



SLOVENSKI STANDARD

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Premične dvizne delovne ploščadi - 1. del: Konstrukcijski izračuni - Merila stabilnosti - Konstrukcijska izvedba - Varnost - Pregledi in preskusi

Mobile elevating work platforms - Part 1: Design calculations - Stability criteria - Construction - Safety - Examinations and tests

Fahrbare Hubarbeitsbühnen - Teil 1: Berechnung - Standsicherheit - Bau - Sicherheit - Prüfungen

Plates-formes élévatrices mobiles de personnel - Partie 1: Calculs de conception - Critères de stabilité - Construction - Sécurité - Examens et essais

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Druga dvigalna oprema

Other lifting equipment

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EUROPEAN STANDARD
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**Mobile elevating work platforms - Part 1: Design
calculations - Stability criteria - Construction - Safety -
Examinations and tests**

Plates-formes élévatrices mobiles de personnel - Partie 1 :
Calculs de conception - Critères de stabilité - Construction -
Sécurité - Examens et essais

Fahrbare Hubarbeitsbühnen - Teil 1: Berechnung -
Standssicherheit - Bau - Sicherheit - Prüfungen

This European Standard was approved by CEN on 12 December 2021.

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 CEN-CENELEC Management Centre or to any CEN member.

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European foreword

This document (EN 280-1:2022) 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of an identical text or by endorsement, at the latest by August 2022, and conflicting national standards shall be withdrawn at the latest by August 2022.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN shall not be held responsible for identifying any or all such patent rights.

This document supersedes EN 280:2013+A1:2015.

EN 280-1:2022 includes the following major changes with respect to EN 280:2013+A1:2015:

- 3.12: definition of “travelling” has been specified;
- 3.29: new definition of “lowered travel position”;
- 3.30: new definition of “Safety function”;
- 3.31: new definition “Elevated travel position”;
- 4.4.1.2: requirements for the load sensing system were amended and specified;
- 4.6.1: requirements for manual adjustment of the work platform exceeding 5° was amended;
- 4.6.9: protection of hands was totally reworded with regard to different requirements for the different types of MEWPs; <https://standards.iteh.ai/catalog/standards/sist/a2df8bbe-9554-4910-b62b-9885-d119/cen-en-280-1:2022>
- 4.7.2: the restriction was added: when the work platform is out of the lowered travel position and/or transport position;
- 5.1.4.2.2.2: depression tests for MEWPs of type 2 and 3 was restructured and amended;
- Annex F (informative): the calculation example for the dynamic factor “z” for kerb obstacle collisions was totally revised;
- Annex ZA: Adoption of the annex to new CEN-Guide 414:2017.

Various editorial changes were made for better reading and understanding of the document.

This document has been prepared under a Standardization Request 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.

Any feedback and questions on this document should be directed to the users’ national standards body. A complete listing of these bodies can be found on the CEN website.

EN 280-1:2022 (E)

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

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Introduction

This document is a type C standard as stated in EN ISO 12100:2010.

The machinery concerned and the extent to which hazards, hazardous situations and hazardous events are covered are indicated in the scope of this document.

When provisions of this type C standard are different from those which are stated in type A or B standards, the provisions of this type C standard take precedence over the provisions of the other standards, for machines that have been designed and built according to the provisions of this type C standard.

The object of this document 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 document does not repeat all the general technical rules applicable to every electrical, mechanical or structural component.
- The safety requirements of this document 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 assumed that MEWPs are used only by qualified and trained operators.

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

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

- As far as possible this document sets out only the requirements that materials and equipment need to meet in the interest of safety, and it is assumed that persons operating MEWPs are adequately trained.
- Where for clarity an example of a safety measure is given in the text, this does not need to 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/TC 98/WG 1 to determine a suitable factor and stability calculation method for MEWPs have been adopted. The test method is described in Annex C (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 utilization for wire ropes found in other standards for lifting devices, appropriate extracts of the widely accepted standard DIN 15020-1 have been taken into 4.5.2 and Annex D (normative) with a worked example in Annex E (informative).

This document may also be used as guidance for static elevating work platforms where the vertical projection of the centre of the area of the platform can be outside the tipping lines.

EN 280-1:2022 (E)

1 Scope

1.1 This document specifies safety requirements and measures for all types and sizes of Mobile Elevating Work Platform (MEWP, see 3.1) 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 only at access positions at ground level or on the chassis.

