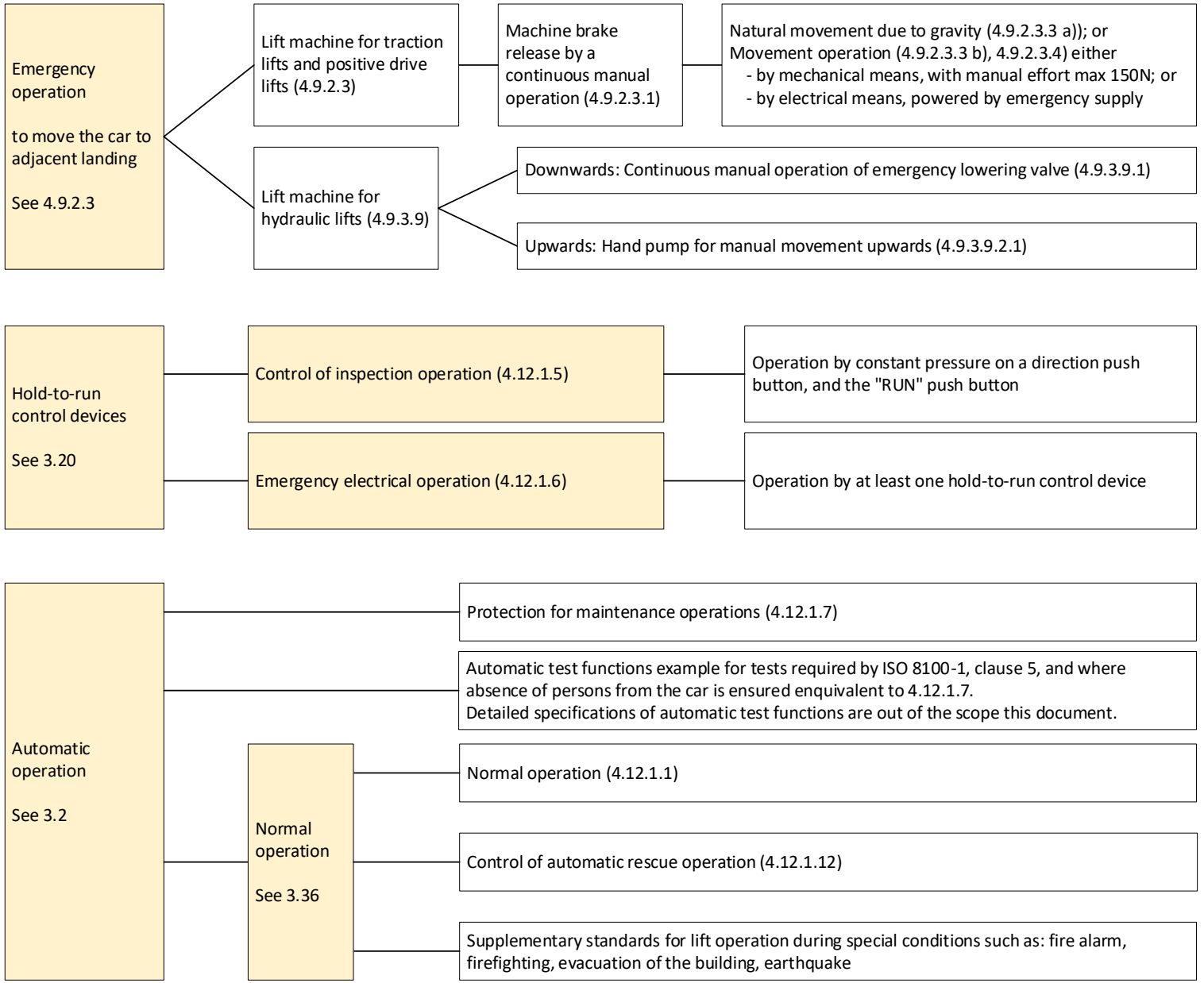
Emergency operation is used for actions where the safety chain is fully bypassed

3.2 automatic operation

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

3.36 normal operation

automatic operation wherein the lift is used for transport of passenger or goods, and wherein the car is stopped automatically at the landings



