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**Railway applications - Wheel/Rail friction management -
Part 2-3: Properties and Characteristics - Adhesion
materials**

Applications ferroviaires - Gestion du frottement
roue/rail - Parte 2-3: Propriétés et Caractéristiques -
Matériau d'Adhésion

Bahnwendungen - Reibungsmanagement zwischen
Rad und Schiene - Teil 2-3: Eigenschaften und
Merkmale - Kraftschlussmaterialien

This Technical Specification (CEN/TS) was approved by CEN on 27 December 2020 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.

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

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European foreword

This document (CEN/TS 15427-2-3:2021) 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 is part of the series EN 15427, Railway applications - Wheel/Rail friction management, which consists of the following parts:

- *Part 1-1: Equipment and Application - Flange Lubrication*
- *Part 1-2: Equipment and Application - Top of Rail materials*
- *Part 1-3: Equipment and Application - Adhesion materials*
- *Part 2-1: Properties and Characteristics - Flange lubricants*
- *Part 2-2: Properties and Characteristics - Top of Rail materials*
- *Part 2-3: Properties and Characteristics - Adhesion materials*
- *Part 3: Rationale for requirements and further background information*

According to the CEN-CENELEC Internal Regulations, the national standards organisations of the following countries are bound to implement 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, Turkey and the United Kingdom.

CEN/TS 15427-2-3:2021 (E)

Introduction

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

- 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”;
- altering 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”;
- altering the level of adhesion at the interface between the top of rail and the wheel tread.

This document sets out requirements for the material to be used for adhesion management. It specifies requirements for the material, how to test it and how to approve it.

The main purpose of an adhesion material is to condition the wheel/ rail contact to either prevent the occurrence of slipping or sliding or to enable recovery of traction/ braking where slipping or sliding occurs.

The adhesion material should be tested to confirm there is:

- compatibility with top of rail systems;
- no intolerable increased risk of fire;
- no harmful environmental effects;
- no incompatibility between the different materials in use, particularly between solid and fluid systems;
- satisfactory and consistent product quality and performance;
- no degradation to the safety of the railway (braking, signalling).

1 Scope

This document specifies the requirements of adhesion materials intended to be applied to the interface between the wheel tread and the rail crown (active interface). It can be applied either directly or indirectly to the wheel tread or rail.

It outlines the information required for most approval procedures, the method of testing and routine control/monitoring of the material.

This document does not deal with Top of Rail materials. For Top of Rail materials see CEN/TS 15427-2-2:2021.

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 933-1:2012, *Tests for geometrical properties of aggregates - Part 1: Determination of particle size distribution - Sieving method*

EN 1097-3:1998, *Tests for mechanical and physical properties of aggregates - Part 3: Determination of loose bulk density and voids*

EN 1097-6:2013, *Tests for mechanical and physical properties of aggregates - Part 6: Determination of particle density and water absorption*

CEN/TS 15427-1-3:2021, *Railway applications - Wheel/rail friction management - Part 1-3: Equipment and Application - Adhesion materials* standards/sist/ef1bef7d-1173-4b02-b824-4b9a153dcf31/sist-ts-cen-ts-15427-2-3-2021

EN 1744-1:2009+A1:2012, *Tests for chemical properties of aggregates - Part 1: Chemical analysis*

ISO 2049:1996, *Petroleum products - Determination of colour (ASTM scale)*

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 <http://www.electropedia.org/>

3.1

adhesion material

substance that is used to either prevent the occurrence of slipping or sliding or to enable recovery of traction/ braking where slipping or sliding occurs

3.2

batch

entire content of a single identified production of material from the same manufacturing process

CEN/TS 15427-2-3:2021 (E)**3.3****active interface**

contact area between the wheel tread and the top of the rail

3.4**trainborne**

type of system installed on a train

3.5**trackside**

type of system installed on or adjacent to the track

3.6**customer**

railway undertaking, infrastructure owner, manufacturer or buyer of railway products or subassemblies, or their representative

3.7**supplier**

supplier of adhesion materials

Note 1 to entry: A supplier might also be the manufacturer of the product.

3.8**product specification**

document prepared by the customer that describes the conditions and requirements for the lubricant to meet

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4 Adhesion material requirements

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The adhesion material shall be designed to either reduce the occurrence of slipping or sliding or to enhance recovery of traction/ braking where slipping or sliding occurs.

Different materials may be used for traction/ braking.

When applied within the specified limits to the active interface the material shall not compromise the safety of the railway (i.e braking distance, signalling systems).

NOTE See Annex A.

5 General requirements**5.1 Introduction**

This clause outlines the information required to gain approval on most railway networks. It does not cover its performance on the railway.