NOTE Machines designed for the handling of goods which are equipped with work platforms as interchangeable equipment are regarded as MEWPs.

1.2 This document 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) use in potentially explosive atmospheres;
- b) work from the platform on external live electric systems;
- c) use of compressed gases for load bearing components;
- d) getting on and off the work platform at changing levels;
- e) specific applications (e.g. railway, ships) covered by National or local regulations.

1.3 This document does not apply to:

- a) machinery serving fixed landings (see e.g. EN 81-20:2020 and EN 81-50:2020, EN 12159:2012);
- b) fire-fighting and fire rescue appliances (see e.g. EN 1777:2010);
- c) unguided work cages suspended from lifting appliances (see e.g. EN 1808:2015);
- d) elevating operator position on rail dependent storage and retrieval equipment (see EN 528:2021);
- e) tail lifts (see EN 1756-1:2021 and EN 1756-2:2004+A1:2009);
- f) mast climbing work platforms (see EN 1495:1997+A2:2009);
- g) fairground equipment;
- h) lifting tables (see EN 1570-1:2011+A1:2014 and EN 1570-2:2016);
- i) aircraft ground support equipment (see e.g. EN 1915-1:2013 and EN 1915-2:2001+A1:2009);
- j) elevating operator positions on industrial trucks (see EN ISO 3691-3:2016).

1.4 Classification:

MEWPs are divided into two main groups:

- a) Group A: MEWPs where the vertical projection of the centre of the area of the platform in all platform configurations at the maximum chassis inclination specified by the manufacturer is always inside the tipping lines.

b) Group B: All other MEWPs.

Relating to travelling, MEWPs are divided into three types:

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

NOTE Type 2 and type 3 can be combined.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 12385-4:2002+A1:2008, *Steel wire ropes - Safety - Part 4: Stranded ropes for general lifting applications*

EN 13001-3-1:2012+A2:2018, *Cranes - General design - Part 3-1: Limit states and proof competence of steel structure*

EN 14033-1:2017, *Railway applications - Track - Railbound construction and maintenance machines - Part 1: Technical requirements for running*

EN 14033-2:2017, *Railway applications - Track - Railbound construction and maintenance machines - Part 2: Technical requirements for travelling and working*

EN 14033-3:2017, *Railway applications - Track - Railbound construction and maintenance machines - Part 3: General safety requirements*

EN 14033-4:2019, *Railway applications - Track - Railbound construction and maintenance machines - Part 4: Technical requirements for running, travelling and working on urban rail*

EN 15746-1:2020, *Railway applications - Track - Road-rail machines and associated equipment - Part 1: Technical requirements for travelling and working*

EN 15746-2:2020, *Railway applications - Track - Road-rail machines and associated equipment - Part 2: General safety requirements*

EN 15954-1:2013, *Railway applications - Track - Trailers and associated equipment - Part 1: Technical requirements for running and working*

EN 15954-2:2013, *Railway applications - Track - Trailers and associated equipment - Part 2: General safety requirements*

EN 15955-1:2013, *Railway applications - Track - Demountable machines and associated equipment - Part 1: Technical requirements for running and working*

EN 15955-2:2013, *Railway applications - Track - Demountable machines and associated equipment - Part 2: General safety requirements*

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EN 60068-2-64:2008,¹ *Environmental testing - Part 2-64: Tests - Test Fh: Vibration, broadband random and guidance (IEC 60068-2-64:2008)*

EN 61310-1:2008, *Safety of machinery - Indication, marking and actuation - Part 1: Requirements for visual, acoustic and tactile signals (IEC 61310-1:2007)*

EN 60204-1:2018, *Safety of machinery - Electrical equipment of machines - Part 1: General requirements (IEC 60204-1:2016)*

EN 60204-32:2008, *Safety of machinery - Electrical equipment of machines - Part 32: Requirements for hoisting machines (IEC 60204-32:2008)*

EN 60529:1991,² *Degrees of protection provided by enclosures (IP Code) (IEC 60529:1991)*

EN 62061:2005,³ *Safety of machinery - Functional safety of safety-related electrical, electronic and programmable electronic control systems (IEC 62061:2005)*

EN ISO 3744:2010, *Acoustics - Determination of sound power levels and sound energy levels of noise sources using sound pressure - Engineering methods for an essentially free field over a reflecting plane (ISO 3744:2010)*

