



SLOVENSKI STANDARD

SIST EN 280:2002

01-maj-2002

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Mobile elevating work platforms - Design calculations - Stability criteria - Construction -
Safety - Examinations and tests

Fahrbare Hubarbeitsbühnen - Berechnung - Standsicherheit - Bau - Sicherheit -
Prüfungen

Plates-formes élévatrices mobiles de personnel - Calculs de conception - Critere de
stabilité - Construction - Sécurité - Examen et essais

Ta slovenski standard je istoveten z: EN 280:2001

ICS:

53.020.99 Druga dvigalna oprema Other lifting equipment

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ICS 53.020.99

English version

Mobile elevating work platforms - Design calculations - Stability criteria - Construction - Safety - Examinations and tests

Plates-formes élévatrices mobiles de personnel - Calculs de conception - Critère de stabilité - Construction - Sécurité - Examen et essais

Fahrbare Hubarbeitsbühnen - Berechnung - Standsicherheit - Bau - Sicherheit - Prüfungen

This European Standard was approved by CEN on 15 June 2001.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Management Centre or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

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Foreword

This European Standard has been prepared by Technical Committee CEN/TC 98 "Lifting platforms", the secretariat of which is held by DIN.

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 January 2002, and conflicting national standards shall be withdrawn at the latest by January 2002.

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.

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0 Introduction

The object of this European Standard is to define rules for safeguarding persons and objects against the risk of accidents associated with the operation of Mobile Elevating Work Platforms (MEWPs).

- This European Standard does not repeat all the general technical rules applicable to every electrical, mechanical or structural component.
- The safety requirements of this European Standard have been drawn up on the basis that MEWPs are periodically maintained according to manufacturers' instructions, working conditions, frequency of use and national regulations.

It is also assumed that MEWPs are checked for function daily before start of work and are not put into operation unless all required control- and safety-devices are available and in working order.

If a MEWP is seldom used, the checks may be made before start of work.

Furthermore it is assumed that persons on the work platform in case of power supply failure are not incapacitated and can assist in the operation of the overriding emergency device.

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- As far as possible this European Standard sets out only the requirements that materials and equipment have to meet in the interest of safety, and it is assumed that persons operating MEWPs are adequately trained.

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- Where for clarity an example of a safety measure is given in the text, this shall not be considered as the only possible solution. Any other solution leading to the same risk reduction is permissible if an equivalent level of safety is achieved.

- As no satisfactory explanation could be found for the dynamic factors used for stability calculations in previous national standards, the results of the tests carried out by the former CEN/TC98/WG1 to determine a suitable factor and stability calculation method for MEWPs have been adopted. The test method is described in annex B (informative) as a guide for manufacturers wishing to use higher or lower operating speeds and to take advantage of developments in control systems.

Similarly, to avoid the unexplained inconsistencies in coefficients of utilisation for wire ropes found in other standards for lifting devices, appropriate extracts of the widely accepted standard DIN 15020 have been taken into 5.4.2 and annex C (normative) with a worked example in annex D (informative).

1 Scope

1.1 This European Standard specifies technical safety requirements and measures for all types and sizes of Mobile Elevating Work Platform (MEWP) intended to move persons to working positions where they are carrying out work from the work platform (WP) with the intention that persons are getting on and off the work platform at one defined access position.

1.2 This European Standard is applicable to the structural design calculations and stability criteria, construction, safety examinations and tests before MEWPs are first put into service. It identifies the hazards arising from the use of MEWPs and describes methods for the elimination or reduction of these hazards.

It does not cover the hazards arising from:

- a) operation by radio and other wire-less controls;
- b) use in potentially explosive atmospheres;
- c) electromagnetic incompatibility;
- d) work on live electric systems;
- e) use of compressed gases for load bearing components;
- f) getting on and off the work platform at changing levels.

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1.3 This European standard does not apply to:

- a) permanently installed personnel lifting appliances serving defined levels (see e.g. EN 81-1:1998 and EN 81-2:1998);
- b) fire-fighting and fire rescue appliances (see e.g. prEN 1777:1994);
- c) unguided work cages suspended from lifting appliances (see e.g. EN 1808:1999);
- d) elevating operator position on rail dependent storage and retrieval equipment (see EN 528:1996);
- e) tail lifts (see prEN 1756-1:1994 and prEN 1756-2:1997);
- f) mast climbing work platforms (see EN 1495:1997);
- g) fairground equipment;
- h) lifting tables with a lifting height of less than 2 m (see EN 1570:1998);
- i) builders hoists for persons and materials (see prEN 12159:1995);
- j) aircraft ground support equipment (see e.g. prEN 1915-1 and 2:1995);
- k) elevating operator positions on industrial trucks (see prEN 1726-2:1999).

