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Varnost naprav in opreme v zabaviščnih parkih - 1. del: Načrtovanje in izdelava

Safety of amusement rides and amusement devices - Part 1: Design and manufacture

Sicherheit von Fahrgeschäften und Vergnügungsanlagen - Teil 1: Konstruktion, Bemessung und Herstellung

Sécurité des manèges et des dispositifs de divertissement - Partie 1 : Conception et fabrication

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Igrišča

Playgrounds

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EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

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prEN 13814-1

October 2026

ICS

Will supersede EN 13814-1:2019+A1:2024

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**Safety of amusement rides and amusement devices - Part
1: Design and manufacture**

Sécurité des manèges et des dispositifs de
divertissement - Partie 1 : Conception et fabrication

Sicherheit von Fahrgeschäften und
Vergnügungsanlagen - Teil 1: Konstruktion,
Bemessung und Herstellung

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European foreword

This document (prEN 13814-1:2026) has been prepared by Technical Committee CEN/TC 152 “Fairground and amusement park machinery and structures - Safety”, the secretariat of which is held by UNI.

This document is currently submitted to the CEN Enquiry.

This document will supersede EN 13814-1:2019+A1:2024.

EN 13814-1:2026 includes the following significant technical changes with respect to EN 13814-1:2019+A1:2024.

This revision was initiated to incorporate the responses to the questions raised during the 2019 enquiry. A complete review of rider loads to be used in design, testing and operation has been made. The section regarding safety envelope definition has been completely reviewed. The introduction of the term “retention device” helps to clarify the requirements for locking and latching systems. The overall section has also been streamlined to facilitate reading. The accelerations section has been completely reviewed. There are additional paragraphs to cover acceleration limits for children. The previous Annex H entitled Safety Envelopes for Passengers in EN13914-2019 has been removed. The content of the table of hazards has been integrated into Annex E. Clause 4.4 has been restructured and some further alignment with Eurocode has been made. A new section provides a more precise way to define how fatigue load cycles are counted. A new section has been added to explain how components that have reached their theoretical design fatigue life can continue operation by defining initial and subsequent periodic inspections that are required. An additional Annex for high speed go karts has been added. A review of the terms for persons in the park or fairground has also been made.

EN 13814 consists of the following parts, under the general title *Safety of amusement rides and amusement devices*:

- *Part 1: Design and manufacture;*
- *Part 2: Operation, maintenance and use;*
- *Part 3: Requirements for inspection during design, manufacture, operation and use.*

Introduction

The object of this document is to define safety rules related to structures and machinery, which are either an integral part of, or constitute the amusement device itself. The safety rules are intended to safeguard persons against the risk of accidents caused by deficiencies in design, manufacture and operation of such structures and machinery.

Annex A (normative) provides guidance on electrical equipment and control systems.

Annex B (informative) provides control systems – best practices.

Annex C (informative) provides guidance of rider containment.

Annex D (informative) shows a typical layout of a device log for an amusement device.

Annex E (informative) lists hazards pertaining to amusement rides.

Annex F (informative) provides guidance on guest behaviour.

Annex G (informative) provides guidance on the limited accessibility to amusement devices.

Annex H (informative) explains acceleration effects on riders.

Annex I (informative) provides requirements for high speed go karts.

This revision was initiated to incorporate the responses to the questions raised during the 2019 enquiry. For reference the initial replies were provided in document CEN/TR 18042. A complete review of rider loads to be used in design, testing and operation has been made. The section regarding safety envelope definition has been completely reviewed. The introduction of the term “retention device” helps to clarify the requirements for locking and latching systems. The overall section has also been streamlined to facilitate reading. The accelerations section has been completely reviewed. There are additional paragraphs to cover acceleration limits for children. The previous annex H entitled Safety Envelopes for Passengers in EN 13914-2019 has been removed. The annex has been removed and the table of hazards has been integrated into Annex E. Sub-clause 4.4 has been restructured with some further alignment with Eurocode has been made. As part of the fatigue analysis it is important to define how fatigue load cycles are defined. The new section provides a more precise definition. A new section has been added to explain how components that have reached their theoretical design fatigue life by defining initial and subsequent periodic inspections that are required to be able to continue operation. An additional Annex for high speed go karts has been added.

Terms used for the persons in the park of fairground was made. The aim was to standardize terms and provide a logical set of definitions. Words for guest, participant, user, passenger and rider have been reviewed and revised as necessary.

