



SLOVENSKI STANDARD SIST EN 61373:1999

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**Železniške naprave – Oprema voznih sredstev – Preskusi na udarce in vibracije
(IEC 61373:1999)**

Railway applications - Rolling stock equipment - Shock and vibration tests

Bahnanwendungen - Betriebsmittel von Bahnfahrzeugen - Prüfungen für Schwingen und Schocken

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Applications ferroviaires - Matériel roulant - Essais de chocs et vibrations
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Ta slovenski standard je istoveten z: EN 61373:1999

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EUROPEAN STANDARD

EN 61373

NORME EUROPÉENNE

EUROPÄISCHE NORM

April 1999

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English version

Railway applications
Rolling stock equipment
Shock and vibration tests
(IEC 61373:1999)

Applications ferroviaires
Matériel roulant
Essais de chocs et vibrations
(CEI 61373:1999)

Bahnanwendungen
Betriebsmittel von Bahnfahrzeugen
Prüfungen für Schwingen und Schocken
(IEC 61373:1999)

This European Standard was approved by CENELEC on 1999-04-01. 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.

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CENELEC

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

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Foreword

The text of document 9/475/FDIS, future edition 1 of IEC 61373, prepared by IEC TC 9, Electric traction equipment, was submitted to the IEC-CENELEC parallel vote and was approved by CENELEC as EN 61373 on 1999-04-01.

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) 2003-04-01

Annexes designated "normative" are part of the body of the standard.

Annexes designated "informative" are given for information only.

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

Annex ZA has been added by CENELEC.

Endorsement notice

The text of the International Standard IEC 61373:1999 was approved by CENELEC as a European Standard without any modification.

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Annex ZA (normative)

Normative references to international publications with their corresponding European publications

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).

NOTE: When an international publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC 60068-2-27	1987	Basic environmental testing procedures Part 2: Tests - Test Ea and guidance: Shock	EN 60068-2-27	1993
IEC 60068-2-47	1982	Part 2: Tests - Mounting of components, equipment and other articles for dynamic tests including shock (Ea), bump (Eb), vibration (Fc and Fd) and steady-state acceleration (Ga) and guidance	EN 60068-2-47	1993
IEC 60068-2-64 + corr. October	1993 1993	Part 2: Test methods - Test Fh: Vibration, broad-band random (digital control) and guidance	EN 60068-2-64	1994

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Matériel roulant –
Essais de chocs et vibrations**

**Railway applications –
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Shock and vibration tests**

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Commission Electrotechnique Internationale
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INTERNATIONAL ELECTROTECHNICAL COMMISSION

**RAILWAY APPLICATIONS –
ROLLING STOCK EQUIPMENT –
SHOCK AND VIBRATION TESTS**

FOREWORD

- 1) The IEC (International Electrotechnical Commission) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of the IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, the IEC publishes International Standards. Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. The IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
- 2) The formal decisions or agreements of the IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested National Committees.
- 3) The documents produced have the form of recommendations for international use and are published in the form of standards, technical reports or guides and they are accepted by the National Committees in that sense.
- 4) In order to promote international unification, IEC National Committees undertake to apply IEC International Standards transparently to the maximum extent possible in their national and regional standards. Any divergence between the IEC Standard and the corresponding national or regional standard shall be clearly indicated in the latter.
- 5) The IEC provides no marking procedure to indicate its approval and cannot be rendered responsible for any equipment declared to be in conformity with one of its standards.
- 6) Attention is drawn to the possibility that some of the elements of this International Standard may be the subject of patent rights. The IEC shall not be held responsible for identifying any or all such patent rights.

International Standard IEC 61373 has been prepared by IEC technical committee 9: Electric railway equipment.

The text of this standard is based on the following documents:

FDIS	Report on voting
9/475/FDIS	9/509/RVD

Full information on the voting for the approval of this standard can be found in the report on voting indicated in the above table.

Annexes A, B, C and D are for information only.

INTRODUCTION

This standard covers the requirements for random vibration and shock testing items of mechanical, pneumatic, electrical and electronic equipment/components (hereafter only referred to as equipment) to be fitted on to railway vehicles. Random vibration is the only method to be used for equipment/component approval.

The tests contained within this standard are specifically aimed at demonstrating the ability of the equipment under test to withstand the type of environmental vibration conditions normally expected for railway vehicles. In order to achieve the best representation possible, the values quoted in this standard have been derived from actual service measurements submitted by various bodies from around the world.

This standard is not intended to cover self-induced vibrations as these will be specific to particular applications.

Engineering judgement and experience is required in the execution and interpretation of this standard.

This standard is suitable for design and validation purposes; however, it does not exclude the use of other development tools (such as sine sweep), which may be used to ensure a predetermined degree of mechanical and operational confidence. To assist product design for compliance with this standard, guidance is given in annex B which allows comparison with alternative design methods.

