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**Železniške naprave – Trenje na stiku kolo/tirnica – Mazanje kolesnega venca  
(istoveten prEN 15427:2005)**

Railway Applications - Wheel/Rail Friction Management - Flange Lubrication

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ICS

English Version

## Railway Applications - Wheel/Rail Friction Management - Flange Lubrication

This draft European Standard is submitted to CEN members for enquiry. It has been drawn up by the Technical Committee CEN/TC 256.

If this draft becomes a European Standard, CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

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Recipients of this draft are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.

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

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## Foreword

This document (prEN 15427:2005) has been prepared by Technical Committee CEN/TC 256 “Railway Applications”, the secretariat of which is held by DIN.

This document is currently submitted to the CEN Enquiry.

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directive(s).

For relationship with EU Directive(s), see informative annex ZA, which is an integral part of this document.

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## Introduction

Friction management using solid or fluid (oil, grease, etc) lubricants 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 lubrication”,
- friction modification of the top of rail / wheel tread interface, commonly referred to as “top of rail friction management”.

This part of this standard EN sets out requirements for the lubrication of the wheel flange / rail gauge corner only. 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, energy consumption 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,
- adverse effect on signalling systems or track circuits,
- intolerable increased risk of fire,
- harmful environmental effect.
- incompatibility between the different lubricants in use, particularly, between solid and fluid systems.

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## 1 Scope

This standard is limited to specifying the requirements when applying lubricants to the wheel-rail interface between the wheel flange and the rail gauge corner (active interface) and includes both trainborne and trackside solutions.

All relevant terminology, which is specific to flange lubrication is defined in this standard. The means of defining the product specification, testing and quality control are also specified.

## 2 Normative references

The following referenced documents are indispensable for the application 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 61373, *Railway applications. Rolling stock equipment. Shock and vibration tests.*

prEN 13749, *Railway Applications – wheelsets and bogies – method of specifying the structural requirements of bogie frames.*

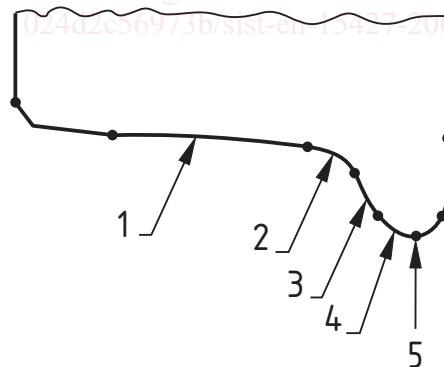
EN 50125-1, *Railway applications – Environmental conditions for equipment – Part 1: Equipment on board rolling stock*

prEN 13715, *Railway Applications – Wheelsets and bogies – Wheels – Tread profile*

## 3 Terms and definitions

For the purposes of this European Standard, the following terms and definitions apply:

Figures 1 and 2 show the areas on the wheel and rail that are referred to in this standard.



**Figure 1: Areas of a wheel tread**

Key:

- |    |             |          |
|----|-------------|----------|
| 1. | Tread       |          |
| 2. | Flange root | } Flange |
| 3. | Flange face |          |
| 4. | Flange toe  |          |
| 5. | Flange tip  |          |

Note: This terminology is specific to this Standard, however to relate it to EN 13715 see Annex E.

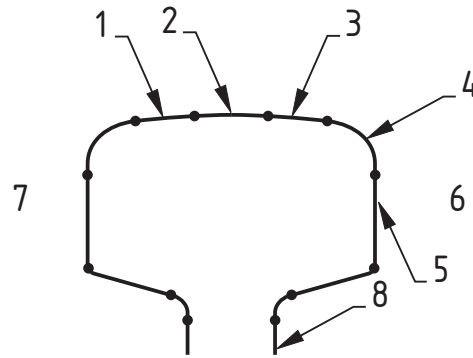


Figure 2: Areas of a rail

Key:

- 1. Field Shoulder
- 2. Crown
- 3. Gauge Shoulder
- 4. Gauge corner
- 5. Gauge face
- 6. Inside of running rail (four foot )
- 7. Outside of running rail (six foot or field side)
- 8. Web