1.4 Classification

MEWPs are divided into two main groups:

Group A: MEWPs where the vertical projection of the centre of gravity of the load is always inside the tipping lines.

Group B: MEWPs where the vertical projection of the centre of gravity of the load may be outside the tipping lines.

Relating to travelling, MEWPs are divided into three types:

- type 1 Travelling is only allowed with the MEWP in its transport position;
- type 2 Travelling with raised work platform is controlled from a point of control at the chassis;
- type 3 Travelling with raised work platform is controlled from a point of control at the work platform.

NOTE: The types 2 and 3 can be combined

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1.5 This standard applies to machines which are manufactured 12 months after publication of this standard.

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2 Normative references

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies (including amendments).

| | |
|---------------------------|---|
| EN 292-1:1991 | <i>Safety of machinery - Basic concepts, general principles for design - Part 1: Basic terminology, methodology</i> |
| EN 292-2:1991 | <i>Safety of machinery - Basic concepts, general principles for design - Part 2: Technical principles and specifications</i> |
| EN 292-2:1991 /A1:1995 | <i>Safety of machinery - Basic concepts, general principles for design - Part 2: Technical principles and specifications</i> |
| EN 349 | <i>Safety of machinery - Minimum gaps to avoid crushing of parts of the human body</i> |
| EN 418 | <i>Safety of machinery - Emergency stop equipment, functional aspects - Principles for design</i> |
| EN 1070:1998 | <i>Safety of machinery - Terminology</i> |
| EN 60204-1:1997 | <i>Safety of machinery - Electrical equipment of machines - Part 1: General requirements (IEC 60204-1:1997)</i> |
| EN 60529:1991 | <i>Degrees of protection provided by enclosures (IP code) (IEC 60529:1989)</i> |
| EN 60947-5-1:1997 | <i>Low-voltage switchgear and controlgear - Part 5-1: Control circuit devices and switching elements - Electromechanical control circuit devices (IEC 60947-5-1:1997)</i> |
| ISO 3864: 1984 | <i>Safety colours and safety signs</i> |
| ISO 4302 | <i>Cranes - Wind load assessment</i> |
| ISO 4305 | <i>Mobile cranes - Determination of stability</i> |
| ISO 4309 | <i>Cranes - Wire ropes - Code of practice for examination and discard</i> |

NOTE: Only documents which had reached the status of a standard at the end of January 2000 have been considered.

3 Terms and definitions

For the purposes of this European Standard, the terms and definitions of EN 1070:1998 and the following apply:

3.1

mobile elevating work platform (MEWP)

mobile machine that is intended to move persons to working positions where they are carrying out work from the work platform with the intention that persons are getting on and off the work platform at one defined access position and which consists as a minimum of a work platform with controls, an extending structure and a chassis. In this standard the abbreviation MEWP is used for mobile elevating work platform

3.2

work platform (see Figure 1)

fenced platform or a cage which can be moved under load to the required working position and from which erection, repair, inspection or similar work can be carried out

3.3

extending structure (see Figure 1)

structure which is connected to the chassis and supports the work platform. It allows movement of the work platform to its required position. It may, for example, be a single or a telescoping or a articulating boom or ladder, or a scissors mechanism or any combination of them, and may or may not slew on the base

3.4

chassis (see Figure 1)

base of the MEWP. It may be pulled, pushed, self propelled, etc.

