

INTERNATIONAL STANDARD

NORME INTERNATIONALE

BASIC SAFETY PUBLICATION

PUBLICATION FONDAMENTALE DE SÉCURITÉ

**Environmental testing –
Part 2-27: Tests – Test Ea and guidance: Shock**

**Essais d'environnement –
Partie 2-27: Essais – Essai Ea et guide: Chocs**



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CONTENTS

FOREWORD.....	4
INTRODUCTION.....	6
1 Scope.....	7
2 Normative references.....	7
3 Terms and definitions	8
4 Description of test apparatus	9
4.1 Required characteristics	9
4.2 Measuring system.....	11
4.3 Mounting	12
5 Severities	13
6 Preconditioning.....	14
7 Initial measurements and functional performance test	15
8 Testing	15
9 Recovery	15
10 Final measurements	15
11 Information to be given in the relevant specification.....	15
12 Information to be given in the test report	16
Annex A (normative) Selection and application of pulse shapes – Guidance.....	17
Annex B (informative) Shock response spectra and other characteristics of pulse shapes.....	27
Annex C (informative) Comparison between impact tests.....	36
Bibliography	37
Figure 1 – Pulse shape and limits of tolerance for half-sine pulse	10
Figure 2 – Pulse shape and limits of tolerance for final-peak saw-tooth pulse.....	10
Figure 3 – Pulse shape and limits of tolerance for trapezoidal pulse.....	11
Figure 4 – Frequency characteristics of the overall measuring system	12
Figure A.1 – Shock response spectrum of a symmetrical half-sine pulse.....	19
Figure A.2 – Shock response spectrum of a final-peak saw-tooth pulse	20
Figure A.3 – Shock response spectrum of a symmetrical trapezoidal pulse	21
Figure B.1 – Framework or box containing oscillatory systems of which f_1 , f_2 and f_3 are examples of resonance frequencies	27
Figure B.2a – Exciting pulse	29
Figure B.2b – Responses for f_1 , f_2 and f_3	29
Figure B.2c – Spectra which result from an infinite number of frequencies, with f_1 , f_2 and f_3 shown as finite points on the continuous curves.....	29
Figure B.2 – Shock response spectrum concept	29
Figure B.3 – Framework containing damped multi-degree-of-freedom system	31
Figure B.4 – Shock response spectrum of a half-sine pulse with ripple.....	33

Figure B.5 – Spectrum of a final-peak saw-tooth 300 m/s^2 , 18 ms pulse compared with the spectra of 200 m/s^2 half-sine pulses with durations between 3 ms and 20 ms 35

Table 1 – Severities for shock testing 14

Table A.1 – Examples of pulse shapes and test severities typically employed for various applications..... 23

Table A.2 – Examples of severities typically employed for various applications 24

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

ENVIRONMENTAL TESTING –

Part 2-27: Tests – Test Ea and guidance: Shock

FOREWORD

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International Standard IEC 60068-2-27 has been prepared by IEC technical committee 104: Environmental conditions, classification and methods of test

This fourth edition cancels and replaces the third edition, published in 1987, and includes the merging of IEC 60068-2-29, second edition (1987). It constitutes a technical revision.

The major changes with regard to the previous edition concern:

- the merging of IEC 60068-2-29 into this edition of IEC 60068-2-27; Part 2-29 will be withdrawn as soon as this edition is published;
- the introduction of soft packaged specimens as defined in the IEC ad hoc working group document agreed in Stockholm:2000.

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

FDIS	Report on voting
104/448/FDIS	104/457/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.

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

It has the status of a basic safety publication in accordance with IEC Guide 104.

This standard is to be used in conjunction with IEC 60068-1.

A list of all the parts in the IEC 60068 series, under the general title *Environmental testing*, can be found on the IEC website.

The committee has decided that the contents of this publication will remain unchanged until the maintenance result date indicated on the IEC web site under "<http://webstore.iec.ch>" in the data related to the specific publication. At this date, the publication will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

INTRODUCTION

This part of IEC 60068 deals with components, equipments and other electrotechnical products, hereinafter referred to as “specimens”, which, during transportation, storage and handling, or in use, may be subjected either to conditions involving relatively infrequent non-repetitive or 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 of subjecting a specimen either to non-repetitive or repetitive shocks of standard pulse shapes with specified peak acceleration and duration.