EN ISO 4871:2009, *Acoustics - Declaration and verification of noise emission values of machinery and equipment (ISO 4871:1996)*

EN ISO 11201:2010, *Acoustics - Noise emitted by machinery and equipment - Determination of emission sound pressure levels at a work station and at other specified positions in an essentially free field over a reflecting plane with negligible environmental corrections (ISO 11201:2010)*

EN ISO 12100:2010, *Safety of machinery - General principles for design - Risk assessment and risk reduction (ISO 12100:2010)*

EN ISO 13849-1:2015, *Safety of machinery - Safety-related parts of control systems - Part 1: General principles for design (ISO 13849-1:2015)*

EN ISO 13849-2:2012, *Safety of machinery - Safety-related parts of control systems - Part 2: Validation (ISO 13849-2:2012)*

EN ISO 13850:2015, *Safety of machinery - Emergency stop function - Principles for design (ISO 13850:2015)*

EN ISO 13854:2019, *Safety of machinery - Minimum gaps to avoid crushing of parts of the human body (ISO 13854:2017)*

ISO 4305:2014, *Mobile cranes - Determination of stability*

ISO 4309:2017, *Cranes - Wire ropes - Care and maintenance, inspection and discard*

EN ISO 11688-1:2009, *Acoustics - Recommended practice for the design of low-noise machinery and equipment - Part 1: Planning (ISO/TR 11688-1:1995)*

¹ As impacted by EN 60068-2-64:2008/A1:2019.

² As impacted by EN 60529:1991/AC:1993-05, EN 60529:1991/A1:2000, EN 60529:1991/A2:2013, EN 60529:1991/A2:2013/AC:2019-02 and EN 60529:1991/AC:2016-12.

³ As impacted by EN 62061:2005/AC 2010-02, EN 62061:2005/A1:2013 and EN 62061:2005/A2:2015.

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN ISO 12100:2010 and the following apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at <https://www.electropedia.org/>
- ISO Online browsing platform: available at <https://www.iso.org/obp>

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 only at access positions at ground level or on the chassis and which consists as a minimum of a work platform with controls, an extending structure and a chassis

3.2

work platform

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

Note 1 to entry: See Figure 1.

3.3

extending structure

structure which is connected to the chassis and supports the work platform and which allows movement of the work platform to its required position

Note 1 to entry: See Figure 1.

Note 2 to entry: It may, for example, be a single or a telescoping or an 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

base of the MEWP, which may be pulled, pushed, self-propelled, etc. or stationary

Note 1 to entry: See Figure 1.

3.5

stabilisers

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

Note 1 to entry: See Figure 1.

3.6

access position

position(s) to provide access to and from the work platform

Note 1 to entry: Access position and transport position can be identical.

EN 280-1:2022 (E)**3.7****transport position**

configuration(s) of the MEWP prescribed by the manufacturer in which the MEWP is intended to be delivered to the place of use

Note 1 to entry: Access position and transport position can be identical.

3.8**lowering**

operations to move the work platform to a lower level

Note 1 to entry: See Figure 2.

3.9**lifting**

operations to move the work platform to a higher level

Note 1 to entry: See Figure 2.

3.10**rotating**

circular movement of the work platform about a vertical axis

Note 1 to entry: See Figure 2.

3.11**slewing**

circular movement of the extending structure about a vertical axis

Note 1 to entry: See Figure 2.

3.12**travelling**

movements of the chassis except during transportation

Note 1 to entry: See Figure 2.

3.13**vehicle mounted MEWP**

MEWP where the chassis is a vehicle and where travelling controls are located within the cab of the vehicle

3.14**pedestrian controlled MEWP**

MEWP where the controls for powered movement in the transport position are located so that they are capable of being operated by a person walking close to the MEWP

3.15**self-propelled MEWP**

MEWP where the travelling controls are located at the work platform

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3.16**rated load**

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

Note 1 to entry: 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 their authorised representative

3.21**totally manually powered 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 1 to entry: The system includes the measuring device(s), the way the measuring devices are incorporated in the machinery 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

Note 1 to entry: The system includes the measuring device(s), the way the measuring devices are incorporated in the machinery and the signal processing system.

3.25**wireless control**

means by which the MEWP operator's commands are transmitted without any physical connection for at least part of the distance between the control console and the rest of the control system