(EN) ISO 8100-1:2026

Annex ZA (informative)
Relationship between this European Standard and the essential requirements of Directive 2014/33/EU aimed to be covered

Annex ZA (informative)

1) Essential Health and Safety Requirements
2) Regulation (EU) 2023/1230
3) Directive 2014/33/EU
4) Directive 2006/42/EU

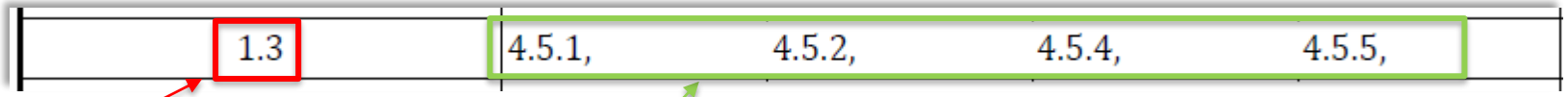
Changes to Annex ZA in ISO 8100-1 and in ISO 8100-2

- Applicable EHSRs(1 of Machinery Regulation(2 have been added, *Table ZA.1.3*
- *ISO 8100-1/2* clause numbers have been updated, completed and corrected to match the new numbering
  Note: *Annex ZA* is not part of the ISO final publication

Relationship between ISO 8100-1/2 and the EHSRs of Lift Directive(3 supplemented by the applicable EHSRs of Machinery Directive(4 and Machinery Regulation(2, remains as earlier

- *ISO 8100-1/2* provides voluntary means of conforming to the EHSRs of Lift Directive and the applicable EHSRs of Machinery Directive and Machinery Regulation as regards lifts and safety components for lifts
- Once *EN ISO 8100-1/2* are cited in the Official Journal of the European Union (OJEU) under 2014/33/EU, compliance with the normative clauses of this standards given in *Annex ZA* Tables confers, within the limits of the scope of this standard, a presumption of conformity with the corresponding EHSRs of 2014/33/EU and associated EFTA regulations.

Example: How to read Annex ZA, based on the case of EN ISO 8100-1, Annex ZA, Table ZA 1.1, 1.3



EHSR 1.3 of Lift Directive

Fulfillment of these requirements and all their sub-clauses in ISO 8100-1, confers the conformity of the lift with EHSR 1.3 of Lift Directive.

(EN) ISO 8100-2:2026

4. Design rules, calculations, verifications and tests

Content according to the ISO 8100-2 structure

4.2 Verification of landing and car door locking devices

4.4 Verification of overspeed governors

4.6 Verification of safety circuits and SIL-rated circuits

4.7 Verification of ascending car overspeed protection means

4.8 Verification of unintended car movement protection means

4.10 Guide rails calculation

4.13 Verification of suspension means, compensation means and their terminations

4.15 Calculations of rams, cylinders, rigid pipes and fittings

4.17 Electrical and electronic components - Fault exclusion

4.18 Design rules for SIL-rated circuits

Annex A (normative) - SIL-rated circuits

Annex ZA (content is in part 1 ZA)

Appendixes

Machinery Regulation impact assessment

Key editorial and content updates

ISO 8100-2 content changes for testing of lift components

Reasons:

- It is not possible to repeat legal obligations from for example the Lifts Directive 2014/33/EU.
- The standard can only specify product requirements and how to verify the product requirements.
- Examinations and/or certifications are usually done by 3rd parties. This was claimed to be misleading and therefore replaced with the wording verifications.
- The instructions for safety components are not covered specifically in EN ISO 8100-1 as this is the lift standard.
- ISO 8100-2 covers the EHSR for safety component instructions.

