

**Railway applications - Rolling stock -
Pantographs: Characteristics and tests
- Part 2: Pantographs for metros and
light rail vehicles**

Railway applications - Rolling stock - Pantographs:
Characteristics and tests - Part 2: Pantographs for
metros and light rail vehicles

EESTI STANDARDI EESSÕNA

NATIONAL FOREWORD

<p>Käesolev Eesti standard EVS-EN 50206-2:2002 sisaldab Euroopa standardi EN 50206-2:1999 ingliskeelset teksti.</p> <p>Käesolev dokument on jõustatud 18.12.2002 ja selle kohta on avaldatud teade Eesti standardiorganisatsiooni ametlikus väljaandes.</p> <p>Standard on kättesaadav Eesti standardiorganisatsioonist.</p>	<p>This Estonian standard EVS-EN 50206-2:2002 consists of the English text of the European standard EN 50206-2:1999.</p> <p>This document is endorsed on 18.12.2002 with the notification being published in the official publication of the Estonian national standardisation organisation.</p> <p>The standard is available from Estonian standardisation organisation.</p>
--	---

<p>Käsitlusala:</p> <p>This standard defines the general assembly characteristics which are to be applied to pantographs, to enable current collection from the overhead line system. It also defines the tests the pantographs have to perform, excluding insulators. This standard does not apply to pantograph dielectric tests, which are to be performed on the pantograph installed on the vehicle roof.</p> <p>This standard does not apply to pantographs used on main line vehicles: these pantographs are considered in EN 50206-1.</p> <p>This standard relates to conventional suspended overhead line systems and accessories. The systems (or part of them) which are rigidly suspended will require special consideration between the customer and the supplier.</p>	<p>Scope:</p> <p>This standard defines the general assembly characteristics which are to be applied to pantographs, to enable current collection from the overhead line system. It also defines the tests the pantographs have to perform, excluding insulators. This standard does not apply to pantograph dielectric tests, which are to be performed on the pantograph installed on the vehicle roof.</p> <p>This standard does not apply to pantographs used on main line vehicles: these pantographs are considered in EN 50206-1.</p> <p>This standard relates to conventional suspended overhead line systems and accessories. The systems (or part of them) which are rigidly suspended will require special consideration between the customer and the supplier.</p>
--	--

ICS 29.280, 45.060.01

Võtmesõnad: metro, pantograph, properties, railway, tests, tramway

**Railway applications - Rolling stock
Pantographs: Characteristics and tests
Part 2: Pantographs for metros and light rail vehicles**

Applications ferroviaires
Matériel roulant
Pantographes: Caractéristiques et essais
Partie 2: Pantographes pour métros et
tramways

Bahnanwendungen - Schienenfahrzeuge
Merkmale und Prüfungen von
Stromabnehmern
Teil 2: Dachstromabnehmer für
Stadtbahnen und Straßenbahnen

This European Standard was approved by CENELEC on 1999-01-01. CENELEC 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 Central Secretariat or to any CENELEC 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 CENELEC member into its own language and notified to the Central Secretariat has the same status as the official versions.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

CENELEC

European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

Central Secretariat: rue de Stassart 35, B - 1050 Brussels

Foreword

This European Standard was prepared by SC 9XB, Electromechanical material on board rolling stock, of Technical Committee CENELEC TC 9X, Electrical and electronic applications for railways. The text of the draft was submitted to the formal vote and was approved by CENELEC as EN 50206-2 on 1999-01-01.

The following dates were fixed:

- latest date by which the EN has to be implemented
at national level by publication of an identical national standard
or by endorsement (dop) 2000-01-01
- latest date by which the national standards conflicting
with the EN have to be withdrawn (dow) 2002-01-01

Annexes designated „normative“ are part of the body of the standard.

Annexes designated „informative“ are given for information only.

In this standard, annexes A, B and C are normative and annex D is informative.

SC9XB Note:

Clauses and subclauses subject to further change are indicated in the text by a note.

Those affected are:

