

**Raudteealased rakendused. Aerodünaamika. Osa 5:  
Nõuded aerodünaamikale tunnelites ning selle  
katsetamise protseduurid KONSOLIDEERITUD TEXT**

Railway applications - Aerodynamics - Part 5:  
Requirements and test procedures for aerodynamics in  
tunnels CONSOLIDATED TEXT

## EESTI STANDARDI EESSÕNA

## NATIONAL FOREWORD

<p>Käesolev Eesti standard EVS-EN 14067-5:2006+A1:2010 sisaldab Euroopa standardi EN 14067-5:2006+A1:2010 ingliskeelset teksti.</p> <p>Standard on kinnitatud Eesti Standardikeskuse 31.12.2010 käskkirjaga ja jõustub sellekohase teate avaldamisel EVS Teatajas.</p> <p>Euroopa standardimisorganisatsioonide poolt rahvuslikele liikmetele Euroopa standardi teksti kättesaadavaks tegemise kuupäev on 03.11.2010.</p> <p>Standard on kättesaadav Eesti standardiorganisatsioonist.</p>	<p>This Estonian standard EVS-EN 14067-5:2006+A1:2010 consists of the English text of the European standard EN 14067-5:2006+A1:2010.</p> <p>This standard is ratified with the order of Estonian Centre for Standardisation dated 31.12.2010 and is endorsed with the notification published in the official bulletin of the Estonian national standardisation organisation.</p> <p>Date of Availability of the European standard text 03.11.2010.</p> <p>The standard is available from Estonian standardisation organisation.</p>
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English Version

## Railway applications - Aerodynamics - Part 5: Requirements and test procedures for aerodynamics in tunnels

Applications ferroviaires - Aérodynamique - Partie 5:  
Exigences et procédures d'essai pour l'aérodynamique en  
tunnel

Bahnanwendungen - Aerodynamik - Teil 5: Anforderungen  
und Prüfverfahren für Aerodynamik im Tunnel

This European Standard was approved by CEN on 30 June 2006 and includes Amendment 1 approved by CEN on 28 September 2010.

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# Contents

Page

Foreword.....	4
1 Scope .....	5
2 Normative references .....	5
3 Terms, definitions, symbols and abbreviations .....	5
4 Methodologies for quantifying the pressure changes in order to meet the medical health criterion.....	5
4.1 General.....	5
4.2 Train-tunnel-pressure signature .....	5
4.3 Maximum pressure changes .....	8
5 Pressure loading on unsealed crossing trains.....	10
6 Pressure loading on sealed trains in tunnels.....	12
6.1 General.....	12
6.2 Single train case .....	13
6.3 Two train case.....	15
Annex A (informative) Predictive equations .....	20
Annex B (informative) Pressure comfort criteria .....	28
Annex C (informative) Micro-pressure wave .....	29
Annex ZA (informative) <b>ZA</b> Relationship between this European Standard and the Essential Requirements of EU Directive 2008/57/EC of the European Parliament and of the Council of 17 June 2008 on the interoperability of the rail system within the Community (Recast) <b>ZA</b> .....	32
Bibliography .....	35
Figure 1 — Train-tunnel-pressure signature at a fixed position in a tunnel (detail).....	6
Figure 2 — Train-tunnel-pressure signature at an exterior position just behind the nose of the train .....	7
Figure 3 — External pressure drop due to the head passage of a crossing train.....	10
Figure 4 — Internal pressure evolution inside an unsealed vehicle due to the head passage of a crossing train .....	10
Figure 5 — Pressure differences on an unsealed vehicle due to the head passage of a crossing train .....	11
Figure 6 — Typical measured maximum forces on a freight wagon door during the head passage of a crossing train.....	12
Figure 7 — Pressure difference on a well sealed train in two successive tunnels .....	13
Figure 8 — External pressure histories at different speeds in two successive tunnels.....	14
Figure 9 — Influence of tunnel length on maximum external pressure variation.....	14
Figure 10 — Influence of the relative entry time $\Delta t_{1,2}$ on maximum absolute values of pressure differences for a particular situation .....	15

Figure 11 — Example scenario for train crossings during 1,5 h of scheduled traffic on a high speed line with 6 trains in circulation passing 6 tunnels which cover 10 % of the line length.....	17
Figure 12 — Effect of time schedule variation on the number of train crossings in tunnels for a particular train .....	18
Figure 13 — Calculated pressure trace and resulting pressure loadings above 500 Pa (arrowed) .....	19
Figure 14 — Pressure loadings for two different crossing frequency scenarios.....	19
Figure A.1 — Calculation of a train-tunnel-pressure signature.....	21
Figure A.2 — Solutions $X_{fr}$ of Equation (A.13) for different values of $\zeta = \zeta_h + \zeta_{fr}$ .....	23
Figure A.3 — Solution $X_t$ of Equation (A.18) for different values of $\zeta_1 = \zeta_h + \zeta_{fr} + \zeta_t$ with $\zeta_E = 0,5$ .....	25
Figure A.4 — Aerodynamic drag coefficient.....	27
Figure C.1 — Wave generation, propagation and radiation.....	29
Figure C.2 — Steepening in concrete slab tunnels .....	30
Figure C.3 — Radiation of micro pressure wave.....	31

## Foreword

This document (EN 14067-5:2006+A1:2010) 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 May 2011, and conflicting national standards shall be withdrawn at the latest by May 2011.

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 includes Amendment 1, approved by CEN on 2010-09-28.

This document supersedes EN 14067-5:2006.

The start and finish of text introduced or altered by amendment is indicated in the text by tags  $\boxed{A_1}$   $\boxed{A_1}$ .

$\boxed{A_1}$  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.  $\boxed{A_1}$

This European Standard is part of the series "*Railway applications — Aerodynamics*" which consists of the following parts:

- *Part 1: Symbols and units*
- *Part 2: Aerodynamics on open track*
- *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: Cross wind effects on railway operation*

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## 1 Scope

This European Standard applies to the aerodynamic loading caused by trains running in a tunnel.

## 2 Normative references

The following referenced document is 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 14067-1:2003, *Railway applications — Aerodynamics — Part 1: Symbols and units*

## 3 Terms, definitions, symbols and abbreviations

For the purposes of this document, the terms, definitions, symbols and abbreviations given in EN 14067-1:2003 and the following apply.

NOTE Additional definitions, symbols and abbreviations are explained in the text.

### 3.1

#### tunnel

closed structure enveloping track(s) with a length of more than 20 m

## 4 Methodologies for quantifying the pressure changes in order to meet the medical health criterion

### 4.1 General

The relevant pressure changes caused by trains running in a tunnel may be measured at full-scale, estimated from approximating equations (see Annex A), predicted using validated numerical methods or measured using moving model tests. The determination of the pressure variations in order to meet the medical safety pressure limits may be undertaken in the same way.

Full-scale test data may be the basis for train and tunnel acceptance and homologation.

Each single train/tunnel combination is described by a train-tunnel-pressure signature.

### 4.2 Train-tunnel-pressure signature

#### 4.2.1 General

The static pressure in the tunnel as shown in Figure 1 develops as follows when a train enters the tunnel:

- there is a sharp first increase in pressure  $\Delta p_N$  caused by the entry of the nose of the train into the tunnel;
- there is a second increase in pressure  $\Delta p_{fr}$  due to friction effects caused by the entry of the main part of the train into the tunnel;
- there is then a drop in pressure  $\Delta p_T$  caused by the entry of the tail of the train in the tunnel;
- there is a sharp drop in pressure  $\Delta p_{HP}$  caused by the passing of the train head at the measurement position in the tunnel.