ISO 8100-2 structure

EN 81-50:2020	*EN ISO 8100-2:2025*	*Notes*
Contents	Contents	
European foreword	European foreword	
	Foreword	ISO foreword
Introduction	Introduction	
1.Scope	1. Scope	
2. Normative references	2. Normative references	
3. Terms and definitions	3. Terms and definitions	
4. List of significant hazards		Obsolete by detailed Annex ZA
5. Safety requirements and/or protective measures	4. Safety requirements and/or protective measures	
Annex A (normative) Model form of type examination certificate	-	Removed, is not a technical requirement for the product
Annex B (normative) Programmable electronic systems in safety related applications for lifts (PESSRAL)	**Annex A** (normative) SIL-rated circuits	Renamed
Annex C (informative) Example for calculation of guide rails	**Annex B** (informative) Example for calculation of guide rails	
Annex D (informative) Calculation of traction – Example	**Annex C** (informative) Calculation of traction – Example	
Annex E (informative) Equivalent number of pulleys N_{equiv} - Examples	**Annex D** (informative) Equivalent number of pulleys N_{equiv} - Examples	
Annex ZA (informative) Relationship between this European Standard and the essential requirements of Directive 2014/33/EU aimed to be covered	**Annex ZA** (informative) Relationship between this European Standard and the essential requirements of Directive 2014/33/EU aimed to be covered	
Bibliography	Bibliography	

ISO 8100-2
Landing doors and car doors

***ISO 8100-2* contains modified wording and changes that minimize room for interpretations**, e.g.

- Added *"The static test and the dynamic test shall be carried out with the same test samples used in the endurance test.", 4.2.1.2.1*
- During endurance test, test current needs to be double *"of the locking device", endurance test, 4.2.1.2.2.*
- Test force *"increasing progressively"* is made clearer: *"between 30 s to 60 s", static test, 4.2.1.2.3*
- Measurable criteria has been added for mechanical tests , *4.2.1.3*

ISO 8100-2
Overspeed governors

Verification of overspeed governors

- For the free fall test the speed shall be recorded to determine the difference between adjusted speed and the speed when an actual free fall occurs, and the safety gear needs to operate. *ISO 8100-2, 4.4.2.2.1 e)*

ISO 8100-2
Verification of safety circuits and SIL-rated circuits

***4.6.1.2* Information for verification clarified**

- E.g. Method of failure analysis employed and documented results

***4.6.3.1* Mechanical test requirements clarified (vibration and shocks)**

- E.g. number of shocks per each axis

***4.6.3.2* Temperature test requirements clarified**

- E.g. number of test cycles stated clearer

***4.6.3.3 / 4.6.3.4* Failure analysis of safety circuit and SIL-rated circuit**

- New mandatory check of PFDavg and PFH calculations for SIL rated circuits

4.6.4 Instructions

- Documentation requirements: must include verified technical data such as type , operation conditions, voltage and hardware/software identification

ISO 8100-2 - Verification of ascending car overspeed protection means (ACOP)

4.7.1 General provisions has some changes, e.g.

- Min. and max. masses, torques, etc. have been removed. Instead, *ISO 8100-2* refers to *4.7.3 Testing*
- List of documents has been removed. Instead, it is referred to *4.7.4 Instructions*

***4.7.3.2.1 General*, defines specifically**

- "*The acceleration of the mass to reach the tripping speed shall not exceed 0,1 m/s^2*". (Note: requirement Is aligned with overspeed governor test, *ISO 8100-2, 4.4.2.2.2*

Speed reducing element

- An absolute requirement on the retardation limit of 1,0 g_n is given in *ISO 8100-2, 4.7.3.2.1*
- Clarified the number of tests required for verification of speed reducing elements (like safety gear) designed for
  - Single mass, ISO 8100-2, 4.7.3.2.2.2
  - Different masses, ISO 8100-2, *4.7.3.2.2.3*

Speed monitoring element (in *EN 81-50* called as "*Overspeed monitoring device*")

- Defined the specific number of tests to be carried out ("Twenty *tests"*), *ISO 8100-2, 4.7.3.2.3.1*

4.7.3.3 Checking after the tests

- A shorter description is provided: "*After the tests, a visual check shall ascertain that no deterioration, except on replaceable friction components, which affects the operation of the safety gear has occurred*."

