

English Version

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

Applications ferroviaires - Gestion des frottements
roue/rail - Partie 2-2 : Propriétés et caractéristiques -
Lubrifiants de tête de rail

Bahnwendungen - Reibungsmanagement zwischen
Rad und Schiene - Teil 2-2: Eigenschaften und
Merkmale - Behandlung der Schienenoberfläche

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EUROPEAN COMMITTEE FOR STANDARDIZATION
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European foreword

This document (CEN/TS 15427-2-2:2021) has been prepared by Technical Committee CEN/TC 256 "Railway applications", the secretariat of which is held by DIN.

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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.

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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 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 on the top of rail. It specifies requirements for the material, how to test it and how to approve it.

The material for top of rail should be tested to confirm there is:

- compatibility with top of rail material applicator equipment;
- no intolerable increased risk of fire;
- no harmful environmental effects;
- no incompatibility between the different materials/lubricants 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).

The main purpose of a top of rail material is to influence the third layer to reduce friction to a level where a reduction in noise or wear can be realized.

1 Scope

This document specifies the requirements of 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 adhesion materials, for example:

- sand;
- adhesion enhancers.

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 ISO 868, *Plastics and ebonite - Determination of indentation hardness by means of a durometer (Shore hardness) (ISO 868)*

EN ISO 2160, *Petroleum products - Corrosiveness to copper - Copper strip test (ISO 2160)*

EN ISO 2592, *Petroleum and related products - Determination of flash and fire points - Cleveland open cup method (ISO 2592)*

EN ISO 3104, *Petroleum products - Transparent and opaque liquids - Determination of kinematic viscosity and calculation of dynamic viscosity (ISO 3104)*

EN ISO 3146, *Plastics - Determination of melting behaviour (melting temperature or melting range) of semi-crystalline polymers by capillary tube and polarizing-microscope methods (ISO 3146)*

EN ISO 3675, *Crude petroleum and liquid petroleum products - Laboratory determination of density - Hydrometer method (ISO 3675)*

EN ISO 4589-1, *Plastics - Determination of burning behaviour by oxygen index - Part 1: General requirements (ISO 4589-1)*

EN ISO 4589-2, *Plastics - Determination of burning behaviour by oxygen index - Part 2: Ambient-temperature test (ISO 4589-2)*

EN ISO 5659-1, *Plastics — Smoke generation — Part 1: Guidance on optical-density testing (ISO 5659-1)*

EN ISO 5659-2, *Plastics - Smoke generation - Part 2: Determination of optical density by a single-chamber test (ISO 5659-2)*

ISO/TR 5659-3, *Plastics — Smoke generation — Part 3: Determination of optical density by a dynamic-flow method*

EN ISO 7827, *Water quality - Evaluation of the "ready", "ultimate" aerobic biodegradability of organic compounds in an aqueous medium - Method by analysis of dissolved organic carbon (DOC) (ISO 7827)*

EN ISO 9408, *Water quality - Evaluation of ultimate aerobic biodegradability of organic compounds in aqueous medium by determination of oxygen demand in a closed respirometer (ISO 9408)*

EN ISO 9439, *Water quality - Evaluation of ultimate aerobic biodegradability of organic compounds in aqueous medium - Carbon dioxide evolution test (ISO 9439)*

EN ISO 10707, *Water quality - Evaluation in an aqueous medium of the "ultimate" aerobic biodegradability of organic compounds - Method by analysis of biochemical oxygen demand (closed bottle test) (ISO 10707)*

EN ISO 12185, *Crude petroleum and petroleum products - Determination of density - Oscillating U-tube method (ISO 12185)*

ISO 2049, *Petroleum products — Determination of colour (ASTM scale)*

ISO 3016, *Petroleum and related products from natural or synthetic sources — Determination of pour point*

ISO 6072, *Rubber — Compatibility between hydraulic fluids and standard elastomeric materials*

ISO 6743-99, *Lubricants, industrial oils and related products (class L) — Classification — Part 99: General*

ISO 7120, *Petroleum products and lubricants — Petroleum oils and other fluids — Determination of rust-preventing characteristics in the presence of water*

ISO 9772, *Cellular plastics — Determination of horizontal burning characteristics of small specimens subjected to a small flame*

ISO 11007, *Petroleum products and lubricants — Determination of rust-prevention characteristics of lubricating greases*

DIN 51418-1, *X-ray spectrometry — X-ray emissions and X-ray fluorescence analysis (XRF) — Part 1: Definitions and principles*

DIN 51418-2, *X-ray spectrometry — X-ray emissions and X-ray fluorescence analysis (XRF) — Part 2: Definitions and basic principles for measurements, calibration and evaluation of results*

DIN 51451, *Testing of petroleum products and related products — Analysis by infrared spectrometry — General working principles*

DIN 51817, *Testing of lubricants — Determination of oil separation from greases under static conditions*

DIN 51820-1, *Testing of lubricants — Analysis of greases by infrared spectrometry — Taking and evaluating an infrared spectrum*