Specification writers will find a list of details to be considered for inclusion in specifications in Clause 11. The necessary guidance is given in Annex A.

ENVIRONMENTAL TESTING –

Part 2-27: Tests – Test Ea and guidance: Shock

1 Scope

This part of IEC 60068 provides a standard procedure for determining the ability of a specimen to withstand specified severities of non-repetitive or repetitive shocks.

The purpose of this test is to reveal mechanical weakness and/or degradation in specified performances, or accumulated damage or degradation caused by shocks. In conjunction with the relevant specification, this may be used in some cases to determine the structural integrity of specimens or as a means of quality control (see Clause A.2).

This test is primarily intended for unpackaged specimens and for items in their transport case when the latter may be considered to be part of the specimen. If an item is to be tested unpackaged, it is referred to as a test specimen. However, if the item is packaged, then the item itself is referred to as a product and the item and its packaging together are referred to as a test specimen. When used in conjunction with IEC 60068-2-47, this standard may be used for testing packaged products. This possibility was included in the 2005 version of IEC 60068-2-47 for the first time.

This standard is written in terms of prescribed pulse shapes. Guidance for the selection and application of these pulses is given in Annex A and the characteristics of the different pulse shapes are discussed in Annex B.

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 A.2 and A.4).

For the purposes of this test, the specimen is always mounted to the fixture or the table of the shock testing machine during testing.

NOTE The term “shock testing machine” is used throughout this standard, but other means of applying pulse shapes are not excluded.

One of the responsibilities of a technical committee is, wherever applicable, to make use of basic safety publications in the preparation of its publications.

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.

IEC 60068-1, *Environmental testing – Part 1: General and guidance*

IEC 60068-2-47:2005, *Environmental testing – Part 2-47: Tests – Mounting of specimens for vibration, impact and similar dynamic tests*

IEC 60068-2-55, *Environmental testing – Part 2-55: Tests – Test Ee and guidance: Bounce*

IEC 60721-3-1, *Classification of environmental conditions – Part 3: Classification of groups of environmental parameters and their severities – Section 1: Storage*

IEC 60721-3-5, *Classification of environmental conditions – Part 3: Classification of groups of environmental parameters and their severities – Section 5: Ground vehicle installations*

Guide 104, *The preparation of safety publications and the use of basic safety publications and group safety publications*

3 Terms and definitions

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

NOTE The terms used are, for the most part, defined in ISO 2041^{[1]1} or IEC 60068-1. The following additional terms and definitions are also applicable for the purposes of this standard.

3.1

check point

point located on the fixture, on the table surface of the shock-testing machine or on the specimen as close as possible to the fixing point, and in any case rigidly connected to it

NOTE 1 A number of check points are used as a means of ensuring that the test requirements are satisfied.

NOTE 2 If more than four fixing points exist, the relevant specification should state the number of fixing points to be used as check points.

NOTE 3 In special cases, for example, for large or complex specimens, the check points will be prescribed by the relevant specification if not close to the fixing points.

NOTE 4 Where a large number of small specimens are mounted on one fixture, or in the case of a small specimen where there are a number of fixing points, a single check point (that is the reference point) may be selected for the derivation of the control signal. This signal is then related to the fixture rather than to the fixing points of the specimen(s). This procedure is only valid when the lowest resonance frequency of the loaded fixture is well above the upper frequency of the test.

3.2

fixing point

part of the specimen in contact with the fixture or the table of the shock-testing machine at a point where the specimen is normally fastened in service

NOTE If a part of the real mounting structure is used as the fixture, the fixing points are taken as those of the mounting structure and not of the specimen.

3.3

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.

3.4

repetition rate

number of shocks per second

3.5

shock severity

combination of the peak acceleration, the duration of the nominal pulse and the number of shocks

¹ Figures in square brackets refer to the bibliography.