ISO 8100-2 - Verification of unintended car movement protection means (UCMP)

***Changes which* simplify and clarify the requirements include, e.g.:**

- Removed key parameter limits that applicant needs to provide, like “minimum and maximum masses”, “force or torque or fluid pressure”, *ISO 8100-2, 4.8.1*
- List of documents that shall be provided for the UCMP verification, is redefined and moved to a new clause *“4.8.4 Instructions”*
- Testing measurement of *“the average retardation”* is redefined as just *“the retardation”,* to clarify that the measurement is made on the retardation itself and not based on a collected set of measurements, *ISO 8100-2, 4.8.3.1*
- *4.8.3.3 Checking after the tests*
  - A shorter description is provided: *“After the tests, a visual check shall ascertain that no deterioration, except on replaceable friction components, which affects the operation of the safety gear has occurred.”*

ISO 8100-2
Guide Rail Calculations

Formulae corrected

- Omega ω value was added to some buckling formulae of *Annex B*

Combined stress calculation completed in ISO 8100-2, *Annex B* (*4.10.1*)

- Combined bending
- Combined bending + compression/tension
- Combined bending + buckling

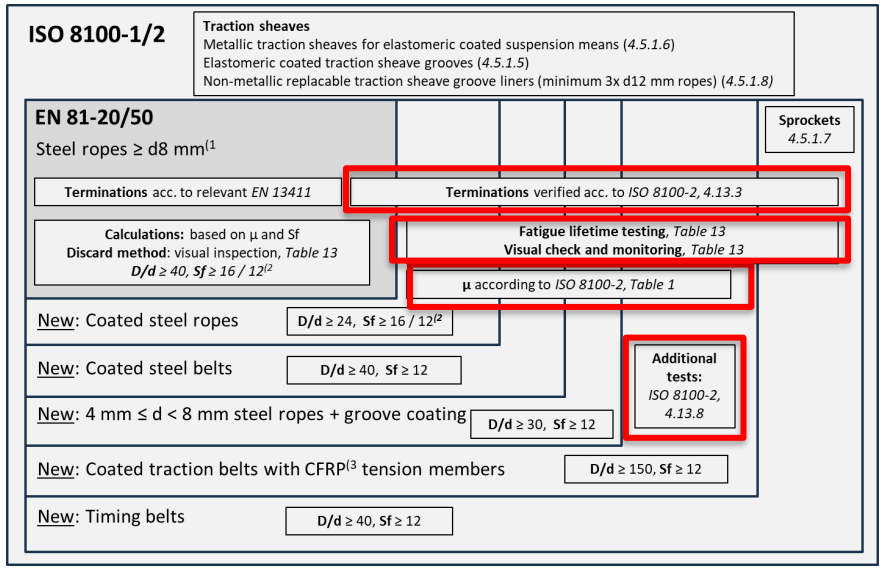
Calculation methods harmonized

- All methods (analytical or alternative, e.g. FEM) must use the same boundary conditions
- $k_3 \cdot M_{aux}$ replaced with F_{aux} (aligned with *ISO 8100-1*)

Annex B

- Clarifies that example does <u>not</u> include all the load scenarios (e.g. buffer impact, bouncing scenarios)

ISO 8100-2 - Suspension means



Note For original illustration, see "ISO 8100-1, Suspension means" in this document

Main changes in ISO 8100-2 regarding suspension means

- "Conventional steel wire ropes" contain some minor changes

Table 1 — Applicable friction factors

	Steel wire ropes with steel/cast iron traction sheave	Elastomeric coated ropes	Elastomeric coated traction belts	Steel wire ropes: with elastomeric coated traction sheave, and with non-metallic replaceable traction sheave groove liners
Car loading condition	f_{load} [a] shall be calculated in accordance with 4.13.6.1	f_{load} [a] shall be verified in accordance with 4.13.6.2	f_{load} [a] shall be verified in accordance with 4.13.6.2	f_{load} [a] shall be calculated in accordance with 4.13.6.1
Emergency braking condition	f_{brake} [b] shall be calculated in accordance with	f_{brake} [b] shall be verified in accordance with	f_{brake} [b] shall be verified in accordance with	f_{brake} [b] shall be calculated in accordance with