3.5

stabilisers (see Figure 1)

all devices and systems used to stabilise MEWPs by supporting and/or levelling the complete MEWP or the extending structure, e.g. jacks, suspension locking devices, extending axles

3.6

access position¹⁾

position to provide access to the work platform

3.7

transport position¹⁾

position of the work platform prescribed by the manufacturer in which the MEWP is brought to the place of use

3.8

lowering (see Figure 2)

all operations to move the work platform to a lower level

3.9

¹⁾Access position and transport position can be identical

raising (see Figure 2)
all operations to move the work platform to a higher level

3.10

rotating (see Figure 2)
circular movement of the work platform about a vertical axis

3.11

slewing (see Figure 2)
circular movement of the extending structure about a vertical axis

3.12

travelling (see Figure 2)
all movements of the chassis with work platform out of transport position

3.13

vehicle mounted MEWP
MEWP that has travelling controls located within the cab of the vehicle

3.14

pedestrian controlled MEWP
MEWP that has the controls for powered transport located so that they are capable of being operated by a person walking close to the MEWP.

3.15

self propelled MEWP
MEWP that has the travelling controls located at the work platform

3.16

rated load
load for which the MEWP has been designed for normal operation. The rated load is composed of persons, tools and material acting vertically on the work platform

NOTE: A MEWP can have more than one rated load

3.17

load cycle
cycle starting from the access position, carrying out work and returning to the access position

3.18

wire rope drive system
system that comprises one or more wire rope(s) running on rope drums and on or over rope pulleys as well as any associated rope drums, rope pulleys and compensating pulleys

3.19

chain drive system
system that comprises one or more chain(s) running on chain sprockets and on or over chain pulleys as well as any associated chain sprockets, chain pulleys and compensating pulleys

3.20

type test

test on the representative model of a new design or one incorporating significant changes to an existing design, carried out by or on behalf of the manufacturer or his authorised representative

3.21

totally manually operated MEWP

MEWP with movement powered only by manual effort

3.22

rail mounted MEWP

MEWP where travelling is guided by rails

3.23

load sensing system

system of monitoring the vertical load and vertical forces on the work platform

NOTE : The system includes the measuring device(s), the method of mounting the measuring devices and the signal processing system.

3.24

moment sensing system

system of monitoring the moment acting about the tipping line tending to overturn the MEWP

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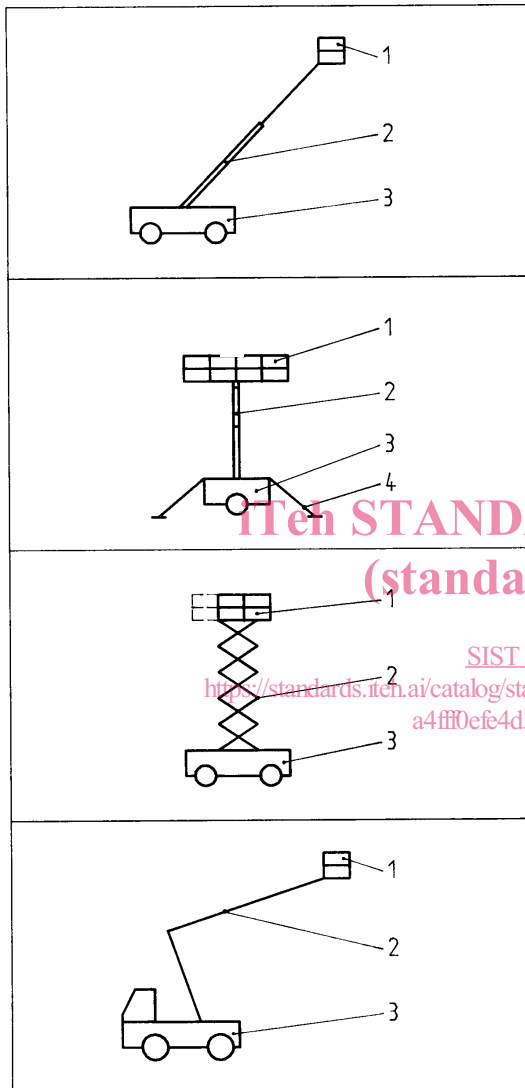
NOTE : The system includes the measuring device(s), the method of mounting the measuring devices and the signal processing system.

3.25

working envelope

space in which the work platform is designed to work within the specified loads and forces under normal operating conditions

NOTE: MEWPS can have more than one working envelope.

