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| STN | **Železnice<br>Metódy výpočtu zábrzdných dráh, brzdných dráh a zaisťovacieho brzdenia<br>Časť 1: Všeobecné algoritmy využívajúce priemerné hodnoty pre výpočet vlakových súprav a jednotlivých vozidiel** | **STN<br>EN 14531-1+A1**<br><br>28 2230 |
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Táto norma obsahuje anglickú verziu európskej normy.
This standard includes the English version of the European Standard.

Táto norma bola oznámená vo Vestníku ÚNMS SR č. 04/19

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EUROPEAN STANDARD

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# EN 14531-1:2015+A1

November 2018

ICS 45.060.01 Supersedes EN 14531-1:2015

English Version

# Railway applications - Methods for calculation of stopping and slowing distances and immobilization braking - Part 1: General algorithms utilizing mean value calculation for train sets or single vehicles

Applications ferroviaires - Méthodes de calcul des distances d'arrêt, de ralentissement et d'immobilisation - Partie 1 : Algorithmes généraux utilisant le calcul par la valeur moyenne pour des rames ou des véhicules isolés

Bahnanwendungen - Verfahren zur Berechnung der Anhalte- und Verzögerungsbremswege und der Feststellbremsung - Teil 1: Allgemeine Algorithmen für Einzelfahrzeuge und Fahrzeugverbände unter Berücksichtigung von Durchschnittswerten

This European Standard was approved by CEN on 27 June 2015 and includes Amendment 1 approved by CEN on 5 August 2018.

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.

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

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



Ref. No. EN 14531-1:2015+A1:2018 E

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# European foreword

This document (EN 14531-1:2015+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 May 2019, and conflicting national standards shall be withdrawn at the latest by May 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 2018-08-05.

This document supersedes A1 EN 14531-1:2015 A1.

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

This series of European standards EN 14531, *Railway applications — Methods for calculation of stopping and slowing distances and immobilization braking* consists of:

— *Part 1: General algorithms utilizing mean value calculation for train sets or single vehicles*;

— *Part 2: Step-by-step calculations for train sets or single vehicles*.

The two parts are interrelated and should be considered together when conducting the step-by-step calculation of stopping and slowing distances.

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

# Introduction

This European Standard describes a common calculation method for railway applications. It describes the general algorithms utilizing mean value calculation for use in the design and validation of brake equipment and braking performance for all types of train sets and single vehicles. In addition the algorithms provide a means of comparing the results of other braking performance calculation methods.

EN 14531 was originally planned to have six parts covering the calculation methodology to be used when conducting calculations relating to the braking performance of various types of railway vehicles under the heading EN 14531, Railway applications – Methods for calculation of stopping, slowing distances and immobilization braking. The six parts were as follows:

— Part 1: General algorithms

— Part 2: Application to single freight wagon

— Part 3: Application to mass transit (LRV's and D- and E- MU's)

— Part 4: Application to single passengers coach

— Part 5: Application to locomotive

— Part 6: Application to high speed trains

EN 14531-1 was originally published in 2005 followed by EN 14531-6 which was published in 2009.

Following the above it was decided that a common methodology could be used for Parts 2 to 5 and this should be contained under a revised version of Part 1 with a title of *Railway applications — Methods for calculation of stopping and slowing distances and immobilisation braking — Part 1: General algorithms utilizing mean value calculation for train sets or single vehicles* while revising Part 6 to be Part 2 with the title of *Railway applications - Methods for calculation of stopping and slowing distances and immobilization braking - Part 2: Step by step calculations for train sets or single vehicles*.

EN 14531-1:2005 and EN 14531-6:2009 are referenced in the current technical specifications for interoperability (TSIs) (Freight wagons and locomotive and passenger rolling stock (RST)). The tables of the Annex ZA give the equivalence of the TSI referenced clauses of the original EN 14531 series to the clauses of this issue of EN 14531-1 and EN 14531-2.

# 1 Scope

This European Standard describes general algorithms for the brake performance calculations to be used for all types of train sets, units or single vehicles, including high speed, locomotive and passenger coaches, conventional vehicles and wagons.

This European Standard does not specify the performance requirements. It enables the estimation and/or comparison by calculation of the various aspects of the performance: stopping or slowing distances, dissipated energy, power, force calculations and immobilization braking.

If it is required to validate, verify or assess braking performance it is recommended that a more detailed calculation is performed in accordance with EN 14531-2, i.e. a step by step calculation.

This European Standard contains generic examples of the calculation of brake forces for individual brake equipment types and calculation of stopping distance and immobilization braking relevant to a train (see Annexes C and D).

# 2 Normative references

The following referenced 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 14067-4, *Railway applications — Aerodynamics — Part 4: Requirements and test procedures for aerodynamics on open track*

EN 14478, *Railway applications — Braking — Generic vocabulary*

EN 14531-2, *Railway applications — Methods for calculation of stopping and slowing distances and immobilisation braking — Part 2: Step by step calculations for trains or single vehicles*

〚A1〛 *deleted text* 〚A1〛

EN 16452, *Railway applications — Braking — Brake blocks*

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