} Top of rail

### 3.1

#### active interface

contact area between wheel flange root and rail gauge corner

NOTE Contact also occurs between the wheel tread and the crown of the rail but this interface is not within the scope of this standard

### 3.2

#### flange lubrication

lubrication of the active interface, either by applying a lubricant to the wheel flange or to the rail gauge face

### 3.3

#### train

one or more railway vehicles coupled together

### 3.4

#### lubricant

fluid (oil, grease, etc) or solid (stick) that lowers the friction level

### 3.5

#### lubrication system

means of applying a lubricant to the active interface

### 3.6

#### applicator

equipment that is attached to the railway vehicle and results in lubricant being delivered to the active interface

### 3.7

#### trainborne equipment

lubrication system carried on the train that consists of one or more applicators, a storage unit and a control device

### 3.8

#### lubricator

equipment fitted to the track that delivers lubricant to the gauge face of the rail

### 3.9

#### trackside equipment

lubrication system mounted on or adjacent to the track that consists of one or more lubricators, storage containers and a control device



**3.10****railway undertaking (Train operator)**

authority responsible for operating the train or their authorised representative

**3.11****contracting entity**

organisation purchasing the train. Could be a railway undertaking, a leasing company or a manufacturer

**3.12****infrastructure manager**

authority responsible for the infrastructure

**3.13****supplier**

organisation that produces and/or supplies the lubrication equipment

**4 Requirements for trainborne equipment****4.1 General**

**4.1.1** The trainborne equipment shall apply lubricant to take effect in the active interface. The trainborne equipment shall be installed as a minimum on one axle close to the leading end of a train to ensure all the following active interfaces between the train wheels and rails are lubricated. The optimum position for this equipment is on the leading wheelset, but space limitations may preclude this.

Note: If required, further wheelsets may be equipped with trainborne equipment.

**4.1.2** The trainborne equipment shall be designed to limit contamination of any other part of the train or infrastructure. Build up of excess lubricant on the train shall be avoided to reduce the risk of fire. It may also lead to problems with maintenance.

**4.1.3** Solid lubricants that are used in the form of, for example stick application on to the flange may eject part of the stick as debris. The mass of this part shall be no greater than 5 g

**4.1.4** Compatibility between different lubricants in use shall be taken into account. Lubricant properties and characteristics shall comply with the requirements set out in clause 6.

**4.2 Selection of trainborne equipment**

**4.2.1** In selecting the trainborne equipment, the following shall be taken into account:

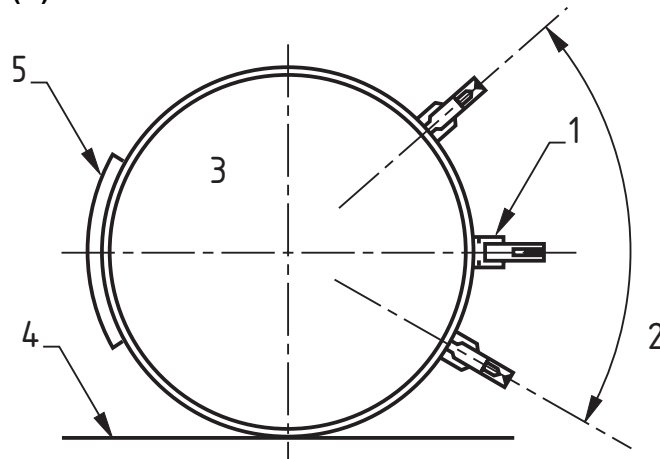
- ambient temperature range and climatic conditions (see EN 50125-1)
- equipment positioning
- space constraints
- availability of air and electrical supplies
- options for system control and lubricant regulation
- interface with other on-board systems
- the type of lubricant
- total life cycle cost and maintainability

**4.2.2** A description of types of applicator currently available is given in Annex A.

**4.3 Design of trainborne equipment**

**4.3.1** The position and alignment of each applicator shall take into account suspension movements to ensure application of lubricant to the active interface in all conditions, and the need to gain access for maintenance. Typical arrangements are shown in figures 3a and 3b.

This caused some concern in Euroland, as to if it was g (9.81m/s<sup>2</sup>) rather than grams. I will leave it to your judgement as to the best/correct way of showing it.

