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Safety rules for the construction and installation of lifts - Part 1: Electric lifts

Règles de sécurité pour la construction et l'installation des
ascenseurs - Partie 1: Ascenseurs électriques

Sicherheitsregeln für die Konstruktion und den Einbau von
Aufzügen - Teil 1: Elektrisch betriebene Personen- und
Lastenaufzüge

This draft amendment is submitted to CEN members for unique acceptance procedure. It has been drawn up by the Technical Committee CEN/TC 10.

This draft amendment A3, if approved, will modify the European Standard EN 81-1:1998. If this draft becomes an amendment, CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for inclusion of this amendment into the relevant national standard without any alteration.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
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Foreword

This document (EN 81-1:1998/prA3:2009) has been prepared by Technical Committee CEN/TC 10 “Lifts, escalators and moving walks”, the secretariat of which is held by AFNOR.

This document is currently submitted to the Unique Acceptance Procedure.

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

For relationship with EC Directive(s), see informative Annexes ZA and ZB, which are integral parts of this document.

1 Modification to the Introduction

The following shall be added to the list of clause 0.3: "

0.3.19 The fixing system of guards, which have to be removed during maintenance and inspection, remains attached to the guard or to the equipment, when the guard is removed."

2 Modification to the Scope

The following shall be added to the list of exclusions of clause 1.3: "

g) lifts with rated speed ≤ 0.15 m/s."

3 Modification to Clause 3 Terms and definitions

The following definitions shall be added: "

stopping accuracy

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

levelling accuracy

vertical distance between car sill and landing sill during loading or unloading of the car

unintended car movement

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

4 Modification to Clause 9 Suspension, compensation and overspeed protection

The title of the clause shall be modified as follows: "

9 Suspension, compensation, overspeed protection and protection against unintended car movement".

A new 9.11 shall be added as follows: "

9.11 Protection against unintended car movement

9.11.1 Lifts shall be provided with a means to stop unintended car movement away from the landing with the landing door not in the locked position and the car door not in the closed position, as a result of failure in any single component of the lift machine or drive system upon which the safe movement of the car depends, except failure of the suspension ropes and the traction sheave of the machine.

9.11.2 The means shall detect unintended movement of the car, shall cause the car to stop, and keep it stopped.

9.11.3 The means shall be capable of performing as required without assistance from any lift component that, during normal operation, controls the speed or retardation, stops the car or keeps it stopped, unless there is built-in redundancy and correct operation is self-monitored.

In the case of using the machine brake, self-monitoring implies verification of correct lifting or dropping of the mechanism or verification of braking force. If a failure is detected, next normal start of the lift shall be prevented.

Self-monitoring is subject to type examination.

9.11.4 The stopping element of the means shall act:

- a) on the car, or
- b) on the counterweight, or
- c) on the rope system (suspension or compensating), or
- d) on the traction sheave (e.g. on the sheave directly or on the same shaft in the immediate vicinity of the sheave).

The stopping element of the means, or the means preventing the car movement may be common with those used for:

- preventing overspeed in down direction,
- preventing ascending car overspeed (9.10)

9.11.5 The means shall stop the car in a distance:

- not exceeding 1,20 m from the landing where the unintended car movement has been detected, and
- the vertical distance between the landing sill and the lowest part of the car apron shall not exceed 200 mm, and
- the free distance from car sill to landing door lintel, or from landing sill to car door lintel shall not be less than 1,00 m (see Figure 4).

These values are obtained with any load in the car, up to 100% of rated load.