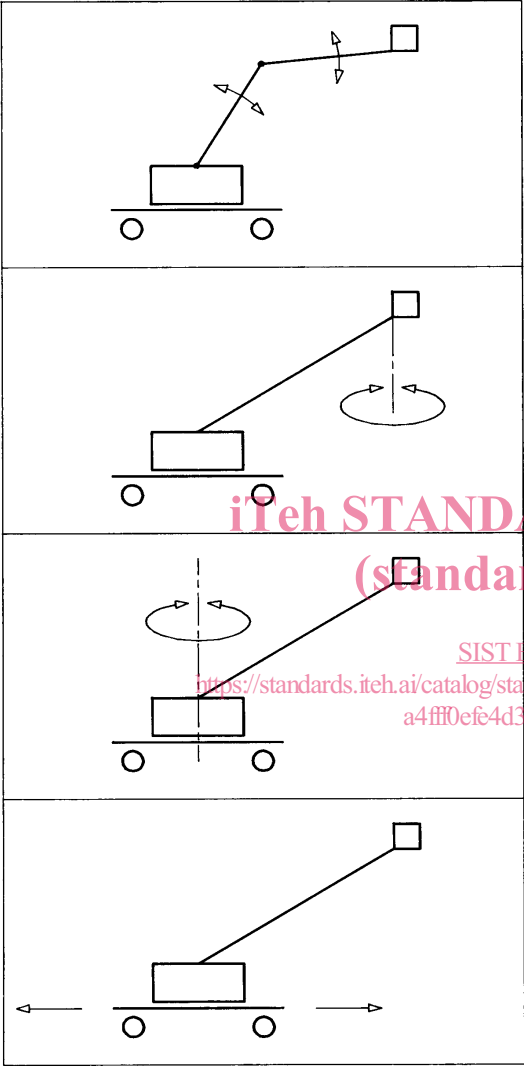


- 1 work platform (see 3.2)
- 2 extending structure (see 3.3)
- 3 chassis (see 3.4)
- 4 stabilisers (see 3.5)

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Figure 1: Illustration of some definitions (1)



lowering/raising (see 3.8 and 3.9)

rotating (see 3.10)

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slewing (see 3.11)

travelling (see 3.12)

Figure 2: Illustration of some definitions (2)

4 List of hazards

The hazards have been identified by the risk assessment procedure and the corresponding requirements formulated.

A hazard which is not significant and for which, therefore, no requirements are formulated, is shown in the Corresponding Requirements column as NS (not significant).

Table 1: List of significant hazards

| | Significant hazards | relevant clauses in this standard |
|----------|---|--|
| 1 | Mechanical hazards | - |
| 1.1 | Crushing hazard | 5.2.4, 5.3.5, 5.3.23, 5.3.4, 5.6.9, 5.7.1, 7.2.13 |
| 1.2 | Shearing hazard | 5.4.4, 5.7.1, 7.2.13 |
| 1.3 | Cutting or severing hazard | NS |
| 1.4 | Entanglement hazard | 5.3.20, 7.2.13 |
| 1.5 | Drawing-in or trapping hazard | 5.3.20, 7.2.13 |
| 1.6 | Impact hazard | 5.3.5, 5.3.25, 7.1.1.1 h) |
| 1.7 | Stabbing or puncture hazard | NS |
| 1.8 | Friction or/abrasion hazard | 7.1.1.6e) |
| 1.9 | High pressure fluid injection hazard | 5.9.1, 5.9.2, 5.9.3, 5.9.4, 5.9.5, 5.9.10 |
| 1.10 | Ejection of parts | NS |
| 1.11 | Loss of stability (of machinery and machine parts) | 5.2, 5.3.2, 5.3.6, 5.3.7, 5.3.8, 5.3.10, 5.3.11, 7.2.11) |
| 1.12 | Slip, trip and fall hazards | 5.6.2, 5.6.3, 5.6.4, 5.6.5, 5.6.6, 5.6.7, 7.2.13 |
| 2 | Electrical hazards, caused for example by: | - |
| 2.1 | Electrical contact (direct or indirect) | 5.8, 7.1.1.2 g) |
| 2.2 | Electrostatic phenomena | NS |
| 2.3 | Thermal radiation | NS |
| 2.4 | External influences on electrical equipment | 5.8.1 |
| 3 | Thermal hazards for example resulting in: | - |
| 3.1 | Burns and scalds by a possible contact of persons by flames or explosions and also by the radiation of heat sources | 5.3.20 |
| 3.2 | Health-damaging effects by hot or cold work environment | 5.3.20 |
| | (continued) | |