NAMS 1545-6: 2022

Edition 1.3

SANS 1545-6: 2015

NAMIBIAN STANDARD

Safety rules for the construction and installation of lifts

Part 6: Rack-and-pinion lifts

This Namibian standard is the identical implementation of SANS 1545-6:2015 and is adopted with the permission of the South African Bureau of Standards

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NAMIBIAN STANDARDS INSTITUTION

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National foreword

This Namibian Standard (NAMS) is identical to South African Standard SANS 1545-6:2015 Safety rules for the construction and installation of lifts, Part 6: Rack-on-pinion Lifts, and was approved for adoptions by the Namibian Standards Institution CEO.

Namibian standards are developed based on NSI Standards development procedures in accordance with the rules given in the International Organisation for Standardisation/ International Electrotechnical Commission (ISO/IEC) Directives 1, ISO/IEC Guide 21-1 Adoption of international standards as regional or national standards and WTO – TBT World Trade Organisation code of Good Practice (which is published as Annex 3 in the TBT Agreement)

The NSI Management Technical Committee responsible for the standard is NSI TC 8/SC 1, Lifts and Escalators.

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SOUTH AFRICAN NATIONAL STANDARD

Safety rules for the construction and installation of lifts

Part 6: Rack-and-pinion lifts

WARNING
This document references other documents normatively.

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Table of changes

Change No.	Date	Scope
Amdt 1	2006	Amended to update referenced standards, to delete reference to South African legislation in the body of the text, and to modify an annex on comprehensive report for rack-and-pinion lifts (annex O).
Amdt 2	2014	Amended to update the list of parts in the foreword, and to modify the minimum safety factor against the endurance limit for tooth strength and for pitting and shear.
Amdt 3	2015	Amended to the update the annex on comprehensive report for rack-and-pinion lifts (annex O).

Foreword

This South African standard was approved by National Committee SABS/TC 1082, *Lifts, escalators and passenger conveyors*, in accordance with procedures of the SABS Standards Division, in compliance with annex 3 of the WTO/TBT agreement.

This document was approved for publication in March 2015.

This document supersedes SANS 1545-6:2014 (edition 1.2).

A vertical line in the margin shows where the text has been technically modified by amendment No. 3.

This document is referenced in the Occupational Health and Safety Act, 1993 (Act No. 85 of 1993).

A reference is made in item 12.4 of table N.1 to the "relevant national legislation". In South Africa, this means the Mine Health and Safety Act, 1996 (Act No. 29 of 1996) and its Regulations. **Amdt 1**

SANS 1545 consists of the following parts, under the general title *Safety rules for the construction and installation of lifts*:

Part 1: Electric lifts.

Part 2: Hydraulic lifts.

Part 3: Lifts for persons with disabilities (stairlifting platforms). **Amdt 1**

Part 4: Lifts for persons with disabilities (vertical lifting platforms). **Amdt 1**

Part 5: Electric and hydraulic access, goods only lifts.

Part 6: Rack-and-pinion lifts.

Part 7: Electric and hydraulic service lifts (dumb waiters). **Amdt 2**

Part 8: To be allocated.

Part 9: Lift landing doors – Fire resistance testing.

Foreword *(concluded)*

Annexes A, B, D, F, H, I, J, L, N, O, P and Q form an integral part of this document. Annexes C, E, G, K, M and R are for information only.

0 Introduction

0.1 General

0.1.1 The object of this part of SANS 1545 is to define safety rules related to rack-and-pinion passenger, goods and goods/passenger lifts with a view to safeguarding persons and objects against the risk of accidents associated with the user, and to maintenance and emergency operations of lifts.

0.1.2 A study has been made of various possible dangerous situations with lifts in the events of

a) shearing,

b) crushing,

c) falling,

d) impact,

e) trapping,

f) fire,

g) electric shock, and

h) failure of material due to

1) mechanical damage,

2) wear, and

3) corrosion.

0.1.3 Persons to be safeguarded are

a) users (passengers),

b) maintenance and inspection personnel, and

c) persons outside the lift well, the machine room and the pulley room (if any).

0.1.4 Objects to be safeguarded are

a) loads in the car,

b) components of the lift installation, and

c) the location in which, or adjacent to which, the lift is installed.

