



BSI Standards Publication

# Railway applications — Wheel/ Rail Friction Management

---

Part 1-3: Equipment and Application — Adhesion Materials

## National foreword

This Published Document is the UK implementation of CEN/TS 15427-1-3:2023. It supersedes PD CEN/TS 15427-1-3:2021, which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee RAE/3/-/6, Railway applications - Wheel/rail friction management.

A list of organizations represented on this committee can be obtained on request to its committee manager.

### Contractual and legal considerations

This publication has been prepared in good faith, however, no representation, warranty, assurance or undertaking (express or implied) is or will be made, and no responsibility or liability is or will be accepted by BSI in relation to the adequacy, accuracy, completeness or reasonableness of this publication. All and any such responsibility and liability is expressly disclaimed to the full extent permitted by the law.

This publication is provided as is, and is to be used at the recipient's own risk.

The recipient is advised to consider seeking professional guidance with respect to its use of this publication.

This publication is not intended to constitute a contract. Users are responsible for its correct application.

This publication is not to be regarded as a British Standard.

© The British Standards Institution 2023  
Published by BSI Standards Limited 2023

ISBN 9 78 0 539 20371 4

ICS 55.040

**Compliance with a Published Document cannot confer immunity from legal obligations.**

This Published Document was published under the authority of the Standards Policy and Strategy Committee on 31 October 2023.

### Amendments/corrigenda issued since publication

Date	Text affected
------	---------------

---

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.

CEN members are required to announce the existence of this CEN/TS in the same way as for an EN and to make the CEN/TS available promptly at national level in an appropriate form. It is permissible to keep conflicting national standards in force (in parallel to the CEN/TS) until the final decision about the possible conversion of the CEN/TS into an EN is reached.

CEN members are the national standards bodies of 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 United Kingdom.



EUROPEAN COMMITTEE FOR STANDARDIZATION  
COMITÉ EUROPÉEN DE NORMALISATION  
EUROPÄISCHES KOMITEE FÜR NORMUNG

**CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels**

<b>Contents</b>		<b>Page</b>
<b>European foreword</b> .....		<b>4</b>
<b>Introduction</b> .....		<b>5</b>
<b>1</b>	<b>Scope</b> .....	<b>6</b>
<b>2</b>	<b>Normative references</b> .....	<b>6</b>
<b>3</b>	<b>Terms and definitions</b> .....	<b>7</b>
<b>4</b>	<b>General</b> .....	<b>8</b>
<b>4.1</b>	<b>Purpose</b> .....	<b>8</b>
<b>4.2</b>	<b>Application</b> .....	<b>9</b>
<b>5</b>	<b>Requirements for trainborne equipment</b> .....	<b>9</b>
<b>5.1</b>	<b>General</b> .....	<b>9</b>
<b>5.2</b>	<b>Design of trainborne equipment</b> .....	<b>10</b>
<b>5.3</b>	<b>Installation of trainborne equipment</b> .....	<b>10</b>
<b>5.4</b>	<b>Operations, inspection and maintenance</b> .....	<b>11</b>
<b>5.5</b>	<b>Application</b> .....	<b>11</b>
<b>5.6</b>	<b>Verification</b> .....	<b>12</b>
<b>6</b>	<b>Requirements for trackside equipment</b> .....	<b>12</b>
<b>6.1</b>	<b>General</b> .....	<b>12</b>
<b>6.2</b>	<b>Design of trackside equipment</b> .....	<b>13</b>
<b>6.3</b>	<b>Installation of trackside equipment</b> .....	<b>14</b>
<b>6.4</b>	<b>Operation, inspection and maintenance</b> .....	<b>14</b>
<b>6.5</b>	<b>Application</b> .....	<b>14</b>
<b>6.6</b>	<b>Verification</b> .....	<b>15</b>
<b>Annex A (informative) Types of trainborne equipment</b> .....		<b>16</b>
<b>A.1</b>	<b>Introduction</b> .....	<b>16</b>
<b>A.2</b>	<b>Trainborne equipment - sand application to the active interface</b> .....	<b>16</b>
<b>A.3</b>	<b>Trackside equipment - applicator for traction gels</b> .....	<b>18</b>
<b>Annex B (informative) Guideline on approvals testing and verification</b> .....		<b>19</b>
<b>B.1</b>	<b>General</b> .....	<b>19</b>
<b>B.2</b>	<b>Trials</b> .....	<b>20</b>
<b>B.2.1</b>	<b>General</b> .....	<b>20</b>
<b>B.2.2</b>	<b>Monitoring</b> .....	<b>20</b>
<b>B.2.3</b>	<b>Outcome of trial</b> .....	<b>20</b>
<b>Annex C (informative) Guideline braking tests for adhesion materials (trainborne and trackside equipment)</b> .....		<b>21</b>
<b>C.1</b>	<b>General</b> .....	<b>21</b>
<b>C.2</b>	<b>Choosing the right test vehicle:</b> .....	<b>21</b>
<b>C.3</b>	<b>Trainborne equipment</b> .....	<b>21</b>

<b>C.4</b>	<b>Test track</b> .....	<b>22</b>
<b>C.5</b>	<b>Test conditions</b> .....	<b>22</b>
<b>C.6</b>	<b>Conducted tests</b> .....	<b>22</b>
<b>C.7</b>	<b>Testing proactive adhesion material</b> .....	<b>22</b>
<b>C.7.1</b>	<b>Test purpose</b> .....	<b>22</b>
<b>C.7.2</b>	<b>Test procedure</b> .....	<b>22</b>
<b>C.7.3</b>	<b>Test cases</b> .....	<b>22</b>
<b>C.7.4</b>	<b>Application adhesion material</b> .....	<b>23</b>
<b>C.7.5</b>	<b>Assessment criterion</b> .....	<b>23</b>
<b>C.8</b>	<b>Testing reactive adhesion material:</b> .....	<b>23</b>
<b>C.8.1</b>	<b>Test purpose</b> .....	<b>23</b>
<b>C.8.2</b>	<b>Reference braking distance</b> .....	<b>23</b>
<b>C.8.3</b>	<b>Application adhesion material</b> .....	<b>23</b>
<b>C.8.4</b>	<b>Point of braking</b> .....	<b>23</b>
<b>C.8.5</b>	<b>Assessment criterion</b> .....	<b>23</b>
<b>C.9</b>	<b>Effect on brake blocks and magnetic track brakes</b> .....	<b>23</b>
<b>C.10</b>	<b>Application efficiency of adhesion material</b> .....	<b>24</b>
<b>C.10.1</b>	<b>General</b> .....	<b>24</b>
<b>C.10.2</b>	<b>Purpose</b> .....	<b>24</b>
<b>C.10.3</b>	<b>Angle of nozzle for adhesion materials without adhesive properties</b> .....	<b>24</b>
	<b>Bibliography</b> .....	<b>26</b>

## 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.

## 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,<sup>1</sup> *Railway applications — Braking — wheel slide protection*

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

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)*

---

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