



SLOVENSKI STANDARD
SIST-TS CEN/TS 17959:2023

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Varnost zabaviščnih atrakcij in naprav: Priporočila za kakovost proizvodnje za strojne komponente

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

Sicherheit von Fahrgeschäften und Vergnügungsanlagen - Teil 4: Empfehlungen für die Herstellung von Maschinenbauteilen

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

Ta slovenski standard je istoveten z: CEN/TS 17959:2023

ICS:

97.200.99 Druga oprema za razvedrilo Other equipment for entertainment

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CEN/TS 17959

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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

This Technical Specification (CEN/TS) was approved by CEN on 23 July 2023 for provisional application.

The period of validity of this CEN/TS is limited initially to three years. After two years the members of CEN will be requested to submit their comments, particularly on the question whether the CEN/TS can be converted into a European Standard.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
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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.

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.

Any feedback and questions on this document should be directed to the users’ national standards body. A complete listing of these bodies can be found on the CEN website.

According to the CEN/CENELEC Internal Regulations, the national standards organisations of the following countries are bound to announce this Technical Specification: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Türkiye and the United Kingdom.

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CEN/TS 17959:2023 (E)**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.

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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*

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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*

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:

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

3.1

dynamic load

load which results in fatigue stresses as also defined in EN 13814-1:2019, 4.7.3.2

3.2

static load

any load not considered as a *dynamic load* (3.1)

3.3

commercially available components or parts

parts which are listed in a catalogue, where the performance specification of the part is defined by its technical datasheet

Note 1 to entry: The terms “components” and “parts” are synonymous.

Note 2 to entry: Off the shelf parts are synonymous to commercially available parts.

Note 3 to entry: Mass produced bespoke parts (custom designed) are not considered to be commercially available parts.

3.4

quality grade

QG

classification of machinery parts as defined in Clause 5

3.5

manufacturing

process of creation, including material, machining, welding, cutting, assembly and verification of all steps

4 Applicability of the machinery component quality grade method

In order to assess whether and how this method is applicable for the component in question, the following flow diagram (Figure 1) shall be used.

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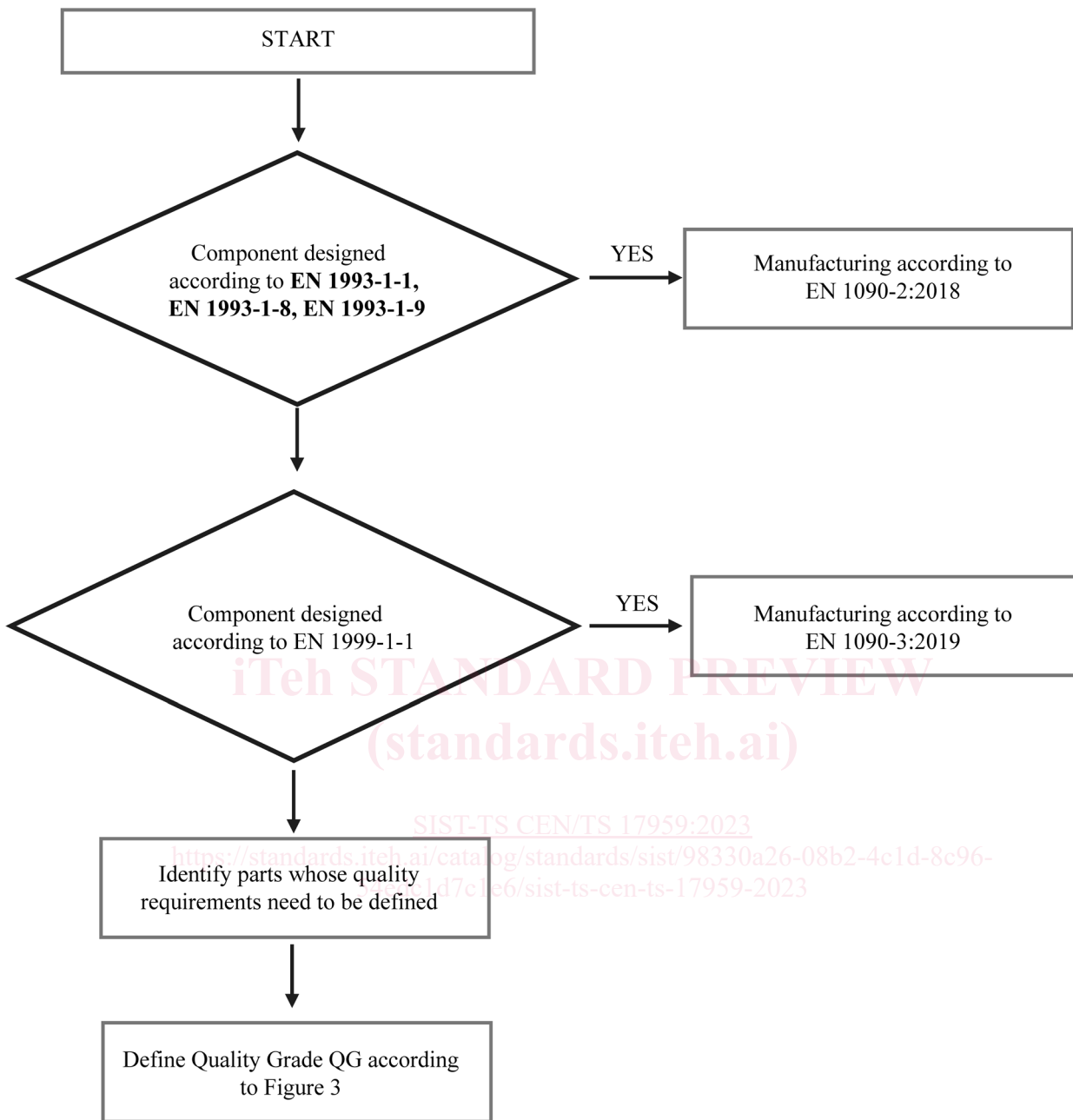