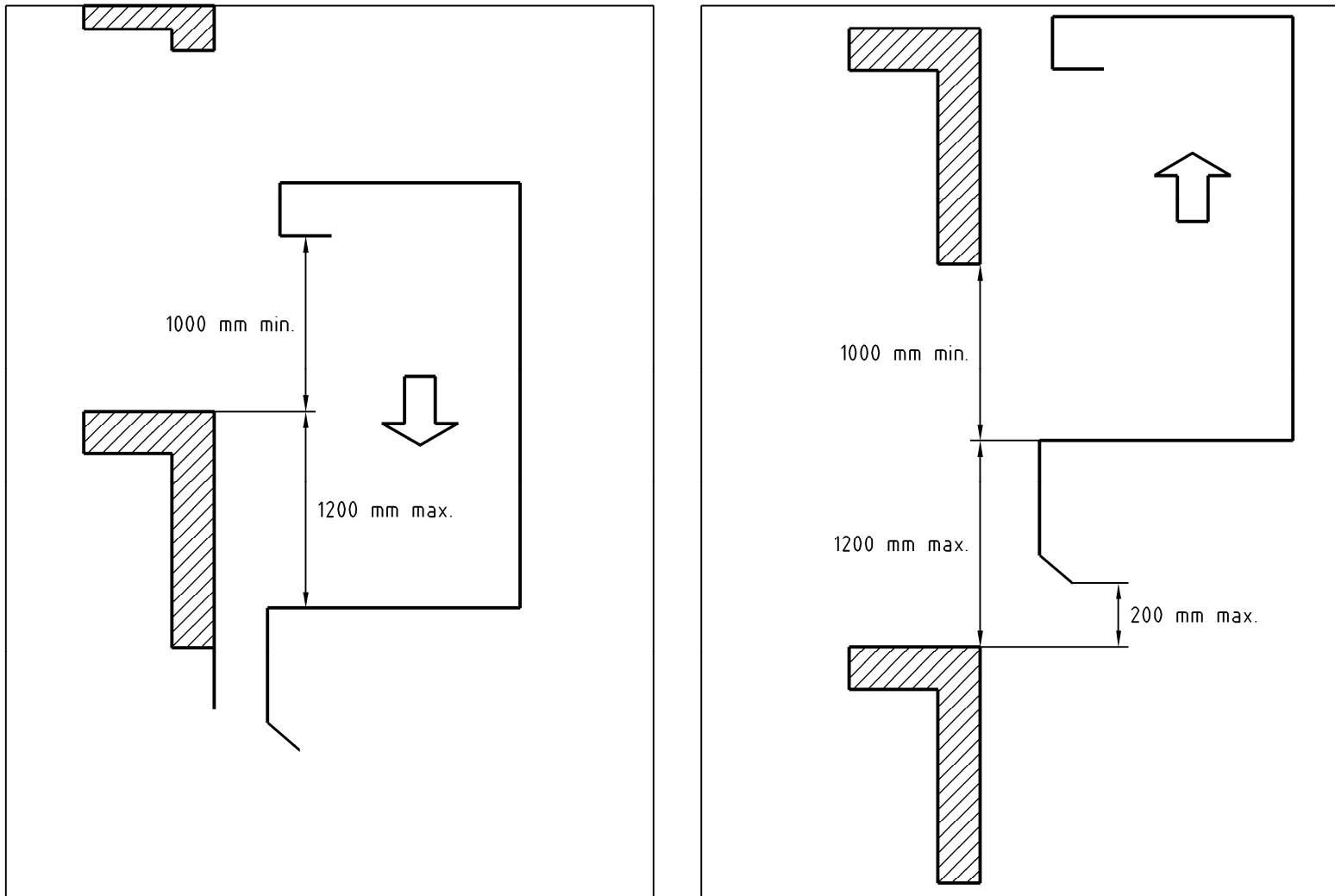


Figure 4 — Unintended car movement

9.11.6 During the stopping phase, the stopping element of the means shall not allow a retardation of the car in excess of:

- $1 g_n$ for unintended movements in up direction,
- the values accepted for safety gears in down direction.

These values are obtained with any load in the car, up to 100% of rated load.

9.11.7 The unintended movement of the car shall be detected by at least one switching device at latest when the car leaves the unlocking zone (7.7.1).

This switching device shall:

- either be a safety contact in conformity with 14.1.2.2, or
- be connected in such a way as to satisfy the requirements for safety circuits in 14.1.2.3, or
- satisfy requirements of 14.1.2.6.

9.11.8 The means shall operate an electric safety device in conformity with 14.1.2 if it is engaged.

NOTE This can be common to switching device of 9.11.7.

