



SLOVENSKI STANDARD
oSIST prEN 16028:2010
01-marec-2010

Železniške naprave - Trenje na stiku kolo/tirnica - Maziva za mazalke na vozilih in za tirne mazalke

Railway applications - Wheel/rail friction management - Lubricants for trainborne and trackside applications

Bahnanwendungen - Spurkranzschmierung - Prüfung der Schmiermittel

Applications ferroviaires - Gestion des frottements roue/rail - Lubrifiants pour les applications embarquées et fixes de voie

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Ta slovenski standard je istoveten z: prEN 16028

ICS:

45.040	Materiali in deli za železniško tehniko	Materials and components for railway engineering
75.100	Maziva	Lubricants, industrial oils and related products

oSIST prEN 16028:2010

en,fr

EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

DRAFT
prEN 16028

November 2009

ICS

English Version

Railway applications - Wheel/rail friction management - Lubricants for trainborne and trackside applications

Applications ferroviaires - Gestion du frottement roue/rail -
Méthodes d'essai des lubrifiants flasque/rail

Bahnanwendungen - Spurkranzschmierung - Prüfung der
Schmiermittel

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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

Management Centre: Avenue Marnix 17, B-1000 Brussels

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Foreword

This document (prEN 16028:2009) 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/CENELEC/ETSI by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directive 2008/57/EC.

For relationship with EU Directive 2008/57/EC, see informative annex ZA, which is an integral part of this document.

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SIST EN 16028:2012

<https://standards.iteh.ai/catalog/standards/sist/dff58a5e-cc6e-43f9-987c-b9ed9a08b46f/sist-en-16028-2012>

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”,
- 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 lubricant for flange or rail lubrication. It describes requirements for the lubricant, how to test it and how to approve it.

There needs to be tests made on the lubricant such that there is:

- compatibility with lubricating systems
- no intolerable increased risk of fire,
- no harmful environmental effect,
- no incompatibility between the different lubricants in use, particularly, between solid and fluid systems
- consistent product quality and performance.

The main purpose of the lubricant is to reduce friction and wear and keep them to an acceptable level.

1 Scope

This European Standard specifies the requirements of lubricants intended for lubrication of the wheel-rail interface between the wheel flange and the rail gauge corner (active interface) applied either directly or indirectly to the wheel flange or to the rail to achieve an acceptable level of friction and wear.

It covers the approval procedure, the method of testing and quality control/ monitoring of the lubricant

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 10130, *Cold rolled low carbon steel flat products for cold forming - Technical delivery conditions*

EN 22592, *Methods of test for petroleum and its products. Petroleum products. Determination of flash and fire points. Cleveland open cup method*

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

EN ISO 1183-1, *Plastics - Methods for determining the density of non-cellular plastics - Part 1: Immersion method, liquid pycnometer method and titration method*

EN ISO 2160, *Petroleum products. Corrosiveness to copper. Copper strip test*

EN ISO 2813, *Paints and varnishes -- Determination of specular gloss of non-metallic paint films at 20 degrees, 60 degrees and 85 degrees*

EN ISO 3104, *Methods of test for petroleum and its products. Petroleum products. Transparent and opaque liquids. Determination of kinematic viscosity and calculation of dynamic viscosity*

EN ISO 3146, *Plastics -- Determination of melting behaviour (melting temperature or melting range) of semi-crystalline polymers*

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

EN ISO-4589-part 1, *Plastics. Determination of Burning Behaviour by Oxygen Index - Guidance*

EN ISO-4589-part 2, *Plastics. Determination of Burning Behaviour by Oxygen Index – Ambient Temperature Test*

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

EN ISO 5659-2, *Plastics. Smoke generation. Determination of optical density by a single-chamber test*

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

EN ISO 12185, *Methods of test for petroleum and its products. Crude petroleum and petroleum products. Determination of density. Oscillating U-tube method*

EN ISO 20623, *Methods of test for petroleum and its products. Determination of the extreme-pressure and anti-wear properties of fluids Four ball method (European conditions)*

ISO 760, *Determination of water -- Karl Fischer method (General method)*

ISO 2049, *Methods of test for petroleum and its products. Petroleum products. Determination of colour (ASTM scale)*

ISO 2137, *Mineral oil products – lubricating grease and petroleum jelly: determination of the cone penetration*

ISO 2176, *Mineral oil products – lubricating grease: determination of the drop point*

ISO 3016, *Petroleum Products - Determination of Pour Point*

ISO 3733, *Petroleum products and bituminous materials -- Determination of water -- Distillation method*