New suspension means have been added into *ISO 8100-2*

- Traction calculations shall be made according to ISO 8100-2, *4.11* and *Table 1.*
- Terminations shall be tested according to *ISO 8100-2, 4.13.3*
- CFRP elastomeric coated suspension means shall have additional tests (adhesion, heat, climate) *ISO 8100-2, 4.13.8*
- *Table 13* indicates required testing/verifications: fatigue lifetime testing , verification of elastomeric traction sheaves and visual inspection/discard criteria, ISO 8100-2, 4.13.2, 4.13.5 and 4.14

ISO 8100-2
Calculations of rams, cylinders, rigid pipes and fittings

Calculation of the base thickness of cylinders (Hydraulic lifts)

- The bases of cylinders must be designed only according to figures and formulae, *4.15.1.2.1*
- *EN 81-50* figures and formulae are given as examples, and they do not exclude other possible constructions

Calculations of the jacks against buckling

- For slenderness $\lambda < 100$, yield strength $R_{p0,2}$ is used. *EN 81-50* used tensile strength R_m

ISO 8100-2
Electrical and electronic components, fault exclusion

- Section *4.17* and *Table 4* can be used exclude component faults (failure modes) in fault analysis
- List of fault exclusions is not exhaustive, also other justified fault exclusion can be applied
- When fault exclusion is applied to component, component shall be over-dimensioned (de-rated) by minimum factor of 1,5 on relevant parameters
- Minor updates in fault exclusion criteria (*Table 4*)

ISO 8100-2
Design rules for SIL-rated circuits

New: standard recognizes two possible development paths for SIL-rated circuits, ISO 8100-2, 4.18

- *ISO 8100-2*, *Annex A* (cookbook)
  - Pre-selected architectures as per SIL
  - Pre-selected techniques and measures to avoid and detect failures as per SIL

- Full application of *IEC 61508:2010* with some limitations

ISO 8100-2
Design rules for SIL-rated circuits

- *EN 81-50* have pre-defined set of requirements for PESSRAL.

- *ISO 8100-2* recognizes two possible development paths for SIL-rated circuits
  - *ISO 8100-2, Annex A* (cookbook)
    - Pre-selected architectures as per SIL
    - Pre-selected techniques and measures to avoid and detect failures as per SIL
    - There requirements are heavily revised compared to EN 81-50

  - Full application of *IEC 61508:2010 parts 1-3* with some limitations

(EN) ISO 8100-2:2026

Annex A (normative)
SIL-rated circuits

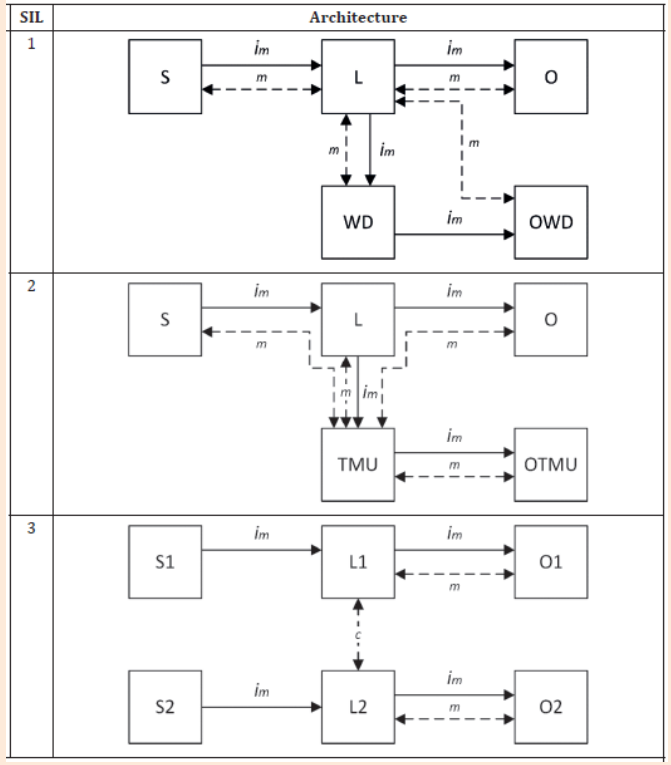
ISO 8100-2
Annex A, SIL-rated circuits “cookbook”

Comprehensive update with additional information to better guide development efforts