1 Scope

This document specifies the minimum requirements necessary to ensure the safe design, calculation, manufacture, and installation of mobile, temporary or permanently installed machinery and structures which are intended for use by persons as a leisure activity, e.g. roundabouts, swings, boats, ferris wheels, roller coasters, chutes, booths, side shows, and structures for artistic aerial displays. The above items are hereafter called amusement devices, which are intended to be installed both repeatedly without degradation or loss of integrity, and temporarily or permanently in fairgrounds and amusement parks or any other locations. Grandstands, construction site installations, scaffolding, removable agricultural structures, simple coin operated children's amusement devices, carrying up to three children, and recreational devices like waterslides or summer toboggan runs, playground equipment, rope courses, climbing wall, inflatable, trampolines, swimming pool equipment (this list is not exhaustive) are not covered by this document.

For all the equipment not covered by the requirements of EN 13814-1, the relevant standards apply.

Nevertheless, this document can be used in the design of any similar structural or user carrying amusement device not explicitly mentioned herein.

In terms of workers' health and safety, national regulations apply.

This document is applicable to manufacturing and major modification of amusement devices and rides for designs after the effective date of publication.

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 818 (all parts), *Short link chain for lifting purposes — Safety*

EN 1090-2:2018+A1:2024, *Execution of steel structures and aluminium structures — Part 2: Technical requirements for steel structures*

EN 1090-3:2019, *Execution of steel structures and aluminium structures — Part 3: Technical requirements for aluminium structures*

EN 1176 (all parts), *Playground equipment and surfacing*

EN 1991-1-4, *Eurocode 1: Actions on structures - Part 1-4: General actions - Wind actions*

EN 1993-1-8, *Eurocode 3: Design of steel structures - Part 1-8: Joints*

EN 1993-1-9, *Eurocode 3: Design of steel structures - Part 1-9: Fatigue*

EN 1999-1-1, *Eurocode 9: Design of aluminium structures — Part 1-1: General rules*

EN 10204, *Metallic products - Types of inspection documents*

EN 12195-2, *Load restraint assemblies on road vehicles - Safety - Part 2: Web lashing made from man-made fibres*

EN 13796-1, *Safety requirements for cableway installations designed to carry persons - Carriers - Part 1: Grips, carrier trucks, on-board brakes, cabins, chairs, carriages, maintenance carriers, tow-hangers*

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prEN 13814-2:2026, *Safety of amusement rides and amusement devices — Part 2: Operation, maintenance and use*

prEN 13814-3:2026, *Safety of amusement rides and amusement devices — Part 3: Requirements for inspection during design, manufacture, operation and use*

EN 14399 (all parts), *High-strength structural bolting assemblies for preloading*

EN 50172, *Emergency escape lighting systems*

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

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

HD 60364-4-41, *Low-voltage electrical installations — Part 4-41: Protection for safety — Protection against electric shock (IEC 60364-4-41)*

HD 60364-5-54, *Low-voltage electrical installations - Part 5-54: Selection and erection of electrical equipment - Earthing arrangements and protective conductors (IEC 60364-5-54)*

HD 60364-7-740, *Electrical installations of buildings - Part 7-740: Requirements for special installations or locations - Temporary electrical installations for structures, amusement devices and booths at fairgrounds, amusement parks and circuses (IEC 60364-7-740)*

EN IEC 61558-1, *Safety of transformers, reactors, power supply units and combinations thereof - Part 1: General requirements and tests*

EN 61800-5-2, *Adjustable speed electrical power drive systems — Part 5-2: Safety requirements — Functional (IEC 61800-5-2)*

EN IEC 62061, *Safety of machinery - Functional safety of safety-related control systems*

EN 62305 (all parts), *Protection against lightning (IEC 62305, all parts)*

CEN/TS 17959, *Safety of amusement rides and devices: Manufacturing quality recommendations for machinery components*

EN ISO 898-1, *Mechanical properties of fasteners made of carbon steel and alloy steel - Part 1: Bolts, screws and studs with specified property classes - Coarse thread and fine pitch thread (ISO 898-1)*

EN ISO 3834-2, *Quality requirements for fusion welding of metallic materials - Part 2: Comprehensive quality requirements (ISO 3834-2)*

EN ISO 3834-3, *Quality requirements for fusion welding of metallic materials - Part 3: Standard quality requirements (ISO 3834-3)*

EN ISO 3834-4, *Quality requirements for fusion welding of metallic materials - Part 4: Elementary quality requirements (ISO 3834-4)*