9.11.9 When the means has been activated or the redundancy monitoring has indicated a failure of the stopping element of the means, its release or the reset of the lift shall require the intervention of a competent person.

9.11.10 The release of the means shall not require the access to the car or the counterweight.

9.11.11 After its release, the means shall be in a condition to operate.

9.11.12 If the means requires external energy to operate, the absence of energy shall cause the lift to stop and keep it stopped. This does not apply for guided compressed springs.

9.11.13 The unintended car movement with open doors protection means is regarded as a safety component and shall be verified according to the requirements in F.8."

5 Modifications to 11.2.4

Figures 4 and 5 in 11.2.4 shall be renumbered as follows:

- "Figure 4" becomes "Figure 5";
- "Figure 5" becomes "Figure 6".

6 Modification to Clause 12 Lift machine

A new 12.12 shall be added as follows: "

12.12 Normal stopping of the car at landings and levelling accuracy

- The stopping accuracy of the car shall be ± 10 mm;
- A levelling accuracy of ± 20 mm shall be maintained. If, during e.g. loading and unloading phases, the value of 20 mm is exceeded, it shall be corrected."

7 Modification to 14.1.2.3.2.3

Figure 6 in 14.1.2.3.2.3 shall be renumbered as follows: "

- "Figure 6" becomes "Figure 7".

8 Modification to Annex A

Add the following to Table A.1 of Annex A: "

Table A.1 — List of the electric safety devices

Clause	Devices checked	
9.11.7	Detection of unintended car movement with open doors	SIL 2
9.11.8	Check the activation of the unintended car movement with open doors protection means	SIL 1

9 Modification to D.2

The following shall be added to the list of D.2.o): "

- Stopping of the car at landings and levelling accuracy (12.12)
 - the stopping accuracy of the car shall be verified to be in compliance with 12.12, at all landings, and in both directions for intermediate floors;
 - verify that the car maintains levelling accuracy as per 12.12 during loading and unloading conditions. This verification shall be made at the most unfavourable floor."

A new D.2 p) shall be added reading: "

- p) Unintended car movement protection means (9.11)

The type-examination has demonstrated the functionality of the means. The aim of the test before putting into service is to check detection, and stopping elements.

Test-requirements

Only the stopping element of the means defined in 9.11 shall be used for the tests for stopping the lift.

The test shall:

- consist of verifying that the stopping element of the means is triggered as required by type examination;
- be made by moving the empty car in up direction in the upper part of the well (e.g. from one floor from top terminal) and fully loaded car in down direction in the lower part of the well (e.g. from one floor from bottom terminal) with a 'pre-set' speed, e.g. as defined during type testing, (inspection speed etc.);

NOTE The full load test is not required if the efficiency of the stopping elements has already been verified during other suitable tests.

The test, as defined by the type-examination, shall confirm that the unintended movement distance will not exceed the value given in 9.11.5.

If the means requires self-monitoring (9.11.3), this shall be verified.

NOTE If the stopping element of the means involves elements present at landing floors, it could be necessary to repeat the test for each concerned landing."

10 Modification to Annex E

The following shall be added to the list of E.2 b): "

- the unintended car movement protection."

11 Modification to Annex F

A new F.8 shall be added reading as follows: "

F.8 Unintended car movement protection means

F.8.1 General provisions

The applicant shall state the key parameters for use of the system that shall consist of an unintended car movement detector, control circuits and stopping element(s) that shall form part of the type examination:

- minimum and maximum masses;
- minimum and maximum force or torque, if applicable;
- individual response times of detector, control circuit and stopping element(s);
- highest speed anticipated before deceleration occurs (see Note 1);
- distance from the floor at which the detector device will be installed;
- test speed(s) (see Note 2);
- limits of temperature and humidity of the design and any other relevant information agreed between the designer and test laboratory.

NOTE 1 The maximum speed attainable would normally be in the magnitude of 2m/s. This is based on the speed attained at start of deceleration e.g. being the result of a "natural" acceleration of 1.5 m/s² through the response times of the unintended car movement protection device, control circuit and stopping elements.