ISO 6072, *Hydraulic Fluid Power - Compatibility between Fluids and Standard Elastomeric Materials*

ISO 6743-99, *Lubricants, industrial oils and related products (class L). Classification. 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*

ISO-13737, *Petroleum products and lubricants — Determination of low-temperature cone penetration 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 51820-1, *Testing of lubricants – Analysis of greases by infrared spectrometry – Taking and evaluating an infrared spectrum*

DIN 51350-1, *Testing of lubricants – Testing in the Shell four-ball tester – General working principles*

DIN 51350-4, *Testing of lubricants; testing by the Shell four-ball tester; determination of welding load of consistent lubricants*

DIN 51350-5, *Testing of lubricants; testing by the Shell four-ball tester; determination of wear data for consistent lubricants*

DIN 51398, *Testing of lubricants; procedure for measurement of low temperature apparent viscosity by means of the Brookfield viscometer (liquid bath method)*

DIN 51631, *Mineral spirits - Special boiling point spirits – Requirements*

DIN 51777-2, *Testing of mineral oil-hydrocarbons and solvents; Determination of the water content according to Karl Fischer (indirect method)*

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DIN 51805, *Testing of lubricants; determination of flow pressure of lubricating greases, Kesternich method*

DIN 51807-1, *Testing of lubricants – Test of the behaviour of lubricating greases in the presence of water: Static test*

DIN 51810-1, *Testing of lubricants – Determination of shear viscosity of lubricating greases by the rotational viscosimeter – Part 1: System of cone and plate*

DIN 51811, *Testing of lubricants – Testing of corrosiveness to copper of greases – copper strip tarnish test*

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

DIN 51834-1, *Testing of lubricants - Tribological test in the translatory oscillation apparatus - Part 1: General working principles*

DIN 51834-2, *Testing of lubricants - Tribological test in the translatory oscillation apparatus - Part 2: Determination of friction and wear data for lubricating oils*

NF T 60-152, *Produits pétroliers - Mesure de la viscosité à basse température au moyen du viscosimètre Brookfield. Méthode à bain liquide. (Petroleum products. Measurement of the viscosity at low temperatures using a Brookfield viscosity meter. Liquid bath method.)*

ASTM D1831, *Standard Test Method for Roll Stability of Lubricating Grease*

ASTM D4049, *Standard Test Method for Determining the Resistance of Lubricating Grease to Water Spray*

OECD 301 suite

OECD Document Equivalent Standard

301a	EN ISO 7827, <i>Water quality. Evaluation in an aqueous medium of the 'ultimate' aerobic biodegradability of organic compounds. Method by analysis of dissolved organic carbon (DOC)</i>
301b	EN 29439, <i>Water quality. Evaluation of ultimate aerobic biodegradability of organic compounds in aqueous medium. Carbon dioxide evolution test</i>
301c	Nil
301d	EN ISO 10707, <i>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)</i>
301e	EN ISO 7827, <i>Water quality. Evaluation in an aqueous medium of the 'ultimate' aerobic biodegradability of organic compounds. Method by analysis of dissolved organic carbon (DOC)</i>
301f	EN ISO 9408, <i>Water quality. Evaluation of ultimate aerobic biodegradability of organic compounds in aqueous medium by determination of oxygen demand in a closed respirometer</i>

3 Terms and definitions

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

3.1

lubricant

substance that is designed to lower friction and wear

3.2

oil

liquid lubricant, of mineral, native or synthetic origin which can have additives included

3.3

grease

semi-solid lubricant

NOTE Grease consists of a thickener and additives dispersed in a lubricating oil.

3.4

stick

encapsulated solid lubricant

NOTE The stick is in, typically, a polymeric binder/carrier. The product is designed for direct contact with a rotating wheel flange; the polymeric binder has a sufficiently high melting point such that it does not melt but rather wears when in contact with the wheel flange.

3.5

batch

entire content of a single identified production of lubricant from the same manufacturing process

3.6

active interface

contact area between wheel flange root and rail gauge side corner

3.7

flange lubrication

lubrication of the active interface by applying a lubricant to the wheel flange

3.8

rail lubrication

lubrication of the active interface by applying a lubricant to the rail gauge side face

3.9

lubricant application unit (LAU)

component of the lubrication system (trainborne or trackside) that delivers the lubricant to the active interface

NOTE This includes stick applicators, spray nozzles, trackside Grease Distribution Units/blades, etc.

