



SLOVENSKI STANDARD
SIST EN 14198:2005

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Železniške naprave – Zavore – Zahteve, ki jih morajo izpolnjevati zavorni sistemi vlakov, vlečeni z lokomotivami

Railway applications - Braking - Requirements for the brake system of trains hauled by a locomotive

Bahnanwendungen - Bremsen - Anforderungen für die Bremsausrüstung lokbespannter Züge

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Applications ferroviaires - Freinage - Exigences concernant le système de freinage des trains tractés par locomotive

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Railway applications - Braking - Requirements for the brake system of trains hauled by a locomotive

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This European Standard was approved by CEN on 22 November 2004.

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Contents

Page

Foreword.....	3
1 Scope.....	4
2 Normative references.....	5
3 Terms and definitions.....	6
4 Symbols and abbreviations.....	9
5 Requirements.....	10
5.1 General.....	10
5.2 Train level.....	10
5.3 Vehicle level.....	13
5.4 UIC brake system.....	13
5.4.1 General.....	13
5.4.2 Functions at train level.....	13
5.4.3 Functions at vehicle level.....	16
5.4.4 Characteristics and braking power of the trains.....	17
5.4.5 Passenger trains.....	18
5.4.6 Freight trains.....	19
5.5 Other brake command and control systems.....	19
5.5.1 General.....	19
5.5.2 Pneumatic brake system without air brake pipe.....	19
5.5.3 Brake system without compressed air.....	22
5.5.4 Characteristics and braking power of the trains.....	22
6 Test conditions.....	22
Annex A (normative) Infrastructure classes.....	23
Annex B (normative) Train composition.....	24
Annex C (normative) Brake equipment of vehicles with UIC air brakes.....	26
Annex D (normative) Brake types, brake positions.....	30
Annex E (normative) Requirements for internal traffic in the United Kingdom.....	31
E.1 General.....	31
E.2 Brake systems other than those covered by the requirements of UIC.....	31
E.2.1 General.....	31
E.3 Functions at train level.....	31
E.4 Functions at vehicle level.....	32
E.4.1 Brake command and control.....	32
E.4.2 Brake force application system.....	33
E.5 Braking performance.....	33
E.5.1 General.....	33
E.5.2 Braking performance of trains operating on UK infrastructures.....	34
Annex F (informative) Common train configurations.....	35
Bibliography.....	37

Foreword

This document (EN 14198:2004) 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 June 2005, and conflicting national standards shall be withdrawn at the latest by June 2005.

It should be noted that certain suburban and regional trains may fall within the scope of WG 23 "Suburban vehicles".

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

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Introduction

Currently, in the standard gauge area of the EU, regulations and specifications for the braking of railway vehicles only exist as internal railway documents in the form of UIC leaflets. Agreements based on these govern the conditions for vehicle transfers between the individual railways. The relationship between the infrastructures and the minimum brake engineering requirements on trains and their individual vehicles is to a large extent unregulated.

With this document, all suppliers will in future be able to offer in response to any invitation to tender vehicles that meet minimum braking requirements, taking into account the applicable infrastructure requirements.

1 Scope

This document specifies basic requirements for the braking of trains hauled by locomotives, including individual vehicles operating on routes of the European railways and their infrastructure systems.

These minimum requirements apply on 2 levels:

- at the train level, as the braking is dependent upon the braking command being communicated throughout the entire train;
- at the vehicle level, so as to ensure the braking system and equipment is configured and dimensioned upon that vehicle in such a way that the required braking effort is developed for the train.

This document covers:

- all new vehicle designs; <https://standards.iteh.ai/catalog/standards/sist/cc122e3d-2449-44ab-b562-cd55d38536ab/sist-en-14198-2005>
- all major overhauls if they involve redesigning or extensive alteration to the brake system of the vehicle concerned;
- all new builds of existing vehicle designs.

This document does not cover vehicles that require special operational management (e.g. track-laying machines).

This document applies specifically to the following types of trains, vehicles and infrastructures:

- a) trains:
- consisting of one or more locomotives and vehicles hauled by a locomotive (including reversible trains);
 - the composition of the train can be changed as required during operation (coupling capability);
 - the maximum speed is greater than or equal to 80 km/h to 200 km/h;
 - the vehicle gauge and track gauge are not specified;
 - the power supply of the locomotive(s) is not specified.

b) vehicles:

— locomotives;

— passenger vehicles (day vehicles, restaurant vehicles, sleeper vehicles, driving trailers, baggage vehicles, etc.);

— freight vehicles

c) infrastructures:

The railways have operating rules which are applicable to braking powers and are related to their infrastructure. Tables A.1 and A.2 give a summary of the minimum braking power requirements as a function of the infrastructure and maximum speed of the trains.