NOTE 2 Test speed(s): a speed stated by the manufacturer, used by the test laboratory to establish a distance moved by the lift (verification distance) so that the unintended movement system is verified for correct operation during final inspection at site. This could be the inspection speed or any other speed determined by the manufacturer and agreed by the laboratory.

Distance the car is permitted to move during unintended movement as defined in clause 9.11.5 is shown in Figure F.2.

The following documents are to be attached to the applications:

- a) detailed and assembly drawings showing the construction, operation, the dimensions and tolerances of the components;
- b) if necessary, also a load diagram relating to elastic parts;
- c) detailed information of the materials used, the type of part on which the means acts, and its surface condition, if relevant (drawn, milled, ground, etc.).

F.8.2 Statement and test sample

F.8.2.1 The applicant shall state for what duty the means is intended.

F.8.2.2 Test sample as agreed between applicant and the laboratory:

- As appropriate, a complete assembly consisting of, unintended car movement detection device, control circuit (actuator), stopping elements and any monitoring device(s) if applicable.
- The number of sets of gripping elements necessary for all the tests shall be attached.
- The type of part on which the device acts, shall also be supplied with the dimensions specified by the laboratory.

F.8.3 Test

F.8.3.1 Method of Test

The method of test shall be defined between applicant and test laboratory, depending on the device and its function to achieve a realistic operation of the system.

Measurements shall be made of:

- the stopping distance;
- the average retardation;
- the response time of the control circuits (see Figure F.2, item 1);
- the response time of the braking element (see Figure F.2, item 2);
- the total distance travelled (sum of acceleration and stopping distances).

Test shall also include:

- operation of the unintended car movement detection device and
- any automatic monitoring system, if applicable.

F.8.3.2 Test procedure

20 tests shall be made on the stopping element with:

- no result outside the specification,
- each result within $\pm 20\%$ of the average value.

Average value to be stated on the certificate.

F.8.3.2.1 Device certified for a single mass or torque

The laboratory shall carry out ten tests with the system mass or torque representing an empty car in up direction and ten tests with the system mass or torque representing a car carrying the rated load in down direction.

Between each test the friction parts shall be allowed to return to their normal temperature.

During the tests several identical sets of friction parts may be used. However, one set of parts shall be capable of 5 tests minimum.

F.8.3.2.2 Device certified for different masses or torques

A series of tests shall be carried out for the maximum value applied for and a series for the minimum value. The applicant shall supply a formula or a chart, showing the calculated variation of the braking force or torque as a function of a given adjustment. The results being expressed in distance travelled.

The laboratory shall verify the validity of the formula or chart.

F.8.3.2.3 Test procedure for unintended movement detection means

10 tests shall be made to verify the operation of the device.

F.8.3.2.4 Test procedure for redundancy monitoring

10 tests shall be made to verify the operation of the device.

F.8.3.3 Checks after the test

After the test:

- a) the mechanical characteristics of the stopping element(s) shall be compared with the original values quoted by the applicant. Other analyses may be carried out in special cases;
- b) if there is no fracture or deformations and any other changes shall be examined (for example, cracks, deformations or wear of the gripping elements, appearance of the rubbing surfaces);
- c) if necessary, photographs shall be taken of the gripping elements and the parts on which the device acts for evidence of deformations or fractures.

F.8.4 Possible modification to the adjustments

If, during the tests, the values found differ by more than 20% from those expected by the applicant, another series of tests may be made with his agreement, after modification of the adjustments if necessary.

F.8.5 Test report

In order to achieve reproducibility, the type examination shall be recorded in all details, such as:

- the method of test defined between applicant and laboratory;
- the description of the testing arrangement;
- location of the device to be used when installed in the testing arrangement;
- number of tests carried out;
- record of all measured values;
- report of observations during the test;
- evaluation of the test results to show compliance with the requirements.