Introduction *(continued)*

0.2 Principles

0.2.1 This part of SANS 1545 does not repeat all the general technical rules applicable to every electrical, mechanical, or building construction including the protection of building environmental elements against fire. It is deemed necessary to establish certain requirements for good construction, because they are specific to lift manufacture and because in the case of lift utilization, the requirements can be more stringent than elsewhere.

0.2.2 This part of SANS 1545 does not only address the essential safety requirements of the lift directive, but additionally states minimum rules for the installation of lifts into mine shafts, buildings and structures. There might be regulations in some countries for the construction of buildings etc., which cannot be ignored. Typical clauses in this respect are those that define minimum values for the height of the machinery space and the pulley rooms and dimensions for their access doors.

0.2.3 When the weight, size or shape (or a combination of these) of components prevent them from being moved by hand, they are

a) fitted with attachments for lifting gear, or

b) so designed that they can be fitted with such attachments (for example, using threaded holes), or

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

0.2.4 This part of SANS 1545 sets out only the requirements that materials and equipment have to comply with in the interests of the safe operation of lifts.

0.2.5 Negotiations have taken place between the customer and the supplier about

a) the intended use of the lift,

b) environmental conditions,

c) civil engineering problems, and

d) other aspects related to the place of installation.

0.3 Rules

0.3.1 Components are

a) designed in accordance with usual engineering practice and calculation codes, considering all failure modes,

b) of sound mechanical and electrical construction,

c) made of materials of adequate strength and suitable quality, and

d) free from defects.

0.3.2 Harmful materials such as asbestos should not be used.

0.3.3 Light metals as specified in SANS 10012 should not be used in a hazardous location.

Introduction *(continued)*

0.3.4 Components will be kept in good repair and working order, so that the required dimensions remain consistent despite wear.

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

0.3.6 By designing the load-bearing elements, a safe operation of the lift is assured for loads ranging from 0 % to 115 % of the rated load.

0.3.7 The requirements of this part of SANS 1545 regarding electrical safety devices are such that the possibility of failure of an electric safety device that complies with all the requirements of the standard need not be taken into consideration.

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

0.3.9 A user might, in certain cases, make one imprudent act. The possibility of two simultaneous acts of imprudence or the abuse (or both) of instructions for use is not considered in this part of SANS 1545.

0.3.10 A risk assessment should be performed on the equipment, which would address acts of imprudence.

0.3.11 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 the safety of users in conformity with maintenance instructions. It is assumed that maintenance personnel are instructed and that they work according to the instructions.

0.3.12 In the case of horizontal forces, the following have been used:

a) a static force of 300 N; and

b) a force that results from an impact of 1 000 N, reflecting the values that one person can exert.

0.3.13 With the exception of the items listed below, a mechanical device built according to good practice and the requirements of this part of SANS 1545 will not deteriorate to a state where a hazardous condition can be created without the possibility of it being detected. The following mechanical failures are considered:

a) breakage and slackening of all linkage by auxiliary ropes;

b) failure of one of the mechanical components of the electromechanical brake used in the application of the braking action on the drum or disk; and

c) failure of a component associated with the main drive elements and the pinion gear.

0.3.14 The possibility of the car free falling from the lowest landing and the safety gear not setting before the car strikes the buffer(s), is considered to be acceptable.

0.3.15 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.

Introduction *(concluded)*

0.3.16 The lift should be installed in such a way that the user in the building can respond effectively to emergency calls without undue delay (see 0.2.5).

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

0.3.18 To ensure the correct functioning of the equipment in the machinery space i.e. taking into account the heat dissipated by the equipment, the ambient temperature in the machinery space (or lift shaft) is assumed to be maintained between +5 °C and +35 °C.

0.3.19 Rack-and-pinion lifts normally have the machinery located on the car. For technical reasons these lifts therefore are provided with a machinery space instead of a machine room. Rack-and-pinion lifts may use balance weights. References in SANS 50081-1 to "counterweight(s)" should, as far as this part of SANS 1545 is concerned, be understood to imply a balance weight. The safety gear and the overspeed governor are normally contained within the same unit on rack-and-pinion lifts. They are treated as one unit for type examination purposes.

0.4 Essential requirements and directives

Essential requirements and directives applicable to South Africa are given in annex R of this part of SANS 1545.

0.5 Deleted by amendment No. 1.

Contents

Contents *(concluded)*