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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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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 -
Standstabilität - Bau - Sicherheit - Prüfungen

This draft European Standard is submitted to CEN members for enquiry. It has been drawn up by the Technical Committee CEN/TC 98.

If this draft becomes a European Standard, 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.

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prEN 280-1:2024 (E)**European foreword**

This document (prEN 280-1:2024) has been prepared by Technical Committee CEN/TC 98 “Lifting platforms”, the secretariat of which is held by DIN.

This document is currently submitted to the CEN Enquiry.

This document will supersede EN 280-1:2022.

This document includes the following major changes with respect to EN 280-1:2022:

- 3.12: definition of “travelling” has been specified;
- 3.32: 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;
- 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 addressed to CEN by the European Commission. The Standing Committee of the EFTA States subsequently approves these requests for its Member States.

For the relationship with EU Legislation, see informative Annex ZA, which is an integral part of this document.

Introduction

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

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

This document is of relevance, in particular, for the following stakeholder groups representing the market players with regard to machinery safety:

- machine manufacturers (small, medium and large enterprises);
- health and safety bodies (regulators, accident prevention organizations, market surveillance etc.).

Others can be affected by the level of machinery safety achieved with the means of the document by the above-mentioned stakeholder groups:

- machine users/employers (small, medium and large enterprises);
- machine users/employees (e.g. trade unions, organizations for people with special needs);
- service providers, e.g. for maintenance (small, medium and large enterprises);
- consumers (in case of machinery intended for use by consumers).

The above-mentioned stakeholder groups have been given the possibility to participate at the drafting process of this document.

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

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

It is assumed, if a MEWP is seldom used, the checks are carried out 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.

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- 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).

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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 such as a variable reach truck 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 12159:2024);
- 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+A1:2022);
- 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 1570-1:2024 and EN 1570-2:2016);
- i) aircraft ground support equipment (see e.g. EN 1915-1:2023 and EN 1915-2:2001+A1:2009);
- j) elevating operator positions on industrial trucks (see EN ISO 3691-3:2016).

1.4 Classification of MEWPs:

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 indicated in the information for use is always inside the tipping lines.

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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, or no travelling of the MEWP is possible due to only being moveable (3.1.3) by design;
- 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 13001-3-6:2018+A1:2021, *Cranes - General design - Part 3-6: Limit states and proof of competence of machinery - Hydraulic cylinders*

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*

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 60529:1991,¹ *Degrees of protection provided by enclosures (IP Code) (IEC 60529:1989+A2:2013)*

EN IEC 62061:2021,² *Safety of machinery - Functional safety of safety-related electrical, electronic and programmable electronic control systems (IEC 62061:2021)*

EN 62745:2017,³ *Safety of machinery - Requirements for cableless control systems of machinery (IEC 62745:2017)*

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

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

EN ISO 13849-1:2023, *Safety of machinery - Safety-related parts of control systems - Part 1: General principles for design (ISO 13849-1:2023)*

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 4305:2014,⁴ *Mobile cranes - Determination of stability*

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

¹ 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.

² As impacted by EN IEC 62061:2021/A1:2024.

³ As impacted by EN 62745:2017/A11:2020.

⁴ As impacted by ISO 4305:2014/A1:2016.

prEN 280-1:2024 (E)**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**

EWP that is either propelled, or moveable, or both

3.1.1**elevating work platform****EWP**

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

3.1.2**propelled**

intended to perform changes of location along the ground by integrated mobility devices following a surface

Note 1 to entry: Mobility is independent from the nature of the propulsion, whether self-propelled, pulled or pushed.

Note 2 to entry: Integrated mobility devices include for example wheels, tracks, casters, and air cushion systems

3.1.3**moveable**

intended to be relocated by external means, through the use of integrated moving points, from one location to another, where no re-build or commissioning is required after relocation

Note 1 to entry: Integrated moving points include for example lifting points, lugs, and fork pockets

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**work platform levelling system**

system to maintain the level of the work platform within a specified tilting angle