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Železniške naprave - Trenje na stiku kolo-tirnica - 1-1. del: Oprema in uporaba - Maziva za prirobnice

Railway applications - Wheel/Rail friction management - Part 1-1: Equipment and Application - Flange Lubricants

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

Applications ferroviaires - Gestion des frottements roue/rail - Partie 1-1 : Équipement et application - Lubrification des boudins de roues

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Railway applications - Wheel/Rail friction management - Part 1-1: Equipment and Application - Flange Lubricants

Applications ferroviaires - Gestion des frottements
roue/rail - Partie 1-1 : Équipement et application -
Lubrification des boudins de roues

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

This European Standard was approved by CEN on 17 January 2022.

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COMITÉ EUROPÉEN DE NORMALISATION
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EN 15427-1-1:2022 (E)**European foreword**

This document (EN 15427-1-1:2022) has been prepared by Technical Committee CEN/TC 256 “Railway Applications”, the secretariat of which is held by DIN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by September 2022, and conflicting national standards shall be withdrawn at the latest by September 2022.

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 EN 15427:2008+A1:2010.

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*

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.

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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 lubrication of the wheel flange / rail gauge corner and back of flange/ check rail interface. It describes systems fitted on board trains and on the track, as both systems may need to be employed to achieve effective lubrication 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 lubrication 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.

EN 15427-1-1:2022 (E)**1 Scope**

This document specifies the requirements for equipment used to apply lubricant to the interface between the wheel flange and the gauge face of the rail, and contact area between the check rail face and the back of the wheel (active interface), either directly or indirectly to the wheel flange or to the rail, and includes both trainborne and trackside solutions.

This document specifies:

- the characteristics that systems of lubrication of the active interface should achieve, together with applicable inspection and test methods to be carried out for verification;
- all relevant terminology which is specific to the lubrication of the active interface.

This document 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 15427-2-1:2022, *Railway applications - Wheel/Rail friction management - Part 2-1: Properties and Characteristics - Flange lubricants*

3 Terms and definitions (standards.iteh.ai)

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 flange and the gauge face of the rail and contact area between the check rail face and the back of the wheel

NOTE See Figures 1, 2 and 3.

3.2**applicator**

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

EXAMPLE Nozzles or 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**railway undertaking**

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/ lubricant

3.8**lubricant**

substance designed to alter friction at the active interface

3.9**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.

3.10**top of rail material**

substance that changes the coefficient of friction of the active interface

4 General**4.1 Purpose of equipment**

The aim of the equipment is to apply the lubricant to the active interface to achieve wheel/rail friction conditions that optimize asset life, as part of a wider wheel/rail management strategy, without compromising the safe operation of the railway.

Wheel flange/ rail friction management may be used to reduce:

- noise and vibration;
- the rate of wear of the wheel and rail;
- number of wheel and rail defects.

The specific purpose for the use of trainborne/ trackside equipment and lubricants shall be understood before deployment in order to achieve the desired outcome (e.g reduction in wear).

EN 15427-1-1:2022 (E)**4.2 Application of lubricant**

The trainborne/trackside equipment shall apply lubricant to take effect in the active interface as set out in Clauses 5 and 6.

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

The trainborne/ trackside lubrication system shall not compromise the performance of the train (i.e braking and traction), see Annex B.

The application of the trainborne/trackside equipment shall be considered where both could be in use at the same location.

Compatibility between different lubricants (such as flange lubricant and top of rail material/adhesion material) in use shall be taken into account. Lubricant properties and characteristics shall comply with the requirements set out in EN 15427-2-1:2022.

The applicator shall be adjustable such that it can be returned to its correct working position (see Annex E) 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.

The lubricant being applied to the active interface shall be approved for use by the relevant authorizing bodies (see Annex B).

NOTE It is good practice for all affected parties (infrastructure manager/ railway undertaking/ suppliers) to discuss the final use as early as possible to ensure a smooth approval process.

Where there is any change to the approved design of the equipment, all affected parties shall be informed. Such changes may lead to equipment requiring reapproval.

5 Requirements for trainborne equipment**5.1 General**

The following general requirements shall be considered when designing and using the equipment:

- 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 the train;
- frequency and amount of application.

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

- suspension movements to ensure application of the lubricant to the active interface in all conditions;
- the need to gain access for maintenance.

The trainborne equipment shall comply with the vehicle gauge as set out in the technical specification of the system.

5.2 Design of trainborne equipment

General considerations 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, (static and dynamic);
- availability of necessary supplies, (e.g. electrical, air, hydraulic, etc.);
- options for system control and lubricant regulation;
- interface with other on-board systems, (e.g. braking);
- the type of lubricant to be applied and its intended function;
- total life cycle cost and maintainability;
- length/ type of train and vehicle architecture;
- interface with infrastructure systems;
- intended design life and sustainability;
- safety and reliability requirements;
- compliance with 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 eg track ballast;
- electromagnetic compatibility (see EN 50121-1);
- cross-wind effects (e.g. wind turbulence can affect the performance of a spray system which could be optimized by use of a windbreak);
- electronic equipment used on rolling stock (EN 62621);
- compatibility between rolling stock and train detection systems (see EN 50238-1);
- noise emissions;
- the type of lubricant to be applied, its characteristics and its intended function.

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EN 15427-1-1:2022 (E)**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 installation shall be checked after a short period of service to ensure that the lubricant is being applied correctly to the active interface, see Annex B.

5.4 Operations, inspection and maintenance

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 (see Annex D for some examples).

A train maintenance plan shall also 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 lubricant usage and application alignment as a method of checking effective delivery.

5.5 Application

The equipment shall be designed so that the rate of application of the lubricant is consistent during the agreed service conditions in the technical specification.

Where lubricants are manually applied by the driver, consideration shall be given to record this action.

Any trainborne equipment using a spray applicator shall have a low speed cut out.

A high speed cut out should be considered for trainborne equipment design.

The lubricant shall be applied to areas "2" and "3" for lubrication of the wheel flange / rail gauge corner interface and to "6" for lubrication of the back of flange/ check rail interface as shown in Figure 1.

Migration of lubricant to other zones is not desirable.