5.2 Product specification

The product specification shall be fully documented and shall include the following information:

- a) purpose of material;
- b) conformity to the applicable type tests as set out in Tables A.1 to A.2;
- c) conformance with other relevant local requirements (such as environmental, fire, toxicity, etc...);

- d) application data:
- 1) including equipment it can be used with;
 - 2) operating temperatures.

NOTE 1 The typical operating temperature range to take into account is from -25 °C to $+80\text{ °C}$.

- e) Additional validation tests (see Table A.3, Annex B and Annex C);
- f) Any previous relevant experience (i.e. use in other countries);
- g) Conditions for packaging, storage and marking (see Clause 8).

NOTE 2 Where legislation and regulations (European, national or local) concerning ecological and environmental compatibility of materials (biodegradability, toxicity, etc.) are applicable, consideration will need to be given to the relevant requirements.

5.3 Technical file

A file of technical data showing compliance with the requirements in the product specification and the results of type tests and trials shall be provided. A technical datasheet shall also be provided (see Clause 7).

A material safety data sheet (MSDS) for the product in the language of the interested customer or country shall be included.

6 Control and monitoring of product

6.1 Manufacturing process

If the manufacturing process is changed in a way that may affect the chemical composition, geometric specification and/ or physical properties it shall be documented and the customer shall be notified.

NOTE In some cases, this leads to a new approval being required.

6.2 Composition of material

If the composition of the material is changed in any way, it shall be documented and the customer shall be notified.

NOTE In some cases, this leads to a new approval being required.

6.3 Routine tests

Routine tests ensure product consistency from batch to batch.

The routine tests are listed in Tables A1 to A2. If additional tests are required (such as those not included in the tables or a type test) this and the frequency can be agreed between the client and supplier.

The sample of material assessed for quality testing shall have been manufactured in a regular production batch. The entire sample of material used for the approval tests shall be taken from the same production batch and delivered in a single consignment and be representative of the batch.

The results of the routine tests shall be recorded.

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Retention of test records and samples, witnessing of tests, calibration of test equipment shall be considered.

7 Technical datasheet**7.1 General**

The technical datasheet shall include the individual identifying code or name of the material, a description of the product's field of use and typical means of application. For each material type, the information in the following subclauses shall also be included.

7.2 Dry particle material characteristics

The product shall be described by its geometric properties and/ or physical properties. Further technical data shall be provided as listed under the 'datasheet' column in Table A.1.

7.3 Water based material characteristics

The material shall be described by its viscosity, its temperature range. Further technical data shall be provided as listed under the 'datasheet' column in Table A.3.

8 Packaging, labelling and storage

The packaging shall protect the contents from contamination and damage.

The labelling shall include at least the following:

- supplier's name; [SIST-TS CEN/TS 15427-2-3:2021](https://standards.iteh.ai/catalog/standards/sist/efdbef7d-1173-4b02-b824-4691534ef71c/sist-ts-cen-ts-15427-2-3-2021)
- brand name and/or code of the material; <https://standards.iteh.ai/catalog/standards/sist/efdbef7d-1173-4b02-b824-4691534ef71c/sist-ts-cen-ts-15427-2-3-2021>
- batch number and date of manufacture/ production, uncoded or coded;
- net mass/quantity/volume;
- handling instructions.

NOTE Local regulatory requirements will apply.

The following additional information shall be included if specified in the product specification:

- customer stock number;
- an indication that the batch has been accepted by the customer.

The storage conditions and, if applicable, the date limit of use of the material shall be provided.

Annex A (normative)

Requirements for dry particle material and testing

A.1 Explanation of Annex A: Tables A.1 to A.3

The tables have 3 purposes:

- 1) Tests to show the product can be used in the railway environment.
 - Values may vary depending on where the material is used.
- 2) Product consistency.
- 3) Performance characteristics.

For each required property of the material, Tables A.1 and A.2 list the mandatory and optional tests for adhesion materials, and parameters for trainborne and trackside applications.

Table A.3 lists additional tests to check the performance characteristics of the material and that the material will operate correctly with the equipment it's to be used with.

A.2 Key to Annex A table columns

The key to the columns 'Type', 'Routine' and 'Technical Datasheet' in Tables A.1 to A.3 is as follows:

- 'Type' = this indicates the type tests required (see 5.2 and 6.2).
- 'Routine' = this indicates the routine tests required (see 6.3).
- 'Technical Datasheet' = this indicates the characteristics to be listed in the product documentation.

In each column, a symbol is used to indicate the required test or information:

- 'X' indicates the test or piece of information is mandatory;
- 'O' indicates the test or piece of information is optional.

A.3 Key to Annex A table column 'Use'

Tables A.1 to A.3 include a column headed 'Use' and the letters used mean the following:

- A = Trainborne;
- B = Trackside.

This column identifies the most common systems in current use. Most trainborne equipment blows/ pumps the material and most trackside equipment pumps the material. However, where alternatives exist, careful consideration of the tests required is needed.