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Safety of amusement rides and devices: Manufacturing quality recommendations for machinery components

Táto norma obsahuje anglickú verziu európskej normy.
This standard includes the English version of the European Standard.

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English Version

Safety of amusement rides and devices: Manufacturing Quality Recommendations for Machinery Components

Sécurité des manèges et des dispositifs de divertissement - Recommandations relatives à la qualité de fabrication pour les éléments de machinerie

Sicherheit von Fahrgeschäften und Vergnügungsanlagen: Empfehlungen für die Herstellung von Maschinenbauteilen

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
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European foreword

This document (CEN/TS 17959:2023) 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.

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Introduction

This document was prepared with reference to EN 13814-1:2019, 5.4.1, 5.4.1.1.

When designing components for an amusement device it is important to take into account the intended quality of the manufactured and installed parts. The manufacturing quality requirements will vary depending upon the consequences in case of a failure of the component. For example, a component whose failure could cause serious injury of a passenger would have a high quality level, to ensure that the risk of material failure (such as raw material quality and treatment) can be reduced to a tolerable level. The intent of this document is to propose a method which enables the designer to be guided as to what should be the minimum applicable quality requirements for each of the parameters listed. Three quality grades (QG) are defined here.

The manufacturing quality requirements are identified as an integral part of risk mitigation.

If the standards used for the design already reference quality requirements, these quality requirements should be used as long as they are at least equivalent to quality requirements used in this document.

1 Scope

This document provides a method on how to assign minimum acceptable manufacturing quality requirements to amusement device metallic components which have been classified as machinery components. Bonded assemblies made in plastic composites are excluded from this scope. Quality requirements can be found in EN 13814-1:2019, 5.4.3.7.

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 1090-2:2018, *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 1369:2012, *Founding - Magnetic particle testing*

EN 1371-1:2011, *Founding - Liquid penetrant testing- Part 1: Sand, gravity die and low pressure die castings*

EN 1563, *Founding - Spheroidal graphite cast irons*

EN 1993-1-10, *Eurocode 3: Design of steel structures - Part 1-10: Material toughness and through-thickness properties*

EN 10160:1999, *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 10204:2004, *Metallic products - Types of inspection documents*

EN 10228-1:2016, *Non-destructive testing of steel forgings - Part 1: Magnetic particle inspection*

EN 10228-2:2016, *Non-destructive testing of steel forgings - Part 2: Penetrant testing*

EN 10228-3:2016, *Non-destructive testing of steel forgings - Part 3: Ultrasonic testing of ferritic or martensitic steel forgings*

EN 10228-4:2016, *Non-destructive testing of steel forgings - Part 4: Ultrasonic testing of austenitic and austenitic-ferritic stainless steel forgings*

EN 10308:2001, *Non destructive testing - Ultrasonic testing of steel bars*

EN 12681 (all parts), *Founding — Radiographic testing*

EN 13814-1:2019, *Safety of amusement rides and amusement devices - Part 1: Design and manufacture*

EN ISO 945-1:2019, *Microstructure of cast irons - Part 1: Graphite classification by visual analysis (ISO 945-1:2019)*

EN ISO 10893-11:2011, *Non-destructive testing of steel tubes - Part 11: Automated ultrasonic testing of the weld seam of welded steel tubes for the detection of longitudinal and/or transverse imperfections (ISO 10893-11:2011)*

EN ISO 16228:2018, *Fasteners - Types of inspection documents (ISO 16228:2017)*

EN ISO/IEC 17025:2017, *General requirements for the competence of testing and calibration laboratories (ISO/IEC 17025:2017)*

ISO 3183:2019, *Petroleum and natural gas industries — Steel pipe for pipeline transportation systems*

ISO 4967:2013, *Steel — Determination of content of non-metallic inclusions — Micrographic method using standard diagrams*

ASTM B594, *Standard Practice for Ultrasonic Inspection of Aluminum-Alloy Wrought Products*

ASTM B618, *Standard Specification for Aluminum-Alloy Investment Castings*

ASTM E155, *Standard Reference Radiographs for Inspection of Aluminum and Magnesium Castings*

ASTM E186, *Standard Reference Radiographs for Heavy-Walled (2 to 412 in. (50.8 to 114 mm)) Steel Castings*

ASTM E280, *Standard Reference Radiographs for Heavy-Walled (412 to 12 in. (114 to 305 mm)) Steel Castings*

ASTM E446, *Standard Reference Radiographs for Steel Castings Up to 2 in. (50.8 mm) in Thickness*

ASTM E689, *Standard Reference Radiographs for Ductile Iron Castings*