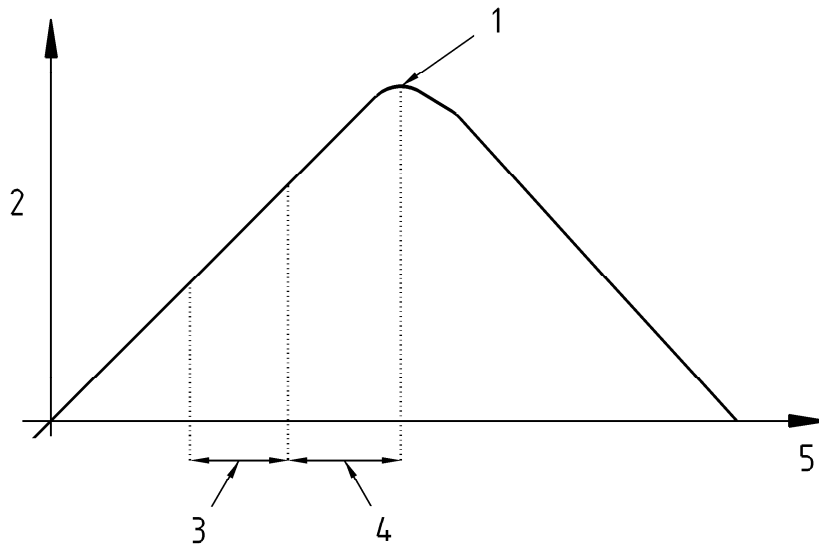
F.8.6 Type examination certificate

F.8.6.1 The certificate shall be drawn up in triplicate, i.e. two copies for the applicant and one copy for the laboratory.

F.8.6.2 The certificate shall indicate:

- a) information according to F.0.2

- b) type and application of the unintended car movement protection system;
- c) the limits of the key parameters (as agreed between laboratory and manufacturer);
- d) the test-speed with relevant parameters for Final Inspection use;
- e) the type of parts on which the stopping elements act;
- f) the combination of "detecting" device and "stopping" element of the means.



Key

- 1 Point at which braking elements start to cause a reduction in speed
- 2 Speed
- 3 Response time of Uncontrolled Car Movement Detection and any control circuits
- 4 Response time of braking elements
- 5 Time

NOTE Unintended car movement zone should be 1,2 m maximum

Figure F 2 — Response time"

12 Modification to Annex ZA

Replace the existing Annex ZA with the following:

"

Annex ZA (informative)

Relationship between this European Standard and the Essential Requirements of EC Directive 95/16/EC

This European Standard has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association to provide a means of conforming to Essential Requirements of the New Approach Directive 95/16/EC.

Once this standard is cited in the Official Journal of the European Communities under that Directive and has been implemented as a national standard in at least one Member State, compliance with the normative clauses of this standard confers, within the limits of the scope of this standard, a presumption of conformity with the relevant Essential Requirements of that Directive and associated EFTA regulations.

WARNING — Other requirements and other EC Directives may be applicable to the product(s) falling within the scope of this standard.

NOTE 1 Regarding 6.2, 6.3, 6.5 and 6.7 see clause 0.2.2 of this standard.

NOTE 2 Note of 5.2.1.2 implies that the installation of lifts with partially enclosed wells may be subject to the authorization of national authorities."

13 Addition of Annex ZB

Add the following Annex ZB:

"

Annex ZB
(informative)

Relationship between this European Standard and the Essential Requirements of EC Directive 95/16/EC amended by Directive 2006/42/EC

This European Standard has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association to provide a means of conforming to Essential Requirements of the New Approach Directive 95/16/EC amended by Directive 2006/42/EC.

Once this standard is cited in the Official Journal of the European Communities under that Directive and has been implemented as a national standard in at least one Member State, compliance with the normative clauses of this standard confers, within the limits of the scope of this standard, a presumption of conformity with the relevant Essential Requirements of that Directive and associated EFTA regulations.

WARNING — Other requirements and other EC Directives may be applicable to the product(s) falling within the scope of this standard.

NOTE 1 Regarding 6.2, 6.3, 6.5 and 6.7 see clause 0.2.2 of this standard.

NOTE 2 Note of 5.2.1.2 implies that the installation of lifts with partially enclosed wells may be subject to the authorization of national authorities."