



SLOVENSKI STANDARD SIST EN 60068-2-27:2001

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Basic environmental testing procedures - Part 2: Tests - Test Ea and guidance: Shock

Basic environmental testing procedures - Part 2: Tests - Test Ea and guidance: Shock

Grundlegende Umweltprüfverfahren -- Teil 2: Prüfungen - Prüfung Ea und Leitfaden: Schocken

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Ta slovenski standard je istoveten z: **EN 60068-2-27:1993**

ICS:

19.040	Preskušanje v zvezi z okoljem	Environmental testing
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ENGLISH VERSION

Basic environmental testing procedures

Part 2: Tests

Test Ea and guidance: Shock

(IEC 68-2-27:1987)

Essais fondamentaux climatiques
et de robustesse mécanique
Deuxième partie: Essais
Essai Ea et guide: Chocs
(CEI 68-2-27:1987)

Grundlegende Umweltprüfverfahren
Teil 2: Prüfungen
Prüfung Ea und Leitfaden:
Schocken
(IEC 68-2-27:1987)

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This European Standard was approved by CENELEC on 1993-03-09.
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, 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

At the request of CENELEC Reporting Secretariat SR 50A, HD 323.2.27 S2:1988 (IEC 68-2-27:1987) was submitted to the CENELEC voting procedure for conversion into a European Standard.

The text of the International Standard was approved by CENELEC as EN 60068-2-27 on 9 March 1993.

The following dates were fixed:

- latest date of publication of an identical national standard (dop) 1994-03-01
- latest date of withdrawal of conflicting national standards (dow) -

Annexes designated "normative" are part of the body of the standard. In this standard, annex ZA is normative.

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The text of the International Standard IEC 68-2-27:1987 was approved by CENELEC as a European Standard without any modification.

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ANNEX ZA (normative)

OTHER INTERNATIONAL PUBLICATIONS QUOTED IN THIS STANDARD
WITH THE REFERENCES OF THE RELEVANT EUROPEAN PUBLICATIONS

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

IEC Publication	Date	Title	EN/HD	Date
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68-1	1982*	Basic environmental testing procedures Part 1: General and guidance	HD 323.1 S1	1988
68-2-29	1968*	Part 2: Tests - Test Eb: Bump	HD 323.2.29 S1	1989
68-2-31	1969	Test Ec: Drop and topple, primarily for equipment-type specimens	EN 60068-2-31*	1993
68-2-32	1975	Test Ed: Free fall	EN 60068-2-32*	1993
68-2-47	1982	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
68-2-55	1987	Test Ee and guidance: Bounce	EN 60068-2-55	1993
721-3-1	1987*	Classification of environmental conditions - Part 3: Classification of groups of environmental parameters and their severities - Storage	HD 478.3.1 S1	1990
721-3-5	1985*	Ground vehicle installations	-	-

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- * IEC 68-1:1982 is superseded by IEC 68-1:1988 which is harmonized as HD 323.1 S2:1988
 - * IEC 68-2-29:1968 is superseded by IEC 68-2-29:1987 which is harmonized as EN 60068-2-29:1993
 - * EN 60068-2-31 includes A1:1982
 - * EN 60068-2-32 includes A1:1982 + A2:1990
 - * IEC 721-3-1:1987 is superseded by IEC 721-3-1:1991 which is harmonized as EN 60721-3-1:1993
 - * IEC 721-3-5:1991 is harmonized as EN 60721-3-5:1993

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**NORME INTERNATIONALE
INTERNATIONAL STANDARD**

**CEI
IEC
68-2-27**

Troisième édition
Third edition
1987



Commission Electrotechnique Internationale

International Electrotechnical Commission

Международная Электротехническая Комиссия

**Essais fondamentaux climatiques et de
robustesse mécanique**

Deuxième partie: Essais — Essai Ea et guide: Chocs

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Basic environmental testing procedures

Part 2: Tests — Test Ea and guidance: Shock

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

BASIC ENVIRONMENTAL TESTING PROCEDURES

Part 2: Tests — Test Ea and guidance: Shock

FOREWORD

- 1) The formal decisions or agreements of the IEC on technical matters, prepared by Technical Committees on which all the National Committees having a special interest therein are represented, express, as nearly as possible, an international consensus of opinion on the subjects dealt with.
- 2) They have the form of recommendations for international use and they are accepted by the National Committees in that sense.
- 3) In order to promote international unification, the IEC expresses the wish that all National Committees should adopt the test of the IEC recommendation for their national rules in so far as national conditions will permit. Any divergence between the IEC recommendation and the corresponding national rules should, as far as possible, be clearly indicated in the latter.