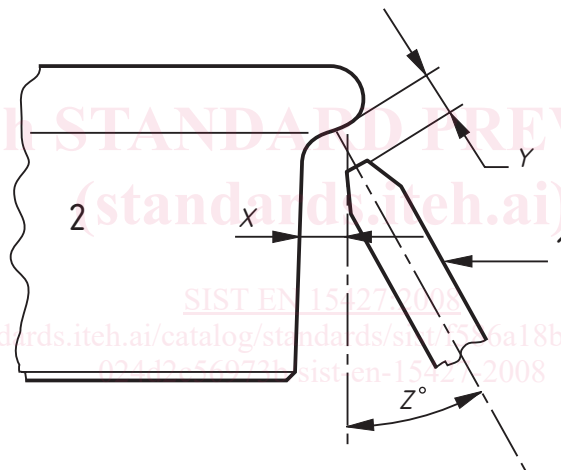


**Figure 3a: Preferred range of applicator positions on the wheel**

Key:

1. Preferred position (on horizontal, see note) where no brake equipment is present
2. Typical range for applicator position ( $30^\circ$  below to  $45^\circ$  above the horizontal)
3. Train wheel
4. Rail level
5. Brake shoe (if fitted)

Note: Positioning the applicator on the horizontal centre line of the wheel will limit the effects of vertical suspension movements.



**Figure 3b: Alignment of applicator onto the wheel flange**

Key

1. Applicator
2. Train wheel
- a, b, c. Dimensions to be agreed between the Railway Undertaking and the supplier.

Note: 'a' and 'b' will be influenced by longitudinal and lateral suspension movements.

**4.3.2** The integrity of the trainborne equipment shall be designed to meet the following:

- vibration and shock loads requirements of EN 61373 and prEN 13749 relevant to the position on the vehicle.
- fatigue life.
- protection of the equipment from flying objects eg track ballast.

**4.3.3** The applicator shall be designed to ensure that the lubricant is delivered to the intended element of the active interface, at all conditions within the train's operational limits, as required by the Railway Undertaking.. The climatic conditions defined in EN 50125-1 shall be considered.

Note : Wind turbulence affects the performance of a spray system which may be optimized by use of a windbreak.

4.3.4 The trainborne equipment shall not exceed the vehicle gauge.

4.3.5 The applicator shall be adjustable such that it can be returned to its correct working position (refer to section 4.5) following wheel reprofiling or other maintenance changes.

4.3.6 A means should be provided in the trainborne equipment to determine when refilling is required.

**4.4 Control**

4.4.1 The control system chosen must ensure that the rate of application of the lubricant is correctly maintained under all conditions during service.

4.4.2 Where the trainborne equipment provides the facility, it is permissible for the driver to temporarily over-ride the application of lubricant if the train's braking or traction is being affected. Where such a facility is provided this action shall be recorded.

4.4.3 Any trainborne equipment using a liquid spray applicator shall have a low speed cut out. Consideration shall be given to varying the point of recommencing lubrication after each such cessation and when regaining the set speed, to ensure that pooling or excess lubricant does not occur at the same location on the infrastructure.

**4.5 Application**

4.5.1 The lubricant shall be applied to the parts of the wheel or the rail as follows:

- a) As set out in Figure 4, lubricant shall be applied to area "L".
- b) As set out in Figure 5, lubricant shall be applied to area "B".

<p>Key to areas:                  Area K is the flange toe.                  Area L is flange face and the initial portion of the flange root up to its midpoint.                  Area M is the remaining portion of the flange root from its midpoint.                  Area N is the tread.</p>	<p>Key:                  Area A is the gauge face.                  Area B is the lower portion of the gauge corner up to its midpoint.                  Area C is the remaining portion of the gauge corner.                  Area D is the crown and shoulders.</p>
<p><b>Figure 4: Areas on wheel for application and verification</b></p>	<p><b>Figure 5: Areas on rail for application and verification</b></p>

**4.6 Verification**

4.6.1 Verification of the trainborne equipment shall be undertaken to establish effective application of the lubricant. The testing method chosen shall depend on the type of lubrication system and shall be relevant to the application. The method of testing shall be agreed between the contracting entity and the equipment supplier.

Note: Annex B sets out typical methods for verification.