SLOVENSKI STANDARD
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Železniške naprave - Zavore – Zavorni sistemi za mestni in primestni javni prevoz – 2.del: Poskusne metode

Railway applications - Braking - Mass transit brake systems - Part 2: Methods of test

Bahnanwendungen - Bremsen - Bremssysteme des öffentlichen Nahverkehrs - Teil 2: Prüfverfahren

Applications ferroviaires - Freinage - Systemes de freinage des transports publics urbains er suburbains - Partie 2: Méthodes d'essais

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This European Standard was approved by CEN on 27 December 2002.

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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 Management Centre has the same status as the official versions.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
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Contents

Foreword

This document (EN 13452-2:2003) 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of an identical text or by endorsement, at the latest by September 2003, and conflicting national standards shall be withdrawn at the latest by September 2003.

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

CEN/TC 256/SC3/WG 23 "Braking/Urban traffic" has been assisted with the preparation of this European Standard by CEN/TC 256/SC3/WG 25 "Braking/Terminology, calculations and acceptance procedures".

This series EN 13452 *Railway applications – Braking – Mass transit brake systems* consists of two parts:

— Part 1: Performance requirements

— Part 2: Methods of test.

With regard to clause 9 of EN 13452-1, which concerns Commuter/Regional trains, it should be noted that there might be border-line cases which may also come under the scope of CEN/TC 256/SC 3/WG 22 "Braking/Mainline railways".

Annex A is informative.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Slovakia, Spain, Sweden, Switzerland and the United Kingdom.

Introduction

The objective of this part of the European Standard is to provide the test requirements to enable compliance with EN 13452-1 to be demonstrated.

This European Standard covers the static and dynamic brake type and routine testing of completed units or trains but it does not cover the testing of components, equipment or individual vehicles.

1 Scope

This European Standard specifies test requirements for the braking of vehicles for urban transport systems, running on steel or rubber tyred wheels and guided by steel rails or other equivalent means.

This European Standard applies to vehicles operating on:

— tramways;

— light railways;

— metros on steel wheels;

— metros on rubber tyred wheels;

— commuter/regional railways;

and is applicable to:

— all newly designed vehicles;

— all major refurbishments, if these include either redesign or extensive modifications to the brake system;

— any new builds of existing designs of vehicles.

This European Standard does not apply to special transport systems, e.g. suspended monorail, rack and pinion lines, special duty vehicles, etc.

Transport Authorities shall ensure that specifications include this European Standard as part of the brake system requirements. Suppliers shall identify, at the time of tendering, any non-compliances against this European Standard.

2 Normative references

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text, and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies (including amendments).

EN 13452-1:2003, *Railway applications — Braking - Mass transit brake systems — Part 1: Performance requirements.*

3 Terms and definitions

For the purposes of this European Standard, the terms and definitions given in EN 13452-1:2003 and the following apply.

3.1
type test
test of the brake system on a unit or a train, to show that the design, and its implementation, meets the required specifications and relevant European Standards

3.2
routine test
test of the brake system to which each unit or train is subjected, after manufacture, to ascertain whether it complies with the specified criteria

3.3
investigative test
test which may be required by the Transport Authority in order to obtain additional information

3.4
supplementary test
test which may be required by the Transport Authority if particular (or special) conditions prevail

4 Test requirements

4.1 General

The testing of new rolling stock consists of two distinct stages, namely type tests and routine tests. The content of both the type and routine tests shall be agreed with the Transport Authority.

This clause defines the requirements of both types of test which shall be performed on the braking system.

Type tests shall be performed on an early production unit or train prior to any of that fleet of vehicles entering service and forms the basis of an acceptance of the brake system design and its implementation. Type testing of refurbished rolling stock shall be undertaken if the brake system has been modified or if the train mass and/or passenger load has been significantly changed (see Section 1 of EN 13452-1:2003).

The content of the type testing for refurbished stock shall be agreed with the Transport Authority, according to the modifications implemented. Routine tests shall be performed on every production unit or train prior to that train entering service.

4.2 Type test requirements

4.2.1 Static type tests

Prior to any static testing, all necessary system integration and constructional tests shall have been successfully completed.

The principal objectives of these static type tests are to verify that the train's braking equipment is compliant with the specification and to establish the values of all the relevant parameters as a reference for assessing the dynamic performance.

A full functional test, including all safety devices, shall have been satisfactorily completed before beginning the dynamic tests.

Static type testing for the brake system may combine both bench tests and on-train tests. The scope of static type testing shall include, but not be limited to, the following (where applicable or equivalents depending on the type of brake equipment):

— brake cylinder pressures (or equivalent);

— load-weigh signals (e.g. pressures);

— friction pair loads (block force or pad clamping force);

— brake actuator operation and stroke;

— governor settings (e.g. pressure switches);

— brake application times;

— brake release times;

— monitoring device accuracy;

— functionality e.g. correct operation of all controls and isolation devices at train / vehicle; component level;

— interlock operation (e.g. traction inhibition in emergency braking);

— brake stored energy capacity (e.g. brake reservoir volume);

— leakage tests;

— protection devices fitted to minimise the effects of failures (e.g. chokes, check valves);

— WSP application / release times;

— sanding system operation.

In case particular parameters, e.g. brake application and release times, cannot be easily tested on certain vehicles, such tests may be undertaken as bench tests if agreed with the Transport Authority.

The exact static testing undertaken depends on the design of the particular rolling stock.

If more than one method of braking (e.g. friction brakes and track brakes) is used in any braking mode, then tests shall be conducted on each of these separately, so as to determine the functionality and response of each system.

4.2.2 Dynamic type tests

4.2.2.1 General

Prior to any dynamic testing, the static testing specified above shall have been completed. In addition any specified simulation and/or bench testing (e.g. thermal predictions, WSP evaluation) shall have been completed.

The purpose of dynamic brake testing is to demonstrate that the train performance complies as a minimum with the relevant requirements as contained in clause 6, 7, 8 or 9 of EN 13452-1:2003.

NOTE The operational performances defined in EN 13452-1 are based on theoretical values. In order to demonstrate compliance with the requirements defined in EN 13452-1 it is recommended to conduct tests and, from the results of these, to determine if the values actually achieved fall within the limits defined in EN 13452-1.

For any initial speed, in accordance with 5.5.1 of Part 1, the stopping distance for each test shall be less than or equal to the calculated value with a theoretical brake as defined with the a_e and t_e specified in 3.7.2 and 3.7.3 of EN 13452-1:2003 and in accordance with the relevant Table 3,7,11 or 15 of EN 13452-1:2003.

In addition, the comfort limits defined by the relevant Table 4, 8, 12 or 16 of EN 13452-1:2003 shall not be exceeded during any of the tests.

Additional tests shall be performed to demonstrate compliance with the brake performance specified by the Transport Authority to be achieved under defined brake failure conditions (refer to 5.6 of EN 13452-1:2003). It is recommended that the failure conditions of one brake application system being defective (e.g. equipment inactive or isolated) and the presence of unbedded components (e.g. brake blocks or pads) are considered by the Transport Authority.

Additional tests shall also be conducted to establish the performance achieved under specified degraded environmental conditions (e.g. wet track). The Transport Authority shall define these conditions and the acceptance criteria for these tests.