For applications not covered by any of these requirements, these requirements are specified by the customer/operator or the railway authority (see Annex A, infrastructure class I 7).

2 Normative references

The following referenced documents are 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.

prEN 14601, *Railway applications – Straight and angled end cocks for brake pipe and main reservoir pipe.*

UIC 410:2002, *Composition and calculation of the weight and braking of passenger trains*¹⁾

UIC 421:2001, *Regulations for the composition and braking of international freight trains*¹⁾

UIC 432:2002, *Wagons – Running speeds – Technical conditions to be observed*¹⁾

UIC 540:2002, *Brakes – Air brakes for freight and passenger trains*¹⁾

UIC 541-03:1984, *Brakes – Regulations concerning the manufacture of different brake parts – Driver's brake valve*¹⁾

UIC 541-04:2004, *Brakes – Regulations concerning the manufacture of different brake parts – Self-adjustable load-proportional braking system and automatic "empty-loaded" control device*¹⁾

UIC 541-06:1992, *Brakes – Regulations concerning the manufacture of different brake parts – Magnetic brakes / Note: Including 1st Amendment up to 1996-01-01*¹⁾

UIC 541-1:2003, *Brakes - Regulations concerning the manufacture of different brake parts*¹⁾

UIC 541-5:2002, *Brakes – Electro-pneumatic brake (EP brake) – Electro-pneumatic emergency brake override (EBO)*¹⁾

UIC 543:2001, *Brakes – Regulations governing the equipment of trailing stock*¹⁾

UIC 544-1:2004, *Brakes – Braking power*¹⁾

¹⁾ Available from: UIC, Direction Générale, 16 rue Jean Rey, F-75015 Paris

EN 14198:2004 (E)

UIC 544-2:1983, *Conditions to be observed by the dynamic brake of locomotives and motor coaches so that the extra braking effort produced can be taken into account for the calculation of the braked weight*¹⁾

UIC 546:1980, *Brakes – High-power brakes for passenger trains/ Note: Including 5th Amendment up to 1983-01-01*¹⁾

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1 coupling capability
ability to join individual vehicles in a railway operation quickly and without aids to form a functional unit (group of vehicles, train). Coupling capability includes separability under the same conditions. The following types of coupling exist:

- conventional type (screw coupling, side buffer, hose coupling, plug connectors);
- automatic couplings.

Coupling capability does not include a connection between vehicles which can only be undone under workshop conditions (e.g. for maintenance purposes)

3.2 brake type
classification term for air brakes as specified in the UIC standard in accordance with their action (G = Goods = slow-acting, P = Passenger = quick-acting)

3.3 brake position
classification term for UIC brakes according to their braking power. Requirements for individual brake positions are contained in the relevant UIC standards

3.4 braking power
power which is generated by a brake system during the braking process

3.5 effective braking power
dimensionless variable which gives the braked weight as a proportion of the total vehicle or train weight

NOTE In conjunction with the type of brake, it is a variable for assessing the braking effect of the vehicle or train. In order to make train journeys safe, proof of an adequate braking effect of the train is required (minimum effective braking power).

3.6 braked weight
characteristic quantity which describes the braking capacity of a vehicle

NOTE It is determined by calculation or testing as described in UIC 544-1 and represents a comparative value for the power of the brakes, but does not have any technical/physical basis. The associated braked weight is marked on the vehicle for each brake position.

¹⁾ Available from: UIC, Direction Générale, 16 rue Jean Rey, F-75015 Paris

3.7**braking energy**

energy dissipated during braking

3.8**braking force**

force applied by a brake to slow the train or vehicle

3.9**brake device**

all the interlinked functional components that belong to the brake of the vehicle. The brake device carries out the tasks of the brake system

3.10**brake system**

combination of means (equipment and programs) for the complete or partial fulfilment of the train braking requirements with a selected level of safety and availability.

