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STANDARD

**MS 158-1:2008**  
(EN 81-1:1998)

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**Safety rules for the construction  
and installation of lifts –**

**Part 1: Electric lifts**

ICS 91.140.90



MUR 2 600



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## National foreword

This Mauritian Standard was drawn by the **Mechanical Engineering Standards Committee (MESC)** through its **Subcommittee on Lifts** and approved by the Standards Council on 29 August 2008. It was notified in the Government Gazette on 15 November 2008\*.

This Mauritian Standard is identical with **EN 81-1:1998**, including amendments A1:2005 and A2:2004 and corrigendum No.1:1999, *Safety rules for the construction and installation of lifts – Part 1: Electric lifts* and is reproduced with the permission of CEN, Rue de Stassart 36, B-1050 Brussels.

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The start and finish of text introduced or altered by the amendment is indicated in the text by tags which carry the number of the amendment, A1 or A2. The list of changes brought by the corrigendum is provided in National Annex NA.

For the purposes of this standard the following changes should be made:

- Throughout the text of this standard, read “...this European Standard ...” to mean “...this Mauritian Standard...”.
- The ‘decimal comma’ should be replaced by the ‘decimal point’

\* General Notice No. 2100 of 2008

## Foreword

This European Standard has been prepared by Technical Committee CEN/TC 10 Passenger, goods and service lifts, the secretariat of which is held by AFNOR

This European Standard replaces EN 81-1:1985.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by February 1999, and conflicting national standards shall be withdrawn at the latest by February 1999.

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

For relationship with EU Directive(s), see informative annex ZA, which is an integral part of this standard.

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

This is the third edition of the standard. It is an amendment of the edition 1985 and shall be given the status of a harmonised standard. The amendment is mainly based on the following points :

- elimination of national deviations;
- incorporation of essential health and safety requirements from the relevant EU Directives;
- elimination of obvious errors;
- incorporation of proposals resulting from interpretation requests dealing with the improvement relative to the progress in technology;
- improvement of the references to other standards according to the progress in that field.

After the CEN Enquiry on prEN81-1:1994 the EU Directive on Lifts (95/16/EC) was adopted. The requirements resulting from the essential health and safety requirements of this Directive being not taken into consideration in the draft have been summarized in the Addendum prA1:1996 to prEN81-1:1994 and submitted to the members of CEN/TC 10 for approval. Having received the approval this Addendum has been incorporated into this standard taking into account the comments received from TC members.

This standard does not correspond in all points to the present internal rules of CEN regarding the format of safety standards. However, the format of this standard has been accepted by the interested parties and is therefore regarded as the better way of implementation of the essential health and safety requirements than a formalistic re-draft. This is mainly because of the coming into force of the EU Directive 95/16/EC on 1 July 1997.

With the next revision of the standard, being already intended, these shortcomings will be removed.

## Foreword to amendment A1

This European Standard (EN 81-1:1998/A1:2005) has been prepared by Technical Committee CEN/TC 10 “Lifts, escalators and moving walks”, the secretariat of which is held by AFNOR.

This Amendment to the European Standard EN 81-1:1998 shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by May 2006, and conflicting national standards shall be withdrawn at the latest by May 2006.

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

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

The 1998 edition of EN 81-1, under 14.1.2.1.1 b) 3) and Annex H foresees the use of electronic components in safety circuits thus giving hardware provisions. This amendment extends their use to permit the inclusion of software (programmable electronic systems — PESSRAL).

This amendment A1 covers those aspects that need to be addressed when programmable electronic systems (PESSRAL) are used to carry out electric safety functions for lifts within the scope of EN 81-1:1998 and EN 81-1:1998/A2:2004.

This amendment A1 covers the necessary additional precautions by replacing the relevant existing text of EN 81-1:1998 or adding new clauses as indicated.

NOTE Drafting and presentation of the amended text has been arranged to comply with the presentation of EN 81-1:1998.

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

## Foreword to amendment A2

This document (EN 81-1:1998/A2:2004) has been prepared by Technical Committee CEN/TC 10 “Lifts, escalators and moving walks”, the secretariat of which is held by AFNOR.

This Amendment to the European Standard EN 81-1:1998 shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by April 2005, and conflicting national standards shall be withdrawn at the latest by April 2005.

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 EU Directive(s).

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

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

EN 81-1:1998 requires special machine and pulley rooms. Modern technology shows that machines and associated parts can be located in the well, on the car or counterweight or in cabinets. To ensure the safety of normal operation, maintenance and inspection provisions are necessary which are not yet described in this standard.

This amendment covers the necessary additional precautions by replacing the relevant existing text of EN 81-1:1998 or adding new clauses as indicated.

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## 0 Introduction

### 0.1 General

**0.1.1** The object of this standard is to define safety rules related to passenger- and goods/passenger-lifts with a view to safeguarding persons and objects against the risk of accidents associated with the user, maintenance and emergency operation of lifts.<sup>1)</sup>

**0.1.2** A study has been made of the various aspects of incidents possible with lifts in the following areas:

**0.1.2.1** Risks possible due to:

- a) shearing;
- b) crushing;
- c) falling;
- d) impact;
- e) trapping;
- f) fire;
- g) electric shock;
- h) failure of material due to:
  - 1) mechanical damage;
  - 2) wear;
  - 3) corrosion.