EN ISO 4014, *Fasteners - Hexagon head bolts - Product grades A and B (ISO 4014)*

EN ISO 4016, *Fasteners - Hexagon head bolts - Product grade C (ISO 4016)*

EN ISO 4017, *Fasteners - Hexagon head screws - Product grades A and B (ISO 4017)*

EN ISO 4018, *Hexagon head screws - Product grade C (ISO 4018)*

EN ISO 4032, *Fasteners - Hexagon regular nuts (style 1) (ISO 4032)*

EN ISO 4413, *Hydraulic fluid power - General rules and safety requirements for systems and their components (ISO 4413)*

EN ISO 4414, *Pneumatic fluid power - General rules and safety requirements for systems and their components (ISO 4414)*

EN ISO 5817, *Welding - Fusion-welded joints in steel, nickel, titanium and their alloys (beam welding excluded) - Quality levels for imperfections (ISO 5817)*

EN ISO 9606-1, *Qualification testing of welders - Fusion welding - Part 1: Steels (ISO 9606-1)*

EN ISO 9606-2, *Qualification test of welders - Fusion welding - Part 2: Aluminium and aluminium alloys (ISO 9606-2)*

EN ISO 9692-1, *Welding and allied processes - Types of joint preparation - Part 1: Manual metal arc welding, gas-shielded metal arc welding, gas welding, TIG welding and beam welding of steels (ISO 9692-1)*

EN ISO 9692-2, *Welding and allied processes - Joint preparation - Part 2: Submerged arc welding of steels (ISO 9692-2)*

EN ISO 9692-3, *Welding and allied processes - Types of joint preparation - Part 3: Metal inert gas welding and tungsten inert gas welding of aluminium and its alloys (ISO 9692-3)*

EN ISO 9712:2012, *Non-destructive testing - Qualification and certification of NDT personnel (ISO 9712:2012)*

EN ISO 10042:2018, *Welding - Arc-welded joints in aluminium and its alloys - Quality levels for imperfections (ISO 10042:2018)*

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

EN ISO 13849 (all parts), *Safety of machinery — Safety-related parts of control systems (ISO 13849)*

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

EN ISO 13857, *Safety of machinery - Safety distances to prevent hazard zones being reached by upper and lower limbs (ISO 13857)*

EN ISO 14119, *Safety of machinery - Interlocking devices associated with guards - Principles for design and selection (ISO 14119)*

EN ISO 14120, *Safety of machinery - Guards - General requirements for the design and construction of fixed and movable guards (ISO 14120)*

EN ISO 14731, *Welding coordination - Tasks and responsibilities (ISO 14731)*

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EN ISO 14732, *Welding personnel - Qualification testing of welding operators and weld setters for mechanized and automatic welding of metallic materials (ISO 14732)*

EN ISO 17635, *Non-destructive testing of welds - General rules for metallic materials (ISO 17635)*

ISO 10474, *Steel and steel products — Inspection documents*

ISO 14118, *Safety of machinery — Prevention of unexpected start-up*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

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

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

3.1**amusement device**

amusement ride (3.3) and any arrangement of equipment that produces the desired effect of amusement or entertainment when the *user* (3.57) moves through it or on it primarily by his or her own action

3.2**amusement device log**

book and/or electronic data file containing all the necessary information about the use and history of any *amusement device* (3.1)

3.3**amusement ride**

equipment that is designed to entertain the *riders* (3.43) during motion including the consequence of biomechanical effect

3.4**attendant**

trained person appointed to work under the supervision of an *operator* (3.31), to assist in the operation of an *amusement device* (3.1) available for use by the guests (3.21)

3.5**behaviour**

non-passive physical activity or movement made by a *guest* (3.21). All reactions to internal and external stimuli

3.6**boarding rider**

rider (3.43) who is transiting from the waiting area to the *amusement ride* (3.3)

3.7**child**

person aged from birth to 14 years

Note 1 to entry: In the amusement field it is helpful to consider children's physical, psychological, social and educational development with relation to their age.