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The test levels to be applied to the item under test are dictated only by its location on the train (i.e. axle, bogie or body-mounted).

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It should be noted that these tests may be performed on prototypes in order to gain design information about the product performance under random vibration. However, for attestation of testing purposes the tests have to be carried out on equipment taken from normal production.

RAILWAY APPLICATIONS – ROLLING STOCK EQUIPMENT – SHOCK AND VIBRATION TESTS

1 Scope

This International Standard specifies the requirements for testing items of equipment intended for use on railway vehicles which are subsequently subjected to vibrations and shock owing to the nature of railway operational environment. To gain assurance that the quality of the item is acceptable, it has to withstand tests of reasonable duration that simulate the service conditions seen throughout its expected life.

Simulated long-life testing can be achieved in a number of ways each having their associated advantages and disadvantages, the following being the most common:

- a) amplification: where the amplitudes are increased and the time base decreased;
- b) time compression: where the amplitude history is retained and the time base is decreased;
- c) decimation: where time slices of the historical data are removed when the amplitudes are below a specified threshold value.

The amplification method as stated in a) above, is used in this standard and together with the publications referred to in clause 2; it defines the default test procedure to be followed when vibration testing items for use on railway vehicles. However, other standards do exist and may be used with prior agreement between the manufacturer and the customer. In such cases attestation of testing against this standard will not apply. Where service information is available comparison with the standard can be performed using the method outlined in annex A.

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Whilst this standard is primarily concerned with railway vehicles on fixed rail systems, its wider use is not precluded. For systems operating on pneumatic tyres, or other transportation systems such as trolleybuses, where the level of shock and vibration clearly differ from those obtained on fixed rail systems, the supplier and customer can agree at the tender stage, the test levels. It is recommended that the frequency spectra and the shock duration/amplitude be determined using the guidelines set out in annex A. Items tested at levels outside those quoted in this standard can not be certified against the requirements of this standard.

An example of this is trolleybuses, whereby body-mounted trolleybus equipment could be tested in accordance with category 1 equipment referred to in the standard.

This standard applies to single axis testing. Multi-axis testing is outside the scope of this standard.

The test values quoted in this standard have been divided into three categories dependent only upon the equipment's location within the vehicle.

Category 1 Body mounted

Class A Cubicles, subassemblies, equipment and components mounted directly on or under the car body.

Class B Anything mounted inside an equipment case which is in turn mounted directly on or under the car body.

NOTE – Class B should be used when it is not clear where the equipment is to be located.

Category 2 Bogie mounted

Cubicles, subassemblies, equipment and components which are to be mounted on the bogie of a railway vehicle.

Category 3 Axle mounted

Subassemblies, equipment and components or assemblies which are to be mounted on the wheelset assembly of a railway vehicle.

NOTE – In the case of equipment mounted on vehicles with one level of suspension such as wagons and trucks, unless otherwise agreed at the tender stage, axle mounted equipment will be tested as category 3, and all other equipment will be tested as category 2.

The cost of testing is influenced by the weight, shape and complexity of the item under test. Consequently at the tender stage the supplier may propose a more cost effective method of demonstrating compliance with the requirements of this standard. Where alternative methods are agreed it will be the responsibility of the supplier to demonstrate to his customer or his representative that the objective of this standard has been met. If an alternative method of evaluation is agreed, then the item tested cannot be certified against the requirement of this standard.

This standard is intended to evaluate equipment which is attached to the main structure of the vehicle (and/or components mounted thereon). It is not intended to test equipment which forms part of the main structure. There are a number of cases where additional or special vibration tests may be requested by the customer, for example:

- a) equipment mounted on, or linked to, items which are known to produce fixed frequency excitation;
- b) equipment such as traction motors, pantographs, shoe gear, suspension components and mechanical parts designed to transmit forces and/or torque, which may be subjected to tests in accordance with their special requirements, applicable to their use on railway vehicles. In all such cases the tests carried out should be dealt with by separate agreement at the tender stage;
- c) equipment intended for use in special operational environments as specified by the customer.

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this International Standard. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies. Members of ISO and IEC maintain registers of currently valid International Standards.

IEC 60068-2-27:1987, *Environmental testing – Part 2: Tests – Test Ea and guidance: Shock*

IEC 60068-2-47:1982, *Basic environmental testing – Part 2: Tests – Mounting of components, equipment and other articles for dynamic tests including shock (Ea), bump (Eb) vibration (Fc and Fd) and steady state acceleration (Ga) and guidance*

IEC 60068-2-64:1993, *Environmental testing – Part 2: Test methods – Test Fh: Vibration, broadband random (digital control) and guidance*