

TECHNICAL SPECIFICATION
SPÉCIFICATION TECHNIQUE
TECHNISCHE SPEZIFIKATION

CEN/TS 15427-1-3

October 2023

ICS 45.040

Supersedes CEN/TS 15427-1-3:2021

English Version

**Railway applications - Wheel/Rail Friction Management -
Part 1-3: Equipment and Application - Adhesion Materials**

Applications ferroviaries - Gestion du frottement
roue/rail - Partie 1-3 : Équipement et application -
Matériau d'adhésion

Bahnanwendungen - Reibungsmanagement zwischen
Rad und Schiene - Teil 1-3: Vorrichtungen und
Anwendung - Kraftschluss erhöhende Materialien

This Technical Specification (CEN/TS) was approved by CEN on 30 August 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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CEN/TS 15427-1-3:2023 (E)**European foreword**

This document (CEN/TS 15427-1-3:2023) has been prepared by Technical Committee CEN/TC 256 "Railway applications", the secretariat of which is held by DIN.

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.

This document supersedes CEN/TS 15427-1-3:2021.

CEN/TS 15427-1-3:2023 includes the following significant technical changes with respect to CEN/TS 15427-1-3:2021:

- document has been editorially updated based on the feedback received on the previous edition;
- corrections and clarifications have been introduced based on the feedback received on the previous edition;
- consistency with the other parts of the series has been improved.

This document is part of the following series:

- *EN 15427-1-1, Railway applications - Wheel/Rail friction management - Part 1-1: Equipment and Application – Flange lubrication;*
- *CEN/TS 15427-1-2, Railway applications - Wheel/rail friction management - Part 1-2: Equipment and application – Top of rail materials;*
- *CEN/TS 15427-1-3, Railway applications - Wheel/rail friction management - Part 1-3: Equipment and application – Adhesion materials;*
- *EN 15427-2-1, Railway applications - Wheel/Rail friction management - Part 2-1: Properties and Characteristics – Flange lubricants;*
- *CEN/TS 15427-2-2, Railway applications - Wheel/rail friction management - Part 2-2: Properties and characteristics – Top of rail materials;*
- *CEN/TS 15427-2-3, Railway applications - Wheel/Rail friction management - Part 2-3: Properties and Characteristics – Adhesion materials;*
- *CEN/prTR 15427-3, Railway applications – Wheel/Rail friction management – Part 3: Rationale for requirements and further background information.*

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.

Introduction

Friction management using solid or fluid (oil, grease, etc.) substances at the wheel-rail interface is a complex subject and includes:

- lubrication of the wheel flange/ rail gauge corner interface, commonly referred to as “flange or rail lubrication”;
- lubrication of the back of flange/ check rail interface; commonly referred to as “check rail lubrication”;
- controlling the level of friction at the interface between the top of rail and the wheel tread, commonly referred to as “top of rail friction management”;
- applying materials to the wheel rail contact to increase (improve/ enhance/ recover) adhesion.

This document sets out requirements for the application for the adhesion materials. It describes systems fitted on board trains and on the track, as both systems may need to be employed to achieve effective adhesion.

Managing the wheel-rail interface effectively will reduce wheel slide and ensure reliable braking performance. When friction is managed effectively, noise levels, wear levels and the risk of flange climbing are reduced. Conversely, where not managed effectively, assets may require replacement prematurely before reaching their full economic potential.

There needs to be control in the application of adhesion materials such that there is:

- no loss of traction or braking performance;
- no adverse effect on signalling systems or track circuits;
- no harmful environmental effect;
- compatibility between the different adhesion materials in use should be carefully considered, particularly, between materials applied from on-board systems and trackside systems;
- no effect on the performance of the infrastructure.

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CEN/TS 15427-1-3:2023 (E)

1 Scope

This document is limited to specifying the requirements when applying adhesion material to the interface between the wheel tread and the crown of the rail and includes both trainborne and trackside solutions.

This document only covers the equipment and application of adhesion material to the active interface.

