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KATSEMEETODID AVALIKUL RAUDTEEL

Railway applications - Aerodynamics - Part 4:
Requirements and test procedures for aerodynamics on
open track

EESTI STANDARDI EESSÕNA

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See Eesti standard EVS-EN 14067-4:2013+A1:2018 sisaldab Euroopa standardi EN 14067-4:2013+A1:2018 ingliskeelset teksti.	This Estonian standard EVS-EN 14067-4:2013+A1:2018 consists of the English text of the European standard EN 14067-4:2013+A1:2018.
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English Version

Railway applications - Aerodynamics - Part 4: Requirements and test procedures for aerodynamics on open track

Applications ferroviaires - Aérodynamique - Partie 4:
Exigences et procédures d'essai pour l'aérodynamique
à l'air libre

Bahnanwendungen - Aerodynamik - Teil 4:
Anforderungen und Prüfverfahren für Aerodynamik
auf offener Strecke

This European Standard was approved by CEN on 21 September 2013 and includes Amendment 1 approved by CEN on 28 August 2018.

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European foreword

This document (EN 14067-4:2013+A1:2018) 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of an identical text or by endorsement, at the latest by June 2019, and conflicting national standards shall be withdrawn at the latest by June 2019.

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 includes Amendment 1 approved by CEN on 2018-08-28.

This document supersedes ^{A1} EN 14067-4:2013 ^{A1}.

The start and finish of text introduced or altered by amendment is indicated in the text by tags ^{A1} ^{A1}.

^{A1} *deleted text* ^{A1} The results of the EU-funded research project "AeroTRAIN" (Grant Agreement No. 233985) have been used.

^{A1} 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 2008/57/EC.

For relationship with EU Directive 2008/57/EC, see informative Annex ZA, which is an integral part of this document. ^{A1}

^{A1} *deleted text* ^{A1}

EN 14067, *Railway applications — Aerodynamics* consists of the following parts:

- *Part 1: Symbols and units*
- *Part 2: Aerodynamics on open track* (^{A1} *withdrawn* ^{A1})
- *Part 3: Aerodynamics in tunnels*
- *Part 4: Requirements and test procedures for aerodynamics on open track*
- *Part 5: Requirements and test procedures for aerodynamics in tunnels*
- *Part 6: Requirements and test procedures for cross wind assessment*

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Introduction

Trains running on open track generate aerodynamic loads on objects and persons they pass. If trains are being passed by other trains, trains are also subject to aerodynamic loading themselves. The aerodynamic loading caused by a train passing an object or a person near the track, or when two trains pass each other, is an important interface parameter between the subsystems of rolling stock, infrastructure and operation and, thus, is subject to regulation when specifying the trans-European railway system.

Trains running on open track have to overcome a resistance to motion which has a strong effect on the required engine power, achievable speed, travel time and energy consumption. Thus, resistance to motion is often subject to contractual agreements and requires standardized test and assessment methods.

1 Scope

This European Standard deals with requirements, test procedures and conformity assessment for aerodynamics on open track. Addressed within this standard are the topics of aerodynamic loadings and resistance to motion, while the topic of cross wind assessment is addressed by EN 14067-6.

This European Standard refers to rolling stock and infrastructure issues. This standard does not apply to freight wagons. It applies to railway operation on gauges GA, GB and GC according to EN 15273. The methodological approach of the presented test procedures may be adapted to different gauges.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 1991-2, *Eurocode 1: Actions on structures — Part 2: Traffic loads on bridges*

EN 15273 (all parts), *Railway applications — Gauges*

EN 15663, *Railway applications — Definition of vehicle reference masses*

ISO 8756, *Air quality — Handling of temperature, pressure and humidity data*

3 Terms, definitions and symbols

3.1 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1.1

peak-to-peak pressure change

modulus of the difference between the maximum pressure and the minimum pressure for the relevant load case

3.1.2

passage of train head

passage of the front end of the leading vehicle which is responsible for the generation of the characteristic pressure rise and drop, over and beside, the train and on the track bed

3.1.3

Computational Fluid Dynamics

CFD

numerical methods of approximating and solving the equations of fluid dynamics

3.1.4

streamline shaped vehicle

vehicle with a closed and smooth front which does not cause flow separations in the mean flow field greater than 5 cm from the side of the vehicle

3.1.5

bluff shaped vehicle

vehicle that is not streamlined