3.10

lubrication system

components required to apply lubricant to the active interface

NOTE that can include one or more Lubricant Application Units, a reservoir unit, pump and/or a control device

3.11

trainborne equipment

lubrication system installed on the train

prEN 16028:2009 (E)**3.12****trackside equipment**

lubrication system installed on or adjacent to the track

3.13**customer**

railway undertaking, manufacturer or buyer of railway rolling stock or subassemblies, or their representative

3.14**supplier**

supplier of lubricants under his responsibility

3.15**manufacturer**

manufacturer of lubricants under his responsibility

NOTE A manufacturer may also be the supplier

4 Restriction of lubricants

The specification for the lubricant supplied by the customer to the manufacturer shall define all relevant European and national legislation and regulations with respect to eco-toxic properties.

NOTE 1 The lubricant should be non hazardous or non-toxic and should not contain, for example, solvents, lead or any other noxious material.

NOTE 2 The product should preferably be bio-degradable, as defined in tables 1 to 3.

5 Information and requirements to be agreed and documented**5.1 General**

The following information shall be fully documented by the supplier. The requirements specified throughout this European Standard, and the following documented requirements, shall be satisfied before a claim of compliance can be made and verified.

5.2 Information to be provided by the customer

The following information shall be provided and fully documented:

- relevant application data – equipment types, ambient temperatures, route information etc;
- level of approval and conditions (see Clause 7 and Tables 1-4);
- additional technical requirements – including safety data and storage conditions (see Clause 11);
- required quality system, quality records and traceability (see Clause 9);
- conditions for delivery, packaging and marking (see Clause 11).

5.3 Information to be provided by the supplier

The following information is to be provided by the supplier and shall be fully documented:

- for the approval, a comprehensive technical data sheet of the lubricant and the safety data sheet in accordance with European legislation.

5.4 Requirements for agreement

Following approval of the product a record sheet shall be established that details the agreements made between the contracting parties (as specified in the referenced clauses) for the following requirements:

- additional technical requirements;
- required quality system testing, quality records and traceability (see Clause 6);
- conditions for delivery, packaging and marking (see Clause 9);
- results of the approval tests (see Clause 7 and Tables 1 to 4);
- conditions for which the grease is approved (see Clause 8);
- limits for base oil viscosity, grease consistency and water content for the approval and batch control tests (see Tables);
- method to evaluate the ability to lubricate (see Tables);
- characteristics subject to the batch control tests, the limits and the frequency of these tests (see 10).

6 Approval of lubricants

6.1 Introduction

6.1.1 Range of tests

The approval of a lubricant is dependent on its intended application and therefore there will be some specific type tests necessary to gain approval for specific applications. Tables 1-4 provide detail of the range of tests, including optional tests that are specific to a lubricant's application.

The product specification shall specify the minimum type tests required from the optional tests.

6.1.2 Sampling

The lubricant submitted for approval shall have been industrially manufactured in a regular production batch. The entire amount of lubricant required for the approval tests shall be taken from the same production batch and be delivered in a single consignment.

The manufacturer shall retain a sample of the lubricant sent for approval of a quantity sufficient to repeat tests as agreed with the customer and for a duration agreed with the customer.

6.1.3 Modifications

After approval, any change in the composition, manufacturing process, manufacturing plant, packaging etc shall be reported to the customer who will decide if the product needs to be retested and reapproved.

prEN 16028:2009 (E)**6.2 Approval procedure****6.2.1 General**

The approval process shall be undertaken in six stages. If after any stage the requirements are not met the customer shall decide whether or not to cease with the approval.

NOTE 1 This process is also shown in the flowchart In Figure 1.

NOTE 2 Cross acceptance may be applied during any or all of this approval process.

NOTE 3 The supplier is encouraged to obtain EU wide homologation by obtaining EU wide certification at a recognized testing body.

6.2.2 Stage 1 – Supplier qualification

The supplier shall be qualified to supply the product.

6.2.3 Stage 2 – Review of technical data

The supplier shall present the technical data stating the main characteristics and applications of the lubricant he judges to comply with this European Standard. He shall also present a safety data sheet in the language of the customer.

NOTE Please note that European Directive EC1907/2006 (REACH) contains relevant requirements.

6.2.4 Stage 3 – Check of main requirements

The customer shall verify by testing or by inspection of the technical data that the lubricant complies with the requirements as listed in Tables 1, 2 & 3. If the lubricant meets the requirements, a specification sheet reporting the values obtained during the approval of all characteristics listed in these tables, as required for approval, shall be drawn up.