3.8**children ride**

amusement ride (3.3) solely designed for the use by children as defined by the *designer* (3.14)

3.9**clearance envelope**

space which adequately reduces the risk of harmful contact of *riders* (3.43) with objects

3.10**competent person**

person who can demonstrate that he has acquired through training, qualifications or experience, or a combination of these, the knowledge and skills enabling that person to perform a specified task

3.11**controller**

person or organisation having overall control of an *amusement device* (3.1). This may be either an individual or corporate body owning an *amusement device* (3.1) or the concessionaire or lessee who has been granted control of the *amusement device* (3.1), by the owner, for a specified period

3.12**design review**

document detailing the review of all the applicable design documents, to determine the suitability for use of an *amusement device* (3.1)

3.13**design risk assessment****DRA**

document, produced by the *designer* (3.14) as a tool for safe design, within the agreed scope of supply

3.14**designer****engineer**

persons or bodies that are responsible for the design of an *amusement device* (3.1) (or modifications thereof), including, but not limited to establishing and describing the configuration of the *amusement device* (3.1), conducting appropriate risk assessment(s), establishing strength (including fatigue strength), designing and specifying electrical/electronic control systems, defining the acceptable quality level for production, defining inspection criteria and including the publication of the necessary documentation

3.15**exiting rider**

rider (3.43) who is transiting from the *amusement ride* (3.3) to the exit

3.16**fail-safe**

characteristic of a system, component, or device, that upon a failure of one of their elements, the system, component, or device is designed to result in a safe state

3.17**fence**

structure designed to restrict or prevent movement across a boundary without change of elevation

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3.18

foreseeable behaviour

foreseeable misuse and predictable pathological *behaviours* (3.5) (such as anxiety, escape, etc).

Note 1 to entry: The concept of “reasonably foreseeable” excludes the irrational. The foreseeability of the hazard includes considering the likelihood of the combination of circumstances that are necessary for it to occur. It will be noted that foreseeable situations in which the user’s actions due to a lack of perception of the hazard or an unexpected event, can expose them to an increased risk.

Note 2 to entry: See Fairground and amusement park – Guidance on safe practice, HSG 175, for more information.

3.19

gate

section of *fence* (3.17) that can be opened to provide access or egress

3.20

guardrail

rail intended to prevent a *user* (3.57) from falling

3.21

guest

persons visiting an amusement park or fairground

3.22

handrail

rail intended to assist the *user* (3.57) to balance

3.23

impact acceleration

acceleration with duration of less than 200 ms

3.24

initial approval

design and calculation review process including, verification, examinations and tests executed by the *inspection body* (3.25) before a ride is first made available for guest use

3.25

inspection body

any organisation capable of carrying out examination, tests and approval of *amusement devices* (3.1)

3.26

machinery component

component which forms part of an assembly in which at least one component moves (excluding vibration and deformation)

3.27

major modification

safety-related alteration to the hardware or software of an *amusement device* (3.1), including the introduction of a new *safety-related component* (3.48) or the substitution of a *safety-related component* (3.48), which results in a deviation from the current design specification

3.28

manufacturer

individual or commercial entity responsible for designing and manufacturing a product with the view to placing it on the market under their own name

Note 1 to entry: Any commercial entity that either places a product on the market under their own name or trademark or modifies a product in such a way that compliance with applicable requirements maybe affected should be considered to be the manufacturer and should assume the obligations of the manufacturer.

3.29

maximum permissible restraint position

position of the *restraint* (3.40) at which the allowed maximum sized rider is properly restrained

Note 1 to entry: Maximum sized riders are *riders* (3.43) with any body dimension at the largest intended design parameters. This position does not necessarily ensure smaller riders are properly restrained.

3.30

operation and use risk assessment

OURA

document, produced by the *controller* (3.11), that details all of the considered risks inherent during all modes of the amusement device operation and the means taken to mitigate against them

Note 1 to entry: This term is explained in detail in 5.1.3.

3.31

operator

trained person appointed by the *controller* (3.11) to be in charge of the operation of an *amusement device* (3.1) when it is intended to be available for the *guests* (3.21)

3.32

participant

person using an *amusement device* (3.1) which is not an *amusement ride* (3.3)

3.33

permit

authorisation to operate an *amusement device* (3.1) in a particular member state granted by the legally authorised body after successful approval and/or examination

3.34

platform

horizontal or inclined surface raised above the level of an adjacent area

Note 1 to entry: See 5.2.1.2 for maximum slope of platform.

3.35

properly restrained

condition where the *restraint* (3.40) is *retained* (3.41) in the intended position relative to the *rider* (3.43) while in the intended riding position

Note 1 to entry: For individual, adjustable *restraints* (3.40) this may mean close to each rider's body, but in a group lap bar, this may mean close to the largest rider's body. Intended riding position means that the rider (3.43) is properly positioned in the rider carrying device, e.g. in a seat with full contact to the seat pan and backrest.

3.36

reach envelope

space, which a *rider* (3.43) can reach during a ride cycle while in the intended riding position