



SLOVENSKI STANDARD
oSIST prEN 13814-1:2016
01-marec-2016

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: prEN 13814-1

ICS:

97.200.40 Igrišča Playgrounds

oSIST prEN 13814-1:2016 **en,fr,de**

EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

DRAFT
prEN 13814-1

January 2016

ICS 91.040.99; 97.200.99

Will supersede 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
Freizeiteinrichtungen - Teil 1: Design und Herstellung

This draft European Standard is submitted to CEN members for enquiry. It has been drawn up by the Technical Committee CEN/TC 152.

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

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prEN 13814-1:2016 (E)**European foreword**

This document (prEN 13814-1:2016) 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, together with its second and third parts, will supersede 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*

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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 (informative) provides guidance on the fatigue analysis of structural steel parts.

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

Annex C (informative) provides control systems – best practices

Annex D (informative) provides guidance of passenger containment.

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

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

Annex G (informative) provides guidance on guest behaviour.

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

Annex I (informative) provides guidance on the safety envelope for passengers

Annex J (informative) explains acceleration effects on passengers

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prEN 13814-1:2016 (E)**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, grandstands, membrane or textile structures, booths, stages, 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. Fixed grandstands, construction site installations, scaffolding, removable agricultural structures and simple coin operated children's amusement devices, carrying up to three children, are not covered by this document.

Nevertheless this document may be used in the design of any similar structural or passenger carrying device not explicitly mentioned herein.

Existing national rules on workers' safety are not concerned by this document.

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

This standard does not apply to manufacture of pre-existing designs made according to EN 13814:2004 for a period of 5 years following the publication of the present standard.

prEN 13814-3:2016 contains requirements for inspection during design, manufacture, operation and use.

2 Normative references

The following referenced documents are indispensable for the application 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 288-9, *Specification and approval of welding procedures for metallic materials — Part 9: Welding procedure test for pipeline welding on land and offshore site butt welding of transmission pipelines*

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

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

EN 1090-3:2009, *Execution of steel structures and aluminium structures — Part 3: Technical requirements for aluminium structures*

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

EN 1261, *Fibre ropes for general service — Hemp*

EN 1677, *Components for slings — Safety*

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 1993-1-9:2005, *Eurocode 3: Design of steel structures — Part 1-9: Fatigue*

EN 1997-1, *Eurocode 7: Geotechnical design — Part 1: General rules*

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

- EN 10160, *Ultrasonic testing of steel flat product of thickness equal or greater than 6 mm (reflection method)*
- EN 10164, *Steel products with improved deformation properties perpendicular to the surface of the product — Technical delivery conditions*
- EN 12195-2:2000, *Load restraint assemblies on road vehicles — Safety — Part 2: Web lashing made from man-made fibres*
- EN 12385 (all parts), *Steel wire ropes — Safety*
- EN 13200-6, *Spectator facilities — Part 6 : Demountable (temporary) stands*
- EN 13411 (all parts), *Terminations for steel wire ropes — Safety*
- prEN 13814-2:2016, *Safety of amusement rides and amusement devices — Part 2: Operation, maintenance and use*
- prEN 13814-3:2016, *Safety of amusement rides and amusement devices — Part 3: Requirements for inspection during design, manufacture, operation and use*
- EN 13889, *Forged steel shackles for general lifting purposes — Dee shackles and bow shackles — Grade 6 – Safety*
- 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 60204-1:2005)*
- 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*
- HD 60364-5-54, *Low-voltage electrical installations — Part 5-54: Selection and erection of electrical equipment – Earthing arrangements and protective conductors*
- 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 636, *Welding consumables — Rods, wires and deposits for tungsten inert gas welding of non-alloy and fine-grain steels — Classification (ISO 636)*
- 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 1141, *Fibre ropes — Polyester - 3-, 4-, 8- and 12-strand ropes (ISO 1141)*

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EN ISO 1181, *Fibre ropes — Manila and sisal - 3-, 4- and 8-strand ropes (ISO 1181)*

EN ISO 1346, *Fibre ropes — Polypropylene split film, monofilament and multifilament (PP2) and polypropylene high-tenacity multifilament (PP3) — 3-, 4-, 8- and 12-strand ropes (ISO 1346)*

EN ISO 2307, *Fibre ropes — Determination of certain physical and mechanical properties (ISO 2307)*

EN ISO 2560, *Welding consumables — Covered electrodes for manual metal arc welding of non-alloy and fine grain steels — Classification (ISO 2560)*

EN ISO 3581, *Welding consumables — Covered electrodes for manual metal arc welding of stainless and heat-resisting steels — Classification (ISO 3581)*

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 9554, *Fibre ropes — General specifications (ISO 9554)*

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 — Recommendations for 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 10042:2005, *Welding — Arc-welded joints in aluminium and its alloys — Quality levels for imperfections (ISO 10042:2005)*
- EN ISO 10325, *Fibre ropes — High modulus polyethylene — 8-strand braided ropes, 12-strand braided ropes and covered ropes (ISO 10325)*
- EN ISO 10547, *Polyester fibre ropes — Double braid construction (ISO 10547)*
- EN ISO 10554, *Polyamide fibre ropes — Double braid construction (ISO 10554)*
- EN ISO 10556, *Fibre ropes of polyester/polyolefin dual fibres (ISO 10556)*
- EN ISO 10572, *Mixed polyolefin fibre ropes (ISO 10572)*
- 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 14122 (all parts), *Safety of machinery — Permanent means of access to machinery (ISO 14122)*
- EN ISO 14171, *Welding consumables — Solid wire electrodes, tubular cored electrodes and electrode/flux combinations for submerged arc welding of non alloy and fine grain steels — Classification (ISO 14171)*
- EN ISO 14174, *Welding consumables — Fluxes for submerged arc welding and electroslag welding — Classification (ISO 14174)*
- EN ISO 14175, *Welding consumables — Gases and gas mixtures for fusion welding and allied processes (ISO 14175)*
- EN ISO 14341, *Welding consumables — Wire electrodes and weld deposits for gas shielded metal arc welding of non alloy and fine grain steels — Classification (ISO 14341)*
- EN ISO 14343, *Welding consumables — Wire electrodes, strip electrodes, wires and rods for arc welding of stainless and heat resisting steels — Classification (ISO 14343)*
- 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 15607, *Specification and qualification of welding procedures for metallic materials — General rules (ISO 15607)*
- EN ISO 15609-1, *Specification and qualification of welding procedures for metallic materials — Welding procedure specification — Part 1: Arc welding (ISO 15609-1)*