- 6.4.2 Resistance to vibrations
- 6.9 Current collection tests

Content

Foreword	2
Introduction	4
1 Scope	4
2 Normative references	4
3 Definitions	5
3.1 General	5
3.2 Design	5
3.3 General characteristics	6
4 Technical requirements	7
4.1 Gauge	7
4.2 Extension of the pantographs	7
4.3 Electric values	7
4.4 Static force tolerances	7
4.5 Transverse rigidity	8
4.6 Collector head	8
4.7 Operating system	8
4.8 Automatic dropping device (A.D.D.)	8
4.9 Pantograph mass and force on the roof	8
4.10 Protection against corrosion	8
5 Marking	9
6 Tests	9
6.1 Categories of tests	9
6.2 General tests	10
6.3 Operating tests	11
6.4 Endurance tests	12
6.5 Resistance to shocks (supplementary type test)	13
6.6 Transverse rigidity test (type test)	13
6.7 Air tightness tests	14
6.8 Measurement of degrees of freedom of collector head (routine test)	14
6.9 Current collection tests (combined test)	14
6.10 Heating tests	14
7 Inspection plan	15
8 Reliability	15
8.1 Specification	15
8.2 In-service reliability demonstration	15
9 Maintenance	15
9.1 Structure	15
9.2 Collector head structure	16
9.3 Maintainability	16
10 Electromagnetic compatibility	16
Annex A (normative)	17
Annex B (normative)	18
Annex C (normative)	19
Annex D (informative)	20

Introduction

The electrical power supply of a tractive unit is achieved by the collection of current from the contact wire by means of one or more pantograph(s), installed on the traction unit or on the vehicle.

The contact strip of the pantograph which slides along the contact wire facilitates the transmission of power.

The pantograph and the catenary form two oscillating sub-systems which can be displaced. There exists an unilateral sliding linkage between them, which shall ensure continuous contact. Their design shall allow for minimum wear of both sub-systems when used.

1 Scope

This standard defines the general assembly characteristics which are to be applied to pantographs, to enable current collection from the overhead line system. It also defines the tests the pantographs have to perform, excluding insulators.

This standard does not apply to pantograph dielectric tests, which are to be performed on the pantograph installed on the vehicle roof.

This standard does not apply to pantographs used on main line vehicles: these pantographs are considered in EN 50206-1.

This standard relates to conventional suspended overhead line systems and accessories. The systems (or part of them) which are rigidly suspended will require special consideration between the customer and the supplier.

2 Normative references

This European Standard incorporates, by dated or undated references, provisions from other publications. These normative references are cited at the appropriate place 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.

DIN 43267	(1973)	Pantographs for electric traction, profile limiting for pantograph carbons with leading horns
EN 29 001		Quality systems - Model for quality assurance in design/development, production, installation and servicing
EN 29 002		Quality systems - Model for quality assurance in production and installation
EN 50125-1 ^{*)}		Railway applications - Environmental conditions for equipment - Part 1: Equipment on board rolling stock
EN 50126		Railway applications - The specification and demonstration of Reliability, Availability, Maintainability and Safety (RAMS)
EN 50206-1		Railway applications - Rolling stock - Pantographs: Characteristics and tests - Part 1: Pantographs for main line vehicles

^{*)} in preparation

EN 50163		Railway applications - Supply voltages of traction systems
EN 50215 ^{*)}		Railway applications - Testing of rolling stock after completion of construction and before entry into service
EN 60529	(1991)	Degrees of protection provided by enclosures (IP code) (IEC 60529:1989)
ENV 50121 series		Railway applications - Electromagnetic compatibility
IEC 60077-1 ^{*)}		Railway applications - Electrotechnical components - Part 1: General service conditions
IEC 60077-2 ^{*)}		Railway applications - Electrotechnical components - Part 2: General rules
IEC 60494	(1974)	Rules for pantographs of electric rolling stock
IEC 61373 ^{*)}		Railway applications - Shock and vibration requirements for rolling stock equipment

3 Definitions

For the purpose of this standard, the following definitions apply.

3.1 General

3.1.1 **supplier**: the manufacturer of the pantograph.

3.1.2 **customer**: either the operating authority or the vehicle manufacturer.

3.1.3 **pantograph** (see annex A): an apparatus that collects current on one or more contact lines. It consists of a base frame, an operating system, a frame and a collector head. It is of variable geometry. In the "operating" position, the apparatus is entirely or partly under voltage. It is electrically insulated only generally at its interfaces, on the vehicle roof. It enables current to be transmitted from the overhead line to the vehicle electrical system.

3.2 Design

The following definitions are related to the sketch in Annex A, except items 9, 15, 16, 17.

3.2.1 **frame** (item 1): An articulated structure which enables the collector head to move in a vertical direction with respect to the base frame of the pantograph.

3.2.2 **base frame** (item 2): Fixed part of the pantograph which supports the frame and is mounted on insulators fixed to the vehicle roof.

3.2.3 **collector head** (item 3): Part of the pantograph supported by the frame which includes contact strips, horns and may include a suspension.

3.2.4 **contact strip** (item 4): Replaceable wearing part of the collector head which interfaces with the overhead line.

3.2.5 **horns** (item 5): Ends of the collector head which ensure smooth engagement with the contact wire.

3.2.6 **collector head length** (item 6): Dimension of collector head measured horizontally transversely in relation to the vehicle.

^{*)} in preparation