SLOVENSKI STANDARD
SIST-TS CEN/TS 15427-1-3:2021

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Železniške naprave - Trenje na stiku kolo-tirnica - 1-3. del: Oprema in uporaba - Lepilni materiali

Railway applications - Wheel/Rail friction management - Part 1-3: Equipment and Application - Adhesion materials

Bahnanwendungen - Reibungsmanagement zwischen Rad und Schiene - Teil 1-3: Vorrichtungen und Anwendung - Kraftschlussmaterialien

Applications ferroviaires - Gestion du Frottement Roue/Rail - Parte 1-3: Équipement et Application - Matériau d'Adhésion

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EUROPEAN COMMITTEE FOR STANDARDIZATION
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EUROPÄISCHES KOMITEE FÜR NORMUNG

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European foreword

This document (CEN/TS 15427-1-3:2021) 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 organizations 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, Turkey 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”;

— 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”;

— 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 wear of both wheel and rail 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;

— no incompatibility between the different lubricants/materials in use, particularly, between solid and fluid 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 only 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 a 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 15427-2-3:2021, *Railway application — Wheel/ Rail friction management – Part 2-3: Properties and Characteristics – Adhesion materials*

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

EN 50121-1, *Railway applications - Electromagnetic compatibility - Part 1: General*

EN 50125-1, *Railway applications - Environmental conditions for equipment - Part 1: Rolling stock and on-board equipment*

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*

EN 62621, *Railway applications - Fixed installations - Electric traction - Specific requirements for composite insulators used for overhead contact line systems*

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
active interface
contact area between wheel tread and the crown of the rail

3.2
applicator
part of trackside/trainborne equipment that delivers the adhesion material to the active interface

EXAMPLE Nozzles or pipes.

3.3
trainborne equipment
system carried on the train that consists of one or more applicators, a storage unit and a means of control

3.4
trackside equipment
system installed on or adjacent to the track that consists of one or more applicators, storage containers and a means of control

3.5
supplier
organisation responsible for supplying the equipment/adhesion material

3.6
adhesion material
substance used to alter friction at the wheel/rail active interface

EXAMPLE Sand.

3.7
technical specification
document outlining agreement between the client and the supplier

3.8
low adhesion
conditions where the wheel/rail adhesion is in the range 0,08 to 0,05

3.9
very low adhesion
conditions where the wheel/rail adhesion is in the range 0,05 to 0,02

3.10
extremely low adhesion
conditions where the wheel/rail adhesion is below 0,02

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

3.11
Wheel Slide Protection
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

3.12
reactive application
application of the adhesion material when there is the demand from the relevant system

3.13
preventative application
planned application of adhesion material to reduce the risk of a low adhesion event

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 15427-2-3:2021, Wheel/Rail friction management – Properties and Characteristics - Adhesion materials.

4.2 Application

The adhesion material application equipment shall apply adhesion material to take effect in the active interface.

The adhesion material application equipment shall be designed to limit contamination of any other part of the train or infrastructure.

Build-up of excess adhesion material on the train or infrastructure shall be avoided.

Where it is likely that adhesion material will come into contact with other materials when applied, possible incompatibilities shall be considered.

The applicator shall be adjustable such that it can be returned to its correct working position following wheel or rail reprofiling or other maintenance changes.

When changing to an alternative adhesion material in the equipment it shall be ensured that the performance of the adhesion material application equipment meets the original requirements of the client/the technical specification.

A method to determine when refilling is required shall be provided.

A method by which the equipment can be checked to ensure its functional status shall be provided.

Ensure the adhesion material being applied to the active interface, has been approved for use by the relevant authorizing bodies (see Annex B).

5 Requirements for trainborne equipment

5.1 General

When applying to the active interface, the following shall be considered:

— method of braking (e.g. tread, disk or other);

— position and number of applicator(s) on the vehicle;

— direction of travel;

— proximity of applicator to the wheel and the rail;

— speed of train;

— amount of application.

The position and alignment of each applicator shall take into account:

— suspension movements to ensure application of the adhesion material to the active interface in all conditions;

— the need to gain access for maintenance.

Affected parties shall be engaged and relevant approvals shall be gained upon introduction of trainborne equipment.

NOTE A description of generic types of applicators is given in Annex A.

5.2 Design of trainborne equipment

General consideration when designing and installing trainborne equipment shall include:

— ambient temperature range and climatic conditions (see EN 50125-1);

— equipment positioning and alignment;

— protection of the adhesion material from contamination (water, dust, etc.);

— space constraints (e.g. static and dynamic);

— availability of necessary supplies (e.g. electrical, air, hydraulic, etc.);

— options for system control and adhesion material regulation;

— interface with other on-board systems (e.g. braking);

— the type of adhesion material;

— total life cycle cost and maintainability;

— length/type of train;

— interface with infrastructure systems;

— intended design life and sustainability;

— safety and reliability requirements;

— vibration and shock loads requirements of EN 61373 and EN 13749 relevant to the position on the vehicle;

— protection of the equipment from flying objects (e.g. track ballast);

— EMC standard (see EN 50121-1);

— aerodynamic effects (e.g. wind turbulence may affect the performance and may be optimized by use of a windbreak);

— electronic equipment used on rolling stock (see EN 62621);

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

— noise emissions;

— volume of the storage.

5.3 Installation of trainborne equipment

The supplier of the trainborne equipment shall produce instructions for the installation and use of the equipment.

Trainborne equipment shall be installed in accordance with the manufacturer's instructions.

The trainborne equipment shall comply with the vehicle gauge.

5.4 Operations, Inspection and maintenance

Before any adhesion material is used it shall be verified if it is compatible with the equipment.

The installation shall be checked prior to and after a short period of entering service to ensure that the adhesion material is being applied to the active interface.

Maintenance instructions for the trainborne equipment shall be provided. These shall include a method for fault diagnosis to check that the trainborne equipment is not partially or fully blocked or misaligned and that all components are securely attached to their mountings.

A train maintenance plan shall include a check of the trainborne equipment to be carried out at pre-defined intervals taking into account the equipment supplier's instructions. This maintenance plan shall include monitoring of adhesion material usage and application to the active interface as a method of checking effective delivery.