Figure 1 — Applicability of the Machinery component quality grade method

5 Quality grade

5.1 Sub-components of machinery components

Depending on the complexity of the design, machinery components may consist of one or more sub-components. Figure 2 contains examples of sub-components and their reference to potential steps in production.

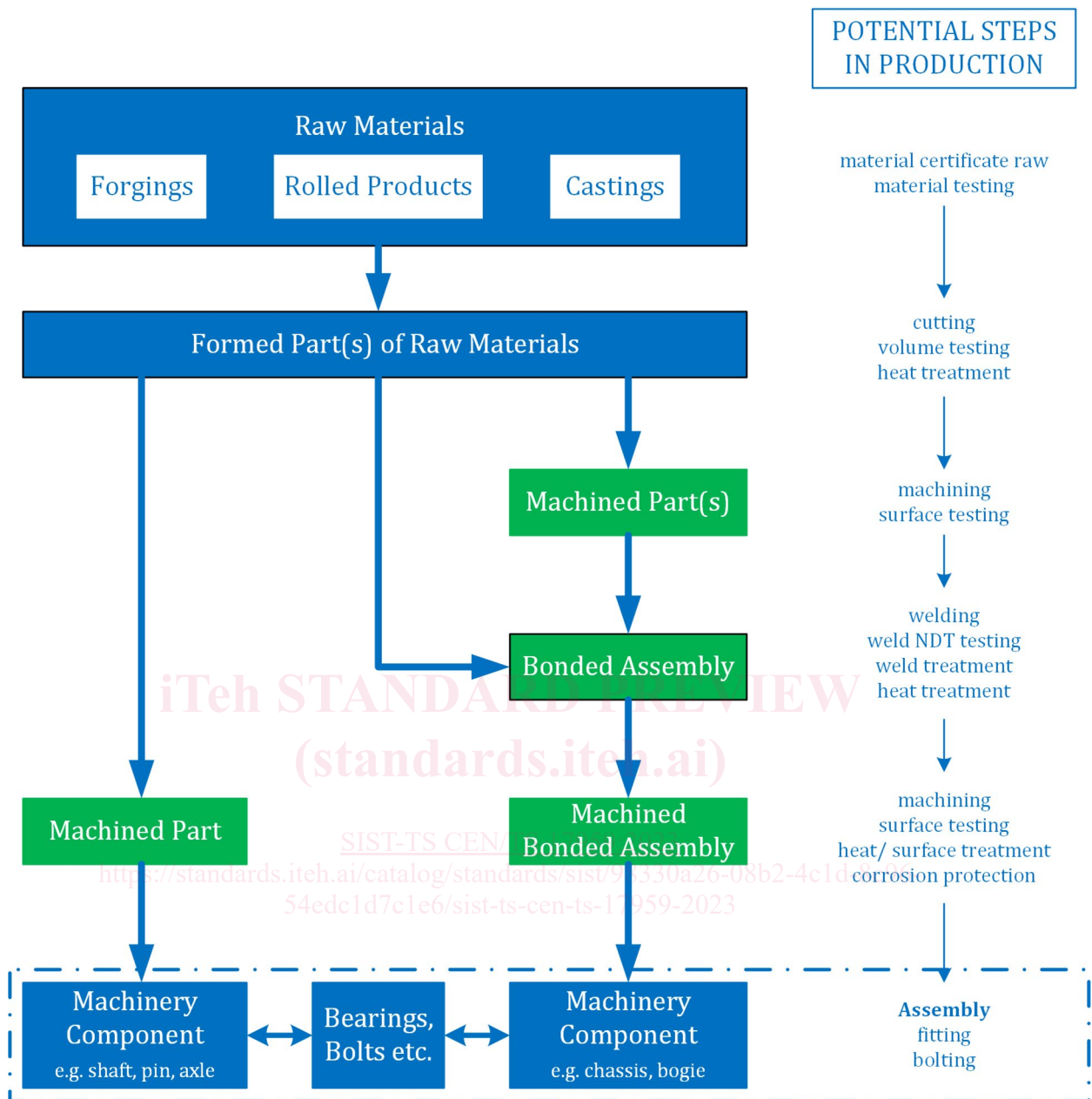


Figure 2 — Sub-Components of a Machinery Component

Sub-components in Figure 2 are:

- formed parts,
- machined parts,
- bonded assemblies,
- machined bonded assemblies,
- fastenings/ fitting elements.