Examples of new topics:

- *Table A.13 — Interboard safety related data communication links of SIL-rated circuits*
- *Table A.14 — Functional safety management measures*
- *Table A.16 — Calculation of safety-related parameters*
- *Table A.17 — List of practices and rules of structured programming*

Pre-selected architectures per SIL



ISO 8100-2
Annex A, SIL-rated circuits

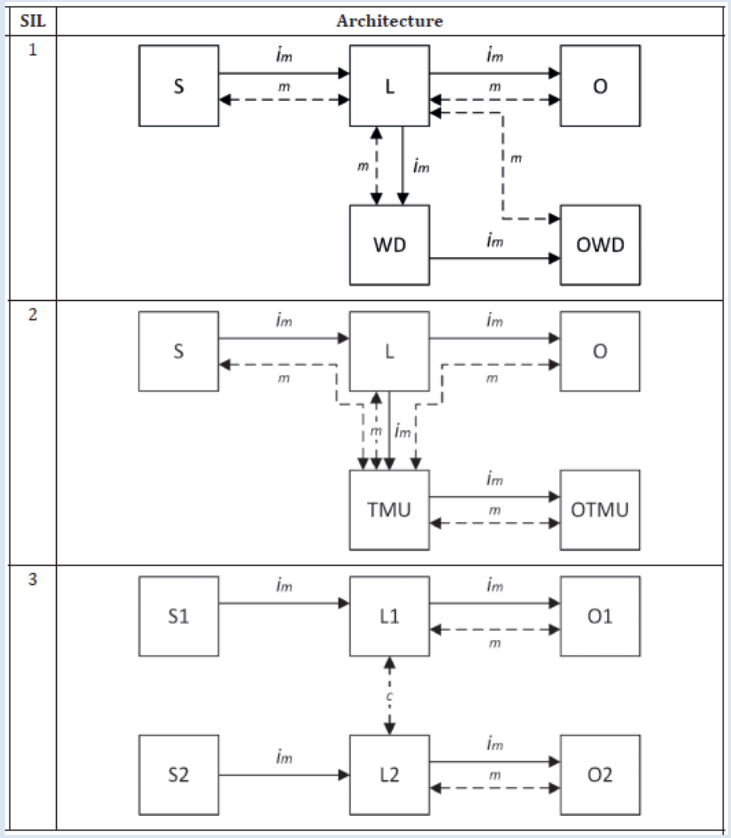
- Comprehensive update to *ISO 8100-1 Annex A*, incorporating additional information to better guide development efforts

- Examples of new topics
  - *Table A.13 — Interboard safety related data communication links of SIL-rated circuits*
  - *Table A.14 — Functional safety management measures*
  - *Table A.16 — Calculation of safety-related parameters*
  - *Table A.17 — List of practices and rules of structured programming*

ISO 8100-2
Annex A (cookbook)

- Designated architectures with PFD/PFH calculation formulas

S, S1, S2:	Input device, e.g. sensor
L, L1, L2:	Logic
O, O1, O2:	Output device, e.g. relay (safety function)
im:	Interconnecting means
m:	Monitoring
c:	Cross monitoring
WD:	Watchdog
OWD:	Output of WD (shut-down only, not safety function)
TMU:	Test and monitoring unit
OTMU:	Output of TMU (shut-down only, not safety function)