This document defines:

- the characteristics that systems for the application of adhesion materials of the wheel-rail interface shall achieve, together with applicable inspection and test methods to be carried out for verification;
- all relevant terminology which is specific to the adhesion materials of the wheel-rail interface.

This document applies to the mainline railway.

NOTE 1 This document can also be used for other railways, e.g. urban rail.

NOTE 2 Where technologies are used to influence the wheel/rail interface, other than the application of an adhesion material, this document is out of scope but can be used as guidance.

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 13749, *Railway applications — Wheelsets and bogies — Method of specifying the structural requirements of bogie frames*

CEN/TS 15427-2-3:2023, *Railway application — Wheel/Rail friction management — Part 2-3: Properties and Characteristics — Adhesion materials*

EN 15595:2018,¹ *Railway applications — Braking — Wheel slide protection*

EN 16834:2019, *Railway applications — Braking — Brake performance* 2023

EN 50238-1, *Railway applications — Compatibility between rolling stock and train detection systems — Part 1: General*

EN 61373, *Railway applications — Rolling stock equipment — Shock and vibration tests (IEC 61373)*

¹ As impacted by EN 15595:2018/AC:2021.

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminological 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

active interface

contact area between wheel tread and the crown of the rail

Note 1 to entry: Contact also occurs between the wheel flange root and the rail gauge corner but this interface is not within the scope of this document.

Note 2 to entry: See Figures 1 and 2.

3.2

applicator

part of trackside/trainborne equipment that delivers the adhesion material to the active interface

EXAMPLE Nozzles, pipes or applicator bars.

3.3

trainborne equipment

type of equipment that delivers product to the active interface installed on a train

3.4

trackside equipment

type of equipment that delivers product to the active interface installed on or adjacent to the track

3.5

infrastructure manager

authority responsible for the infrastructure or their authorised representative

3.6

supplier

provider of equipment, material and/or support services

3.7

adhesion material

substance used to alter adhesion at the wheel/rail active interface

EXAMPLE Sand.

3.8

technical specification

document defining other or additional requirements not defined in this standard

Note 1 to entry: Usually this is produced by and agreed between the customer and/or the manufacturer (sometimes called the supplier) or even a railway undertaking or an infrastructure manager and can be an accompaniment to contractual requirements.

CEN/TS 15427-1-3:2023 (E)**3.9****low adhesion**

conditions where the wheel/rail adhesion is in the range 0,08 to 0,05 according to EN 15595

3.10**very low adhesion**

conditions where the wheel/rail adhesion is in the range 0,05 to 0,03 according to EN 15595

3.11**extremely low adhesion**

conditions where the wheel/rail adhesion is below 0,03 according to EN 15595

Note 1 to entry: Low, very low and extremely low will be referred to as low adhesion throughout the document.

3.12**wheel slide protection system WSP**

system designed to make the best use of available wheel-rail adhesion (where this is less than the wheel-rail adhesion demanded), and in some cases improve wheel-rail adhesion, by a controlled reduction and restoration of the brake force to prevent wheelsets from locking and uncontrolled sliding, thereby minimizing the extension of stopping or slowing distances and possible wheel damage

3.13**reactive application**

application of the adhesion material when there is the demand from the relevant system

3.14**preventative application**

planned application of adhesion material to reduce the risk of a low adhesion event

3.15**dry particles**

conglomeration of discrete solid macroscopic particles with low moisture content

3.16**traction gel**

traction enhancing product which can be pumped and applied as a fluid, and it consists of a suspension of solid traction enhancing particles in a liquid or gel

4 General**4.1 Purpose**

Where a low adhesion event is encountered, the application of adhesion material to the active interface shall enhance/recover the adhesion without compromising the safe operation of the railway.

Where adhesion materials are applied as a preventative measure, the adhesion material shall reduce the risk of a low adhesion event occurring.

The specific purpose for the use of adhesion materials and its equipment shall be understood before deployment in order to achieve the desired outcome. (e.g. improved braking performance).

NOTE See CEN/TS 15427-2-3:2023, Wheel/Rail friction management – Properties and Characteristics - Adhesion materials.