6.2.5 Stage 4 – Functional tests

If required, the customer shall verify by inspection of the technical data or by carrying out functional tests or additional checks that the lubricant complies with his requirements. If the lubricant passes these tests and checks, a specification sheet reporting the values obtained during these checks shall be drawn up.

6.2.6 Stage 5 – In-service trials

If required, the customer shall carry out in-service or field trials to verify that the lubricant complies with his requirements. If the lubricant passes these tests, a specification sheet reporting the results obtained during the trials shall be drawn up.

6.2.7 Stage 6 – Decision

The approval of the lubricant shall be granted when:

- technical documents have been approved
- characteristics conform with the requirements laid down in this European Standard and in the agreed specification
- functional and in-service trials have been satisfactory.

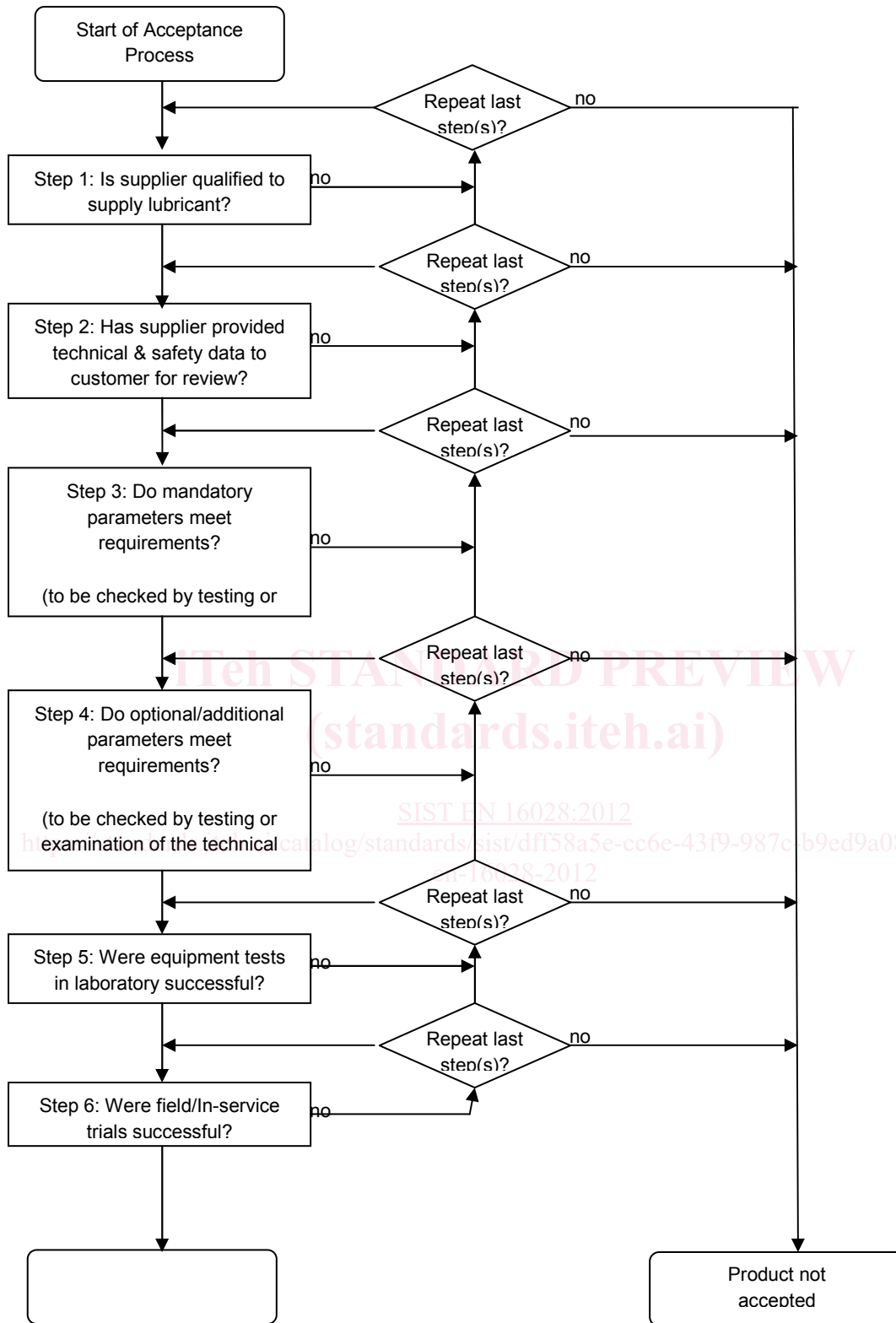


Figure 1 — Flowchart of acceptance process