**0.1.2.2** Persons to be safeguarded:

- a) users;
- b) maintenance and inspection personnel;
- c) persons outside the lift well, the machine room and pulley room (if any).

**0.1.2.3** Objects to be safeguarded:

- a) loads in car;
- b) components of the lift installation;
- c) building in which the lift is installed.

### 0.2 Principles

In drawing up this standard the following have been used.

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

It has, however, seemed necessary to establish certain requirements of good construction, either because they are peculiar to lift manufacture or because in the case of lift utilization the requirements may be more stringent than elsewhere.

**0.2.2** This standard does not only address the essential safety requirements of the Lift Directive, but additionally states minimum rules for the installation of lifts into buildings/constructions. There may be in some countries regulations for the construction of buildings etc. which cannot be ignored.

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

<sup>1)</sup> Within CEN/TC 10 an interpretation committee has been established to answer questions about the spirit in which the experts have drafted the various clauses of this standard. The issued interpretations are available from national standards bodies.

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

- a) either fitted with attachments for lifting gear; or
- b) designed so that they can be fitted with such attachments (e.g. by means of threaded holes); or
- c) shaped in such a way that standard lifting gear can easily be attached.

**0.2.4** As far as possible the standard sets out only the requirements that materials and equipment have to meet in the interests of safe operation of lifts.

**0.2.5** Negotiations have been made between the customer and the supplier about:

- a) the intended use of the lift;
- b) environmental conditions;
- c) civil engineering problems;
- d) other aspects related to the place of installation.

**0.2.6** Risk analysis, terminology and technical solutions have been considered taking into account the methods of the EN 61508 series of standards. This led to a necessary classification of safety functions applied to PESSRAL. **A1**

### **0.3 Assumptions**

Possible risks have been considered of each component that may be incorporated in a complete lift installation.

Rules have been drawn up accordingly.

**0.3.1** Components are:

- a) designed in accordance with usual engineering practice and calculation codes, taking into account all failure modes;
- b) of sound mechanical and electrical construction;
- c) made of materials with adequate strength and of suitable quality;
- d) free of defects.

Harmful materials, such as asbestos, are not used.

**0.3.2** Components are kept in good repair and working order, so that the required dimensions remain fulfilled despite wear.

**0.3.3** Components will be selected and installed so that foreseeable environmental influences and special working conditions do not affect the safe operation of the lift.

**0.3.4** By design of the load bearing elements, a safe operation of the lift is assured for loads ranging from 0 % to 100 % of the rated load.

**0.3.5** The requirements of this European Standard regarding electrical safety devices are such that the possibility of a failure of an electric safety device [see 14.1.2.1.1b)] complying with all the requirements of this European Standard need not to be taken into consideration. **A1**

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

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

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

**0.3.9** For horizontal forces, the following have been used:

- a) static force: 300 N;
- b) force resulting from impact: 1 000 N;

reflecting the values that one person can exert.

**0.3.10** With the exception of the items listed below, a mechanical device built according to good practice and the requirements of the standard will not deteriorate to a point of creating hazard without the possibility of detection.

The following mechanical failures are considered:

- a) breakage of the suspension;
- b) uncontrolled slipping of the ropes on the traction sheave;
- c) breakage and slackening of all linkage by auxiliary ropes, chains and belts;
- d) failure of one of the mechanical components of the electromechanical brake which take part in the application of the braking action on the drum or disk;
- e) failure of a component associated with the main drive elements and the traction sheave.

**0.3.11** The possibility of the safety gear not setting, should the car free fall from the lowest landing, before the car strikes the buffer(s) is considered acceptable.

**0.3.12** When the speed of the car is linked to the electrical frequency of the mains up to the moment of application of the mechanical brake, the speed is assumed not to exceed 115 % of the rated speed or a corresponding fractional speed.

**0.3.13** The organization within the building, where the lift is installed, is such that it can respond effectively to emergency calls without undue delay (see **0.2.5**).

**0.3.14** Means of access are provided for the hoisting of heavy equipment (see **0.2.5**).

**A<sub>2</sub>** **0.3.15** To ensure the correct functioning of the equipment in the machinery spaces, i.e. taking into account the heat dissipated by the equipment, the ambient temperature in the machinery spaces is assumed to be maintained between +5 °C and +40 °C.

**0.3.16** Access ways to the waiting areas are adequately lit (see **0.2.5**).

**0.3.17** Minimum passageways required by building regulations are not obstructed by the open door/trap of the lift and/or any protection means for working areas outside of the well, where fitted according to the maintenance instructions (see **0.2.5**).

**0.3.18** Where more than one person is working at the same time on a lift, an adequate means of communication between these persons is ensured. **A<sub>2</sub>**

## 1 Scope

**1.1** This standard specifies the safety rules for the construction and installation of permanently installed new electric lifts, with traction or positive drive, serving defined landing levels, having a car designed for the transportation of persons or persons and goods, suspended by ropes or chains and moving between guide rails inclined not more than 15° to the vertical.

**1.2** In addition to the requirements of this Standard supplementary requirements shall be considered in special cases (potentially explosive atmosphere, extreme climate conditions, seismic conditions, transporting dangerous goods, etc.).