
Železniške naprave - Aerodinamika - 4. del: Zahteve in ugotavljanje skladnosti za aerodinamiko na odprti progi (vključno z dopolnilom A1)

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

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

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

Ta slovenski standard je istoveten z: EN 14067-4:2024+A1:2025

[SIST EN 14067-4:2024+A1:2025](https://standards.sist.eu/catalog/standards/sist/0107/04dc/14067-4:2024+A1:2025)

<https://standards.sist.eu/catalog/standards/sist/0107/04dc/14067-4:2024+A1:2025>

ICS:

45.060.01 Železniška vozila na splošno Railway rolling stock in general

SIST EN 14067-4:2024+A1:2025

en,fr,de

EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN 14067-4:2024+A1

May 2025

ICS 45.060.01

Supersedes EN 14067-4:2024

English Version

**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.

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. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

CEN members are the national standards bodies of 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 United Kingdom.

<https://standards.iteh.ai/catalog/standards/sist/01879ade-4602-4663-b72b-ffcfc0426ec1/sist-en-14067-4-2024a1-2025>



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

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

Contents

Page

European foreword	4
Introduction	5
1 Scope.....	6
2 Normative references.....	6
3 Terms and definitions	6
4 Symbols	7
5 Requirements on locomotives and passenger rolling stock	14
5.1 Limitation of pressure variations beside the track.....	14
5.1.1 General.....	14
5.1.2 Requirements.....	14
5.1.3 Full conformity assessment	15
5.1.4 Simplified conformity assessment.....	15
5.2 Limitation of slipstream effects beside the track.....	17
5.2.1 General.....	17
5.2.2 Requirements.....	17
5.2.3 Full conformity assessment	19
5.2.4 Simplified conformity assessment.....	20
5.3 Aerodynamic loads in the track bed	22
5.4 Aerodynamically induced ballast projection.....	22
5.5 Running resistance.....	22
6 Requirements on infrastructure	23
6.1 Train-induced pressure loads acting on structures parallel to the track	23
6.1.1 General.....	23
6.1.2 Requirements.....	23
6.1.3 Conformity assessment.....	23
6.2 Train-induced air speeds acting on infrastructure components beside the track	23
6.3 Train-induced aerodynamic loads in the track bed	23
6.4 Train-induced air speed acting on people beside the track.....	23
6.5 Aerodynamically induced ballast projection.....	24
7 Methods and test procedures	24
7.1 Assessment of train-induced pressure variations beside the track.....	24
7.1.1 General.....	24
7.1.2 Pressure variations in the pressure field (reference case)	27
7.1.3 Pressure variations on surfaces parallel to the track.....	36
7.1.4 Effect of wind on loads caused by the train	44
7.2 Assessment of train-induced air flow beside the track.....	44
7.2.1 General.....	44
7.2.2 Slipstream effects on persons beside the track (reference case).....	44
7.2.3 Slipstream effects on objects beside the track.....	48
7.3 Assessment of train-induced aerodynamic loads in the track bed.....	48
7.4 Assessment of running resistance	49
7.4.1 General.....	49
7.4.2 Full-scale tests.....	49

Annex A (informative) Procedure for full-scale tests regarding train-induced air flow in the track bed	57
A.1 General	57
A.2 Track set-up.....	57
A.3 Vehicle configuration and test conditions.....	58
A.4 Instrumentation and data acquisition	58
A.5 Data processing.....	59
Bibliography	60

iTeh Standards
(<https://standards.itih.ai>)
Document Preview

[SIST EN 14067-4:2024+A1:2025](https://standards.itih.ai/catalog/standards/sist/01879adc-4602-4663-b72b-ffcfc0426ec1/sist-en-14067-4-2024a1-2025)

<https://standards.itih.ai/catalog/standards/sist/01879adc-4602-4663-b72b-ffcfc0426ec1/sist-en-14067-4-2024a1-2025>

EN 14067-4:2024+A1:2025 (E)**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.

iTeh Standards
(<https://standards.iteh.ai>)
Document Preview

[SIST EN 14067-4:2024+A1:2025](https://standards.iteh.ai/catalog/standards/sist/01879ade-4602-4663-b72b-ffcfc0426ec1/sist-en-14067-4-2024a1-2025)

<https://standards.iteh.ai/catalog/standards/sist/01879ade-4602-4663-b72b-ffcfc0426ec1/sist-en-14067-4-2024a1-2025>