PREFACE

This standard has been prepared by Sub-Committee 50A: Shock and Vibration Tests, of IEC Technical Committee No. 50: Environmental Testing.

This third edition replaces the second edition of IEC Publication 68-2-27 (1972). It includes Amendment No. 1 (1982) and Amendment No. 2 (1983).

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

SIST EN 60068-2-27:2001	
Six Months' Rule	Reports on Voting
50A(CO)161	50A(CO)168
50A(CO)162	50A(CO)169

Further information can be found in the relevant Reports on Voting indicated in the table above.

The following IEC publications are quoted in this standard:

Publication Nos. 68-1 (1982): Basic Environmental Testing Procedures, Part I: General and Guidance.

- 68-2: Part 2: Tests.
- 68-2-29 (1986): Test Eb and Guidance: Bump.
- 68-2-31 (1969): Test Ec: Drop and Topple, Primarily for Equipment-type Specimens.
- 68-2-32 (1975): Test Ed: Free Fall.
- 68-2-47 (1982): 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.
- 68-2-XX: Test Ee and Guidance: Bounce. (In preparation.)
- 721-3: Classification of Environmental Conditions. Part 3: Classification of Groups of Environmental Parameters and Their Severities.
- 721-3-1: Part 3: Classification of Groups of Environmental Parameters and Their Severities — Storage. (Under consideration.)
- 721-3-5 (1985): Part 3: Classification of Groups of Environmental Parameters and Their Severities — Ground Vehicle Installations.

Other publication quoted:

ISO Standard 2041 (1975): Vibration and Shock — Vocabulary.

BASIC ENVIRONMENTAL TESTING PROCEDURES

Part 2: Tests — Test Ea and guidance: Shock

INTRODUCTION

This test is applicable to components, equipments and other electrotechnical products, hereinafter referred to as "specimens", which, during transportation or in use, may be subjected to conditions involving relatively infrequent non-repetitive shocks. The shock test may also be used as a means of establishing the satisfactory design of a specimen in so far as its structural integrity is concerned and as a means of quality control. It consists basically of subjecting a specimen to non-repetitive shocks of standard pulse shapes with specified peak acceleration and duration.

Specification writers will find in Clause 11 a list of details to be considered for inclusion in specifications and in Appendix A the necessary guidance.

1. Object

To provide a standard procedure for determining the ability of a specimen to withstand specified severities of shock.

2. General description

This standard is written in terms of prescribed pulse shapes. Guidance for the selection and application of these pulses is given in Appendix A and the characteristics of the different pulse shapes are discussed in Appendix B. Three types of pulse, namely the half-sine pulse, the final-peak saw-tooth pulse and the trapezoidal pulse are included in this standard. The choice of pulse shape depends on a number of factors, and the difficulties inherent in making such a choice preclude a preferred order being given in this standard (see Clause A3).

The purpose of the test is to reveal mechanical weakness and/or degradation in specified performance and to use this information, in conjunction with the relevant specification, to decide whether a specimen is acceptable or not. It may also be used, in some cases, to determine the structural integrity of specimens or as a means of quality control (see Clause A2).

This test is primarily intended for unpackaged specimens and for items in their transport case when the latter may be considered as part of the specimen itself.

The shocks are not intended to reproduce those encountered in practice. Wherever possible, the test severity and the shape of the shock pulse applied to the specimen should be such as to reproduce the effects of the actual transport or operational environment to which the specimen will be subjected, or to satisfy the design requirements if the object of the test is to assess structural integrity (see Clauses A2 and A4).