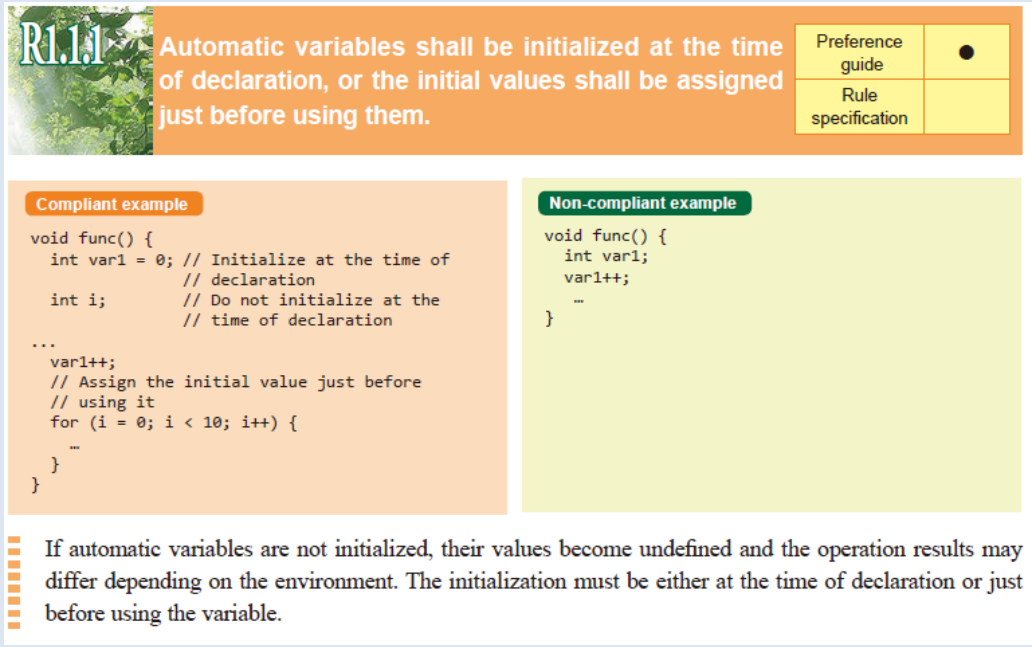


SIL	Formula
1	$PFD_{Src_{SLO}} = 0,25\lambda_D T_1 \frac{1}{2}$ $PFH_{Src_{SLO}} = 0,5\lambda_D$
2	$PFD_{Src_{SLO}} = 0,1\lambda_D T_1$ $PFH_{Src_{SLO}} = 0,2\lambda_D$
3	Sensor subsystem: $PFD_{Src_S} = 0,0027(\lambda_D T_1)^2 + 0,005\lambda_D T_1$ $PFH_{Src_S} = 0,081\lambda_D{}^2 T_1 + 0,01\lambda_D$ Logic subsystem: $PFD_{Src_{LO}} = 0,003(\lambda_D T_1)^2 + 0,0025\lambda_D T_1$ $PFH_{Src_{LO}} = 0,0903\lambda_D{}^2 T_1 + 0,005\lambda_D$ Sum: $PFD_{Src_{SLO}} = PFD_{Src_S} + PFD_{Src_{LO}}$ $PFH_{Src_{SLO}} = PFH_{Src_S} + PFH_{Src_{LO}}$

ISO 8100-2
Annex A (cookbook)

- List of practices and rules of structured programming
- Informative references to IPA/SEC ESCR 3.0

Practicies for Reliability	Practices to improve the reliability of software that has been developed. - Minimizing problems arising while using the software; - Increasing tolerability against bugs and interface violation.
Practicies for Maintainability	Practices to create source code that is easy to modify and maintain. - Making the code easy to understand and modify; - Minimizing the impact of modifications on the entire code; - Making the modified code easy to check.
Practicies for Portability	Practices to improve portability of the software program to another environment as efficiently as possible without error.
Practicies for Efficiency	Practices to effectively utilize the performance and resources of the software. - Coding that is processing time-conscious; - Coding that takes account of memory size.



Machinery Regulation impact to ISO 8100-1/2

New and changed EHSRs in MR affecting ISO 8100-1/2

MR 1.1.2 (e): Instructions for testing of safety functions

→ Table 25 listing safety functions which needs additional instructions for testing

MR 1.1.9: Identification of software to be protected against corruption

→ … Software relevant for safety functions referenced in Table 25 shall be identified …, 4.12.4

MR 1.1.9: Cybersecurity for protection against corruption

→ Reference to ISO 8102-20 in clause 4.10.1.1.5

MR 1.1.9: Capability and instructions to verify actual software revisions & parameter values

→ Requirements in 6.2.4 v)

MR 1.1.9 & MR 1.2.1 (f): Tracing log of safety software and parameters changes

→ Security related event records (audit records) related to software as per 4.12.4 shall be stored at least five years, 4.10.1.1.6