SLOVENSKI STANDARD
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Železniške naprave - Trenje na stiku kolo-tirnica - 1-2. del: Oprema in uporaba - Materiali za zgornjo površino tirnic

Railway applications - Wheel/Rail friction management - Part 1-2: Equipment and Application - Top of Rail materials

Bahnanwendungen - Reibungsmanagement zwischen Rad und Schiene - Teil 1-2: Vorrichtungen und Anwendung - Behandlung der Schienenoberfläche

Applications ferroviaires - Gestion de la friction roue/rail - Partie 1-2 : Équipements et application - Matériaux de la surface du rail

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45.040	Materiali in deli za železniško tehniko	Materials and components for railway engineering
45.080	Tračnice in železniški deli	Rails and railway components

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European foreword

This document (CEN/TS 15427-1-2:2021) 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 EN 15427 series, 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 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 the requirements for the equipment and application of the top of rail wheel/rail friction management. It describes systems fitted on board trains and on the track, as both systems may need to be deployed to achieve effective friction management of the wheel-rail interface.

Managing the wheel-rail interface effectively will reduce wear of both wheel and rail. 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 top of rail materials such that there is:

— no loss of traction or braking performance;

— no adverse effect on signalling systems or track circuits;

— understanding of the increased risk of fire;

— no harmful environmental effect;

— no incompatibility between the different lubricants/ materials in use, particularly, between solid and fluid systems.

1 Scope

This document is limited to specifying the requirements when applying material to the active interface between the wheel tread and the crown of the rail and includes trainborne and track side equipment.

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

This document defines:

— the characteristics that systems of top of rail equipment for 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 application of top of rail materials of the wheel-rail interface.

This document only applies to the mainline railway.

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

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 15427-2-2, *Railway applications - Wheel/Rail friction management - Part 2-2: Properties and Characteristics - Top of Rail materials*

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

EN 50121 (series), *Railway applications - Electromagnetic compatibility*

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

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.

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

EXAMPLE Nozzles or solid sticks

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
train operator
authority responsible for operating the train or their authorised representative

3.6
infrastructure manager
authority responsible for the infrastructure or their authorised representative

3.7
supplier
organisation responsible for supplying the equipment/ material

3.8
material
substance designed to alter friction at the wheel/rail active interface

3.9
top of rail material
substance that changes the rheology of the third layer body to lower friction

4 General

4.1 Purpose

The primary aim of the top of rail friction management is to achieve wheel/rail friction conditions that optimises asset life and reduces noise and vibration issues, as part of a wider wheel/rail management strategy without compromising the safe operation of the railway.

Top of rail friction management may be used to:

— reduce noise and vibration;

— reduce the rate of wear;

— reduce rate of corrugation growth;

— reduce number of wheel and rail defects.

The specific purpose for the use of top of rail equipment and material shall be understood before deployment in order to achieve the desired outcome (e.g. reduction in wear).

4.2 Application

The trainborne/trackside top of rail equipment shall apply material to take effect in the active interface as set out in Clauses 5 and 6 of this document.

The trainborne/trackside top of rail equipment shall be designed to limit contamination of any other part of the train or infrastructure.

Where both trainborne and trackside top of rail equipment are being applied concurrently, the effect to braking performance and signalling shall be understood.

Compatibility between different materials (such as flange lubricant and top of rail/adhesion material) in use shall be taken into account. Material properties and characteristics shall comply with the requirements set out in CEN/TS 15427-2-2.

The applicator shall be adjustable such that it can be returned to its correct working position (refer to 5.4) following wheel or rail reprofiling or other maintenance changes.

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.

Where there is any change to the approved design of the equipment, the customer shall be informed.

NOTE 1 This may lead to the equipment requiring reapproval.

NOTE 2 Ensure the 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;

— frequency and amount of application.

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

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

— the need to gain access for maintenance.

The trainborne equipment shall comply with the vehicle gauge.

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 - The design and location of the equipment shall factor in the consideration for quick and easy refilling capability;

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

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

— options for system control and material regulation;

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

— the type of material to be applied and its intended function;

— 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 (EN 50121);

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

— Electronic equipment used on rolling stock (EN 62621);

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

— noise emissions.

5.3 Installation of trainborne equipment

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

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