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

EESTI STANDARDIMIS- JA AKREDITEERIMISKESKUS
ESTONIAN CENTRE FOR STANDARDISATION AND ACCREDITATION

EESTI STANDARDI EESSÕNA

NATIONAL FOREWORD

See Eesti standard EVS-EN 14067-4:2024+A1:2025 sisaldab Euroopa standardi EN 14067-4:2024+A1:2025 ingliskeelset teksti.	This Estonian standard EVS-EN 14067-4:2024+A1:2025 consists of the English text of the European standard EN 14067-4:2024+A1:2025.
Standard on jõustunud sellekohase teate avaldamisega EVS Teatajas.	This standard has been endorsed with a notification published in the official bulletin of the Estonian Centre for Standardisation and Accreditation.
Euroopa standardimisorganisatsioonid on teinud Euroopa standardi rahvuslikele liikmetele kättesaadavaks 14.05.2025.	Date of Availability of the European standard is 14.05.2025.
Standard on kättesaadav Eesti Standardimis-ja Akrediteerimiskeskusest.	The standard is available from the Estonian Centre for Standardisation and Accreditation.

Tagasisidet standardi sisu kohta on võimalik edastada, kasutades EVS-i veebilehel asuvat tagasiside vormi või saates e-kirja meiliaadressile standardiosakond@evs.ee.

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

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

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

This European Standard was approved by CEN on 27 February 2024 and includes Amendment 1 approved by CEN on 9 April 2025.

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

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European foreword

This document (EN 14067-4:2024+A1:2025) 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of an identical text or by endorsement, at the latest by November 2025, and conflicting national standards shall be withdrawn at the latest by November 2025.

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 9 April 2025.

This document supersedes ⟦A1⟩ EN 14067-4:2024 ⟨A1⟧.

The start and finish of text introduced or altered by amendment is indicated in the text by tags ⟦A1⟩ ⟨A1⟧.

Results of the EU-funded research project “AeroTRAIN” (Grant Agreement No. 233985) are contained in this document.

⟦A1⟩ *Deleted paragraphs* ⟨A1⟧

This document has been prepared under a standardization request addressed to CEN by the European Commission.

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

— Part 4: Requirements and assessment procedures for aerodynamics on open track;

— Part 5: Requirements and assessment procedures for aerodynamics in tunnels;

— Part 6: Requirements and assessment procedures for cross wind assessment;

— Part 7 (TR): Fundamentals for test procedures for train-induced ballast projection.

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.

According to the CEN-CENELEC Internal Regulations, the national standards organisations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Türkiye and the United Kingdom.

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. It is thus subject to regulation when specifying the trans-European railway system.

Trains running on open track must overcome a running resistance which has a strong effect on the required engine power, achievable speed, travel time and energy consumption. Thus, running resistance is often subject to contractual agreements and requires standardized test and assessment methods. The test set-up for ballast projection was also updated.

1 Scope

This document establishes requirements, test procedures, assessment methods and acceptance criteria for operating rolling stock in open track. For pressure variations and slipstream effects beside the track, requirements and assessment methods are provided. For running resistance, assessment methods are addressed in this document. Load cases on infrastructure components due to train-induced pressure variations and slipstream effects are addressed in this document. For ballasted track test set-ups for ballast projection assessment are proposed.

The requirements only apply to rolling stock of the heavy rail system with maximum train speeds above 160 km/h and not to other rail systems. The document is applicable to all rolling stock and infrastructure in open air with nominal track gauges of 1 435 mm to 1 668 mm inclusive.

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 1991-2:2003,[1] *Eurocode 1: Actions on structures — Part 2: Traffic loads on bridges*

EN 16727-2-2:2016, *Railway applications - Track - Noise barriers and related devices acting on airborne sound propagation - Non-acoustic performance - Part 2-2: Mechanical performance under dynamic loadings caused by passing trains - Calculation method*

EN 17343, *Railway applications - General terms and definitions*

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

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 17343 and the following apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— IEC Electropedia: available at https://www.electropedia.org/

— ISO Online browsing platform: available at https://www.iso.org/obp

3.1
peak-to-peak pressure change
modulus of the difference between the maximum pressure and the minimum pressure for the relevant load case

3.2
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

3.3
Computational Fluid Dynamics
CFD
numerical methods of approximating and solving the equations of fluid dynamics

[1] Document impacted by AC:2010.