For the purpose of this test the specimen is always fastened to the fixture or the table of the shock-testing machine during conditioning.

In order to facilitate the use of this standard, references are given in the main part where the reader is invited to refer to Appendix A and also the clause numbers in the main part are referred to in Appendix A.

This standard is to be used in conjunction with IEC Publication 68-1: Basic Environmental Testing Procedures, Part 1: General and Guidance.

3. Definitions

The terms used are generally defined in ISO Standard 2041 or IEC Publication 68-1.

The following additional terms and definitions are also applicable for the purposes of this standard.

3.1 Fixing point

Part of the specimen in contact with the fixture or the table of the shock testing machine and which is normally used to fasten the specimen in service.

3.2 Check point

Fixing point nearest to the centre of the table surface of the shock testing machine, unless there is a fixing point having a more rigid connection to the table, in which case this latter point shall be used.

Note. — This definition applies as there is only one nominated check point. Other standards in IEC Publication 68-2 contain definitions of check points applicable where provision is made for the control of the test by nomination of more than one check point.

3.3 Shock severity

Combination of the peak acceleration and the duration of the nominal pulse.

3.4 Velocity change

Absolute value of the sudden change of speed resulting from the application of the specified acceleration.

Note. — The change is normally considered sudden if it takes place in a time that is short compared with the fundamental period of concern.

3.5 g_n

Standard acceleration due to the earth's gravity, which itself varies with altitude and geographical latitude.

Note. — For the purposes of this standard, the value of g_n is rounded up to the nearest unity, that is 10 m/s².

4. Description of test apparatus

4.1 Required characteristics

When the shock testing machine and/or fixture are loaded with the specimen, the shock applied at the check point shall consist of a pulse approximating to one of the nominal acceleration against time curves given by the broken lines in Figures 1, 2 and 3, pages 38 to 40.

4.1.1 Basic pulse shapes

The true value of the actual pulse shall be within the limits of tolerance shown by the solid lines in the relevant figure.

Note. — Where it is not practicable to achieve a pulse shape falling within the specified tolerance, the relevant specification should state the alternative procedure to be applied (see Clause A5).

The prescribed pulse shapes are given below. The order in which they are given does not indicate a preference.

Final-peak saw-tooth: asymmetrical triangle with short fall time, as shown in Figure 1.

Half-sine: one half-cycle of a sine wave, as shown in Figure 2.

Trapezoidal: symmetrical trapezoid with short rise and fall times, as shown in Figure 3.

4.1.2 Velocity change tolerances

For all pulse shapes, the actual velocity change shall be within $\pm 15\%$ of the value corresponding to the nominal pulse.

Where the velocity change is determined by integration of the actual pulse, this shall be done from $0.4D$ before the pulse to $0.1D$ beyond the pulse, where D is the duration of the nominal pulse.

Note. — If the velocity change tolerance cannot be achieved without the use of elaborate facilities, the relevant specification should state the alternative procedure to be adopted (see Clauses A5 and A6).

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4.1.3 Transverse motion

The positive or negative peak acceleration at the check point, perpendicular to the intended shock direction, shall not exceed 30% of the value of the peak acceleration of the nominal pulse in the intended direction, when determined with a measuring system in accordance with Sub-clause 4.2 (see Clause A5).

Note. — If the transverse motion tolerance cannot be achieved, the relevant specification should state the alternative procedure to be adopted (see Clause A5).

4.2 Measuring system

The characteristics of the measuring system shall be such that it can be determined that the true value of the actual pulse as measured in the intended direction at the check point is within the tolerances required by the figures referenced in Sub-clause 4.1.1.

The frequency response of the overall measuring system, which includes the accelerometer, can have a significant effect on the accuracy and shall be within the limits shown in Figure 4, page 41 (see Clause A5).

4.3 Mounting

The specimen shall be fastened to the shock testing machine table or fixture by its normal mounting means during conditioning. Mounting requirements are specified in IEC Publication 68-2-47.