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Railway applications - Bolting of rail vehicles and components

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English Version

Railway applications - Bolting of rail vehicles and components

Applications ferroviaires - Boulonnage des véhicules et des composants ferroviaires

Bahnanwendungen - Verschrauben von Schienenfahrzeugen und -fahrzeugteilen

This European Standard was approved by CEN on 30 September 2024.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
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European foreword

This document (EN 17976:2024) has been prepared by Technical Committee CEN/TC 256 “Railway applications”, the secretariat of which is held by DIN.

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of an identical text or by endorsement, at the latest by June 2025, and conflicting national standards shall be withdrawn at the latest by June 2025.

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.

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Introduction

Screwed and bolted joints are often used to assemble safety-critical components on rail vehicles. This document sets out key considerations for design and assembly of such joints, based on an assessment of their criticality.

The application of this document results in an appropriate safety level for bolted joints in railway applications considering design, assembling and service phase.

This document gives guidance on the selection and design of bolted joints for rail vehicles in mechanical and electrical applications.

The function of a bolted joint is to connect two or more parts in a sufficient and safe manner over the intended service life under the conditions of the railway environment. The mechanical bolted joint is designed to transmit forces between the connected components without failure, separation or relative movement. The electrical bolted joint is designed to ensure current transmission between electrical conductors safely and without separation or relative movement. For this purpose, the parts are held together by the preload of the bolt.

This document describes the safety categories of bolted joints and gives an overview of the resulting requirements linked to these safety categories.

It specifies standards for the design and verification of bolted joints. Design includes aspects such as joint dimensions, layout, securing of bolted joints and corrosion protection.

It is intended to support the designer in the basic selection of bolted joints for familiarisation with the necessary systematics and terms.

Tightening of bolted joints is a special process in the railway industry in accordance with ISO 22163. Therefore, the conformity of the resulting product cannot be readily determined without destructive analysis prior to use but the influence parameters affecting the process can be controlled. This document provides guidance to control these parameters.

Furthermore, this document specifies requirements for assembly, quality and maintenance.

1 Scope

This document specifies the requirements for designing, strength assessment, assembly and servicing of mechanical and electrical bolted joints made from metallic components and bolts.

This document is not intended for rivets, lock bolts, self-tapping screws, wood screws, thread-rolling screws, thread-forming and chipboards.

This document is applicable to all rail vehicles.

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 50343, *Railway applications — Rolling stock — Rules for installation of cabling*

EN 15865, *Adhesives — Determination of torque strength of anaerobic adhesives on threaded fasteners (ISO 10964)*

EN ISO 3506-1, *Fasteners — Mechanical properties of corrosion-resistant stainless steel fasteners — Part 1: Bolts, screws and studs with specified grades and property classes (ISO 3506-1)*

EN ISO 3506-2, *Fasteners — Mechanical properties of corrosion-resistant stainless steel fasteners — Part 2: Nuts with specified grades and property classes (ISO 3506-2)*

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

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

EN ISO 10683, *Fasteners — Non-electrolytically applied zinc flake coating systems (ISO 10683)*

EN ISO 4762, *Hexagon socket head cap screws (ISO 4762)*

EN ISO 10664, *Hexalobular internal driving feature for bolts and screws (ISO 10664)*

ISO 261, *ISO general purpose metric screw threads — General plan*

EN 17149-1:2024, *Railway applications — Strength assessment of rail vehicle structures — Part 1: General*