SLOVENSKI STANDARD
SIST EN 13814-1:2019

01-september-2019

Nadomešča:
SIST EN 13814:2005

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 Vergnügungseinrichtungen - Teil 1: Konstruktion, Bemessung und Herstellung

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

Ta slovenski standard je istoveten z: **EN 13814-1:2019**

ICS:

97.200.40 Igrišča Playgrounds

SIST EN 13814-1:2019 **en,fr,de**

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 13814-1

May 2019

ICS 97.200.40

Supersedes EN 13814:2004

English Version

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 Vergnügungseinrichtungen - Teil 1: Konstruktion, Bemessung und Herstellung

This European Standard was approved by CEN on 13 May 2018.

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.

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 CEN-CENELEC Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and United Kingdom.

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

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

Contents

Page

European foreword

This document (EN 13814-1:2019) 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 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 November 2019, and conflicting national standards shall be withdrawn at the latest by May 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, together with its second and third parts, supersedes EN 13814:2004.

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.*

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, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

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 passenger 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) provides guidance on the safety envelope for passengers

Annex I (informative) explains acceleration effects on passengers

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 passenger 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 349, *Safety of machinery — Minimum gaps to avoid crushing of parts of the human body*

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

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

EN 1090-3:2008, *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 1993-1-1, *Eurocode 3: Design of steel structures - Part 1-1: General rules and rules for buildings*

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

EN 13814-2:2019, *Safety of amusement rides and amusement devices — Part 2: Operation, maintenance and use*

EN 13814-3:2019, *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 60204-1:2006, *Safety of machinery — Electrical equipment of machines — Part 1: General requirements (IEC 60204-1:2006)*

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 61558-1, *Safety of power transformers, power supplies, reactors and similar products - Part 1: General requirements and tests (IEC 61558-1)*

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

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

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

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

EN ISO 4016, *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, *Hexagon regular nuts (style 1) - Product grades A and B (ISO 4032)*

EN ISO 4034, *Hexagon regular nuts (style 1) - Product grade C (ISO 4034)*

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 5817:2014, *Welding - Fusion-welded joints in steel, nickel, titanium and their alloys (beam welding excluded) - Quality levels for imperfections (ISO 5817:2014)*

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 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)*

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 terminological 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
arrangement of equipment that produces the desired effect of amusement or entertainment when the *passenger* (3.28) moves through it or on it primarily by his or her own action, or any other system that is not covered by the term *amusement ride* (3.2)

3.2
amusement ride
equipment that is designed to entertain the *passengers* (3.28) during motion including the consequence of biomechanical effect

Note 1 to entry: In this standard, the word *amusement device* is used to refer to an *amusement device* (3.1) or *amusement ride* (3.2).

3.3
attendant
trained person appointed to work under the supervision of an *operator* (3.27), to assist in the operation of an *amusement device* (3.1) available for use by the public

3.4
barrier
device intended to prevent the user from falling and from passing beneath a barrier can also be used as a fence

3.5
closed restraint
closed restraint position in which the *restraint* (3.37) is intended to remain during the operation of the device in order to restrain the *passenger* (3.28)

3.6
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

3.7
controller
ride 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, by the owner, for a specified period

3.8
design review
document detailing the review of all the applicable design documents, to determine the suitability for use of an amusement device

3.9
design risk assessment
DRA
document, produced by the *designer* (3.10) as a tool for safe design, within the agreed scope of supply

3.10
designer
engineer
persons or bodies that are responsible for the design of an amusement device (or modifications thereof), including, but not limited to establishing and describing the configuration of the amusement device, 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

3.11
amusement device log
book and/or electronic data file containing all the necessary information about the use and history of any amusement device

3.12
fail safe
characteristic of a system, component or device the failure of which maintains a safe state

3.13
fence
structure designed to restrict or prevent movement across a boundary without change of elevation

3.14
gate
section of *fence* (3.13) or *barrier* (3.4) that may be opened to provide access or egress

3.15
guardrail
rail intended to prevent a user from falling

3.16
guest
persons that may interact with an amusement device

3.17
handrail
rail intended to assist the user to balance

3.18
initial approval
design and calculation review process including, verification, examinations and tests executed by the *inspection body* (3.19) before a ride is first made available for public use

3.19
inspection body
any organisation capableof carrying out examination, tests and approval of amusement devices

3.20
latching restraint
restraint (3.37) which is held secure against opening except by intentional action of the *passenger* (3.28), *operator* (3.27). This can include *restraints* (3.37) (e.g. drop bars) held in place by gravity, detents or other means

3.21
licensing body
national authority or body legally authorised to issue a permit for operation of an amusement device and related documents

3.22
locking restraint
restraint (3.37) which is held secure against opening except by intentional action of the *operator* (3.27) or other means not accessible by the *passenger* (3.28)

3.23
machinery component
component which form part of an assembly in which at least one component moves (excluding vibration and deformation)

3.24
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* (3.41) or the substitution of a *safety-related component* (3.41), which results in a deviation from the current design specification

3.25
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.

3.26
operation and use risk assessment
OURA
document, produced by the *controller* (3.7), 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 details in 5.1.2.3.