BS EN 14067-4:2013

BSI Standards Publication

Railway applications — Aerodynamics

Part 4: Requirements and test procedures for aerodynamics on open track

This British Standard is the UK implementation of EN 14067-4:2013. It supersedes BS EN 14067-4:2005+A1:2009 and BS EN 14067-2:2002, which are withdrawn.

The UK committee draws users' attention to the distinction between normative and informative elements, as defined in Clause 3 of the CEN/CENELEC Internal Regulations, Part 3.

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When rounded values require unit conversion for use in the UK, users are advised to use equivalent values rounded to the nearest whole number. The use of absolute values for converted units should be avoided in these cases. For the values used in this standard:

1 km/h has an equivalent value of 0.5 mile/h
20 km/h has an equivalent value of 10 mile/h
160 km/h has an equivalent value of 100 mile/h
200 km/h has an equivalent value of 125 mile/h
250 km/h has an equivalent value of 155 mile/h
300 km/h has an equivalent value of 190 mile/h

The UK participation in its preparation was entrusted by Technical Committee RAE/1, Railway Applications, to Subcommittee RAE/1/-/4, Railway Applications - Aerodynamics.

A list of organizations represented on this subcommittee can be obtained on request to its secretary.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

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This European Standard was approved by CEN on 21 September 2013.

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Foreword

This document (EN 14067-4:2013) 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of an identical text or by endorsement, at the latest by April 2014, and conflicting national standards shall be withdrawn at the latest by April 2014.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

This document supersedes EN 14067-4:2005+A1:2009 and EN 14067-2:2003. The results of the EU-funded research project "AeroTRAIN" (Grant Agreement No. 233985) have been used.

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association.

EN 14067-2 has been integrated in this document, and EN 14067-4 has been re-structured and extended to support the Technical Specifications for the Interoperability of the Trans-European rail system and requirements on conformity assessment for rolling stock were added.

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

— *Part 1: Symbols and units*

— *Part 2: Aerodynamics on open track (to be withdrawn)*

— *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