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Railway applications - Adhesive bonding of rail vehicles and their components



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ICS 45.060.01, 83.180

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EUROPEAN STANDARD

EN 17460

NORME EUROPÉENNE

EUROPÄISCHE NORM

July 2022

ICS 45.060.01; 83.180

English Version

Railway applications - Adhesive bonding of rail vehicles and their components

Applications ferroviaires - Collage par collage de
véhicules et de pièces ferroviaires

Bahnwendungen - Kleben von Eisenbahnfahrzeugen
und deren Teilen

This European Standard was approved by CEN on 22 May 2022.

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European foreword

This document (EN 17460:2022) 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of an identical text or by endorsement, at the latest by January 2023, and conflicting national standards shall be withdrawn at the latest by January 2027.

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

Historically, the production of railway vehicles and their components, for the main part, comprises such materials as steels and aluminium alloys. Their methods of construction and assembly include such processes as bolting, riveting, and welding.

Railway vehicles within the meaning of this document are defined in EN 15380-1 [47].

Technological developments have led to the availability of other materials, e.g. composites, and some of these traditional methods of construction as bolting, riveting, and welding and assembly are not necessarily appropriate or suitable for such materials.

For this reason, a process of adhesive bonding can be essential for the production of certain railway vehicles and their components, not only in the case of composites but for steels and aluminium alloys as well as glass and other materials.

The confirmation of the quality and integrity of the final adhesively bonded joints do not readily lend themselves to traditional inspection and testing techniques such as non-destructive testing.

Therefore, it is essential that the quality and control of the adhesively bonded joints of assemblies and components is managed to the best possible level by means of an appropriate process control procedure.

Whilst there are standards that deal with Quality Control and are taken into account, this document aims to give the correct framework and includes additional detail necessary for all adhesive bonding and sealing activities performed on railway vehicles and its components as a special process.

NOTE EN ISO 9001 [41] is such an example.

Against this background, this document refers to definitions as well as organisational, management, contractual and technical principles to be followed in production of adhesively bonded joints in analogy to welding technology. Thus, comparable focal points are also the focus here:

- Focal point 1: Classification of each adhesively bonded joint according to safety requirements (see 5.3.2).
- Focal point 2: Designation of supervisory personnel (Adhesive Bonding Coordinators - ABCs) and execution personnel (Adhesive Bonding Operators) who can objectively demonstrate that they have the necessary and required skills, knowledge, and experience in the field of adhesive bonding (see Clause 4).
- Focal point 3: Verification that the actual loading (stress, strain, and strain energy) of an adhesively bonded joint during the use of an adhesively bonded product is in any case less than the maximum load capacity (see 5.4 and Annex D).

Another focus of this document are the principles of workmanship of adhesively bonded joints (see Clause 6).

1 Scope

This document defines terms and specifies requirements for adhesive bonding and sealing work in rail vehicles and their components independent of the material of the adherend and the solidification mechanism, strength, and deformation properties of the adhesives.

This document is applicable to adhesive bonding and sealing adherends in the:

- development (pre-production);
- production (in-production);
- maintenance including repair (post-production);
- quality assurance of production, inspection, maintenance including repair of rail vehicles and their components.

This document is not applicable to:

- screw retention by the usage of adhesives, if a screw assembly without further safeguard of identical joint design is sufficient for the purpose;
- hybrid joints, if the expected function is given exclusively by another joining technology e.g. welding, screwing, riveting;
- production of vulcanizates;
- production of plywood;
- production of fibre reinforced plastic composites (FRP-composites);
- production of laminated safety glass;
- pure encapsulating of electronic parts;
- application of single-sided adhesive decorative films.

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 1465, *Adhesives — Determination of tensile lap-shear strength of bonded assemblies*

EN 923, *Adhesives — Terms and definitions*

EN ISO 10365, *Adhesives — Designation of main failure patterns*

ISO 16269-6:2014, *Statistical interpretation of data — Part 6: Determination of statistical tolerance intervals*

EN 14869-2, *Structural adhesives — Determination of shear behaviour of structural bonds — Part 2: Thick adherends shear test (ISO 11003-2)*

ISO 12107, *Metallic materials — Fatigue testing — Statistical planning and analysis of data*