NOTE A train may be equipped with one or more braking systems

3.11**brake equipment**

all the devices of a vehicle which belong to the brake

3.12**brake installation**

combination of devices (hardware and software) which meet the braking requirements of a train with a selected degree of safety and availability. The brake installation includes the control and actuation devices

3.13**brake component**

individual part or collection of parts as in a module

3.14**automatic application of the brakes**

braking triggered by devices in the vehicle and/or on the track that cannot be directly influenced (overridden) by the driver

3.15**rapid braking**

most effective method of braking to achieve the shortest possible response of all available brakes of a train. Safe signal transmission is ensured

NOTE in the case of UIC brakes, by the fastest possible drop of pressure in the brake pipe, aided where necessary, by additional brake devices (electro-pneumatic brake, rapid brake accelerator).

3.16**brake response time**

time from when the braking requirement is triggered to when 95 % of the maximum brake cylinder pressure has been attained

EN 14198:2004 (E)**3.17****stopping distance**

distance covered from the time the brake is demanded to when the train stops

3.18**standard-gauge railway (railway)**

standard-gauge railways are railways whose technical and operational characteristics are designed for inter-regional traffic and for which international regulations of a mandatory nature exist (keywords: Technical Unity; interoperability; UIC leaflets) and are agreed with the aim of operating commercial traffic

3.19**passenger emergency braking**

device in vehicles for bringing trains to a standstill in a hazardous situation by means of braking triggered by a passenger or crew member

3.20**hand brake**

a mechanical, hand-operated brake in an individual vehicle acting on one or more wheelset(s) of this vehicle.

NOTE It operates independently of the air brake state and is typically used as a parking/immobilization brake

3.21**self-adjusting load-proportional braking**

continuous matching of the maximum braking force of a brake system to the vehicle mass with the aim of keeping the deceleration constant regardless of the vehicle mass (loading)

3.22**rotation monitor**

device on the vehicle which continuously monitors whether each wheelset of the vehicle is rotating during the journey

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3.23**blending**

combined action of two or more brake systems to attain a specific braking force. It is used for example in normal braking when changing over from the dynamic brake (e.g. electro-dynamic, hydro-dynamic) to the friction brake

3.24**maximum design speed**

maximum speed at which a vehicle or a train can travel within the limits of the braking capability on a specific infrastructure. Boundary conditions (e.g. steep gradient, poor signal visibility, etc.) are not taken into account

3.25**train composition**

assembly of the train from individual vehicles

3.26**total weight**

in the case of passenger vehicles, the sum of the tare weight (including a defined proportion of stock) and allowance for passengers, which is inscribed in the weight grid of the vehicle

NOTE Not applicable to freight vehicles or locomotives.

3.27**allowance for passengers**

fictitious assumed weight for the passengers in a vehicle. It is based on 100 % seat occupancy. The mandatory allowance for passengers is specified in UIC 410 as applicable for the different types of vehicles.

3.28**additional brake device**

"decentralized command initiation for automatic application of the brake" initiated by various triggering events thereby activating rapid braking. These events are detected, e.g. by the passenger-emergency brake (PEB), derailment detection devices (UIC 541-08), device used for ensuring safety of loads

3.29**emergency brake override**

for the purposes of this document, the emergency brake override is the electro-pneumatic emergency brake override as specified in UIC 541-5. It is used to override passenger emergency braking according to 3.19 after acknowledgement by the driver

3.30**magnetic track brake**

brake in which the braking force is generated by the friction between the surface of the rail and the magnet(s) where the pole shoes are drawn onto the rail by the magnetic force

3.31**eddy current brake**

brake in which the braking force is produced by the generation of eddy currents between the brake and the infrastructure

4 Symbols and abbreviations**STANDARD PREVIEW**

For the purpose of this document, the following symbols and abbreviations apply according to existing UIC leaflets:

BP:	Air brake pipe	SIST EN 14198:2005
MRP:	Main reservoir pipe	https://standards.iteh.ai/catalog/standards/sist/cc122e3d-2449-44ab-b562-cd55d38536ab/sist-en-14198-2005
DBV:	Driver's brake valve	
EP:	Electro-pneumatic brake	
EP (UIC):	Electro-pneumatic brake as specified in UIC 541-05	
BA:	Rapid brake accelerator	
WSP:	Wheel slide protection	
H:	Hydrodynamic brake	
EBO:	Emergency brake override	
Mg:	Magnetic track brake	
λ :	Effective braking power	
s_B :	Braking distance	
AR:	Auxiliary reservoir	
ECB:	Eddy current brake	
S, ss:	Traffic types according to UIC for freight vehicles	

EN 14198:2004 (E)

s/AI: Traffic type according to UIC with self-adjusting load-controlled braking

G, P, R: Brake positions according to UIC

5 Requirements**5.1 General**

The service operators shall ensure that specifications include this standard as part of the requirements for the brake installation. The manufacturers shall indicate in the tender where the requirements of the standard are not met.

The brake command and control system can be designed in different ways. The UIC brake system is the most commonly used in continental Europe (see 5.4). Other brake systems can be used provided that it is proven that the safety level achieved is at least equivalent to that obtained with the UIC brake system (see 5.5).

The brake system required for a train hauled by a locomotive shall work independently of the type of brake selected on two levels, the train level and the vehicle level.

The following minimum requirements shall be met on both these levels:

5.2 Train level

Application of the brake which is controlled from the vehicle by the controls (driver's brake valve) shall meet the following functional and safety requirements in the various vehicles:

Requirement 1: Automaticity

Each individual brake system or combination of them shall operate automatically, i.e. in the event of train separation, the two parts of the train shall automatically be braked, brought to a standstill and be able to be kept in the same position in this way within a period specified by the operator. This braking can be overridden by restoring the brake control function or by other intentional operations.

Requirement 2: Inexhaustibility

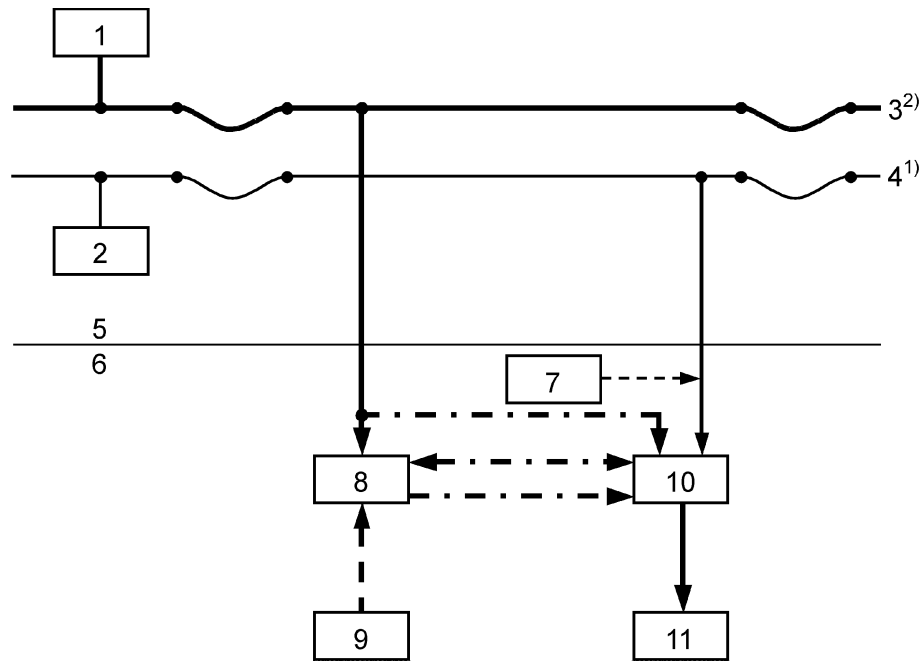
The braking power available in the active brake system of the train shall be adequate

- once the train is prepared and throughout its journey and
- under all track conditions

to attain a braking force when the brake is applied in the train, the maximum value of which is not less than that specified for the UIC brake system. A decisive factor here is ensuring the energy supply to the individual vehicle brakes in the train.

Requirement 3: Basic functional diagram



The basic functional diagram of a brake system shall clearly show the basic functional links and transmission paths for the brake energy generation and brake force generation, including their control and conversion into braking energy. Figure 1 shows the basic structure of a brake system (with train and vehicle levels).





Key

- | | | | |
|---|-------------------------|----|---|
| 1 | Central energy source | 7 | Decentralized command initiation for automatic brake application device |
| 2 | Central command device | 8 | Energy store |
| 3 | Energy medium line(s) | 9 | Separate energy source |
| 4 | Control command line(s) | 10 | Controller |
| 5 | Train level | 11 | Devices generating braking force |
| 6 | Vehicle level | | |

Unbroken line: connection required

 Energy medium line
 Control command line

Broken lines:

 connection also possible
 connection via path A and/or path B

¹⁾ Number of lines freely selectable; joint transmission of energy medium and control command over the same line is allowed.

²⁾ MBP is obligatory for EBO/ep, Mg brake, ECB

Figure 1 — Automatic brake application device (basic functional diagram)