Environmental testing – Part 2-31: Tests – Test Ec: Rough Handling Shocks, primarily for equipment-type specimens

EESTI STANDARDIKESKUS
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NATIONAL FOREWORD

Käesolev Eesti standard EVS-EN 60068-2-31:2008 sisaldab Euroopa standardi EN 60068-2-31:2008 ingliskeelset teksti.	This Estonian standard EVS-EN 60068-2-31:2008 consists of the English text of the European standard EN 60068-2-31:2008.
Standard on kinnitatud Eesti Standardikeskuse 20.10.2008 käskkirjaga ja jõustub sellekohase teate avaldamisel EVS Teatajas.	This standard is ratified with the order of Estonian Centre for Standardisation dated 20.10.2008 and is endorsed with the notification published in the official bulletin of the Estonian national standardisation organisation.
Euroopa standardimisorganisatsioonide poolt rahvuslikele liikmetele Euroopa standardi teksti kättesaadavaks tegemise kuupäev on 12.09.2008.	Date of Availability of the European standard text 12.09.2008.
Standard on kättesaadav Eesti standardiorganisatsioonist.	The standard is available from Estonian standardisation organisation.

ICS 19.040

Võtmesõnad: drop, electricity, equipment, equipment specification writing, jolts, mechanical test, procedures, topple

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 60068-2-31

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English version

Environmental testing - Part 2-31: Tests - Test Ec: Rough handling shocks, primarily for equipment-type specimens

(IEC 60068-2-31:2008)

Essais d'environnement - Partie 2-31: Essais - Essai Ec: Choc lié à des manutentions brutales, essai destiné en premier lieu aux matériels (CEI 60068-2-31:2008)

Umgebungseinflüsse - Teil 2-31: Prüfverfahren - Prüfung Ec: Schocks durch raue Handhabung, vornehmlich für Geräte (IEC 60068-2-31:2008)

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

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Foreword

The text of document 104/458/FDIS, future edition 2 of IEC 60068-2-31, prepared by IEC TC 104, Environmental conditions, classification and methods of test, was submitted to the IEC-CENELEC parallel vote and was approved by CENELEC as EN 60068-2-31 on 2008-07-01.

This European Standard supersedes EN 60068-2-31:1993 and EN 60068-2-32:1993.

The major changes with regard to EN 60068-2-31:1993 concern the introduction of soft packaging tests, where appropriate. EN 60068-2-31:2008 now incorporates EN 60068-2-32:1993.

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)	2009-04-01
– latest date by which the national standards conflicting with the EN have to be withdrawn	(dow)	2011-07-01

Annex ZA has been added by CENELEC.

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Endorsement notice

The text of the International Standard IEC 60068-2-31:2008 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

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.

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

Publication	Year	Title	EN/HD	Year
IEC 60068-2-27	-[1)]	Environmental testing - Part 2-27: Tests - Test Ea and guidance: Shock	-	-
IEC 60068-2-55	1987	Environmental testing - Part 2: Tests - Test Ee and guidance: Bounce	EN 60068-2-55	1993
IEC Guide 104	-[1)]	The preparation of safety publications and the use of basic safety publications and group safety publications	-	-
ISO 48	2007	Rubber, vulcanized or thermoplastic - Determination of hardness (hardness between 10 IRHD and 100 IRHD)	-	-
ISO 4180-2	1980	Complete, filled transport packages - General rules for the compilation of performance test schedules - Part 2: Quantitative data	EN 24180-2	1992

[1)] Undated reference.

CONTENTS

ENVIRONMENTAL TESTING –

Part 2-31: Tests – Test Ec: Rough handling shocks, primarily for equipment-type specimens

1 Scope

This part of IEC 60068 deals with a test procedure for simulating the effects of rough handling shocks, primarily in equipment-type specimens, the effects of knocks, jolts and falls which may be received during repair work or rough handling in operational use.

This procedure does not simulate the effects of impacts received during transportation as loosely constrained cargo. Where the effects of loose cargo transportation are to be assessed, test Ee: Bounce should be used. Also this procedure does not simulate the effects of shock applied to installed equipments. Where this effect is to be assessed refer to test Ea: Shock.

Testing should only be specified for equipment likely to receive such rough handling, for example those of small to medium size and mass, and should only be applied to those faces and corners where there is a risk of such treatment being encountered.

In general, equipment which is frequently handled and serviced (for example field equipment and unit spares) can be considered at risk, whereas equipment forming an integral part of a permanent installation would not normally be considered at risk and need not be tested.

Testing may not be applicable to fragile unprotected equipment of irregular shape (for example aircraft nose radar) which, when removed from the installation would be contained in a handling frame or jig. It may however be applicable to these items of equipment when they are in their transit case or in their handling frame or jig.

For equipment which stands only on one face (for example the normal base) the test is generally only applied to that face.

Shock tests are performed on the specimen when fixed to the test machine. Drop and topple, free fall, repeated free fall and bounce tests are performed with the specimen free.

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

IEC 60068-2-55:1987, *Environmental testing – Part 2-55: Tests – Test Ee and guidance: Bounce*

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

ISO 48:2007, *Rubber, vulcanized or thermoplastic – Determination of hardness (hardness between 10 IRHD and 100 IRHD)*

ISO 4180-2:1980, *Complete, filled transport packages – General rules for the compilation of performance test schedules – Part 2: Quantitative data*

3 General description of test

Rough handling shocks can be simulated by one or more of the following tests:

a) Drop and topple

A simple test intended to assess the effects of knocks or jolts likely to be received primarily by equipment-type specimens during repair work or rough handling on a table or bench.

b) Free fall – Procedure 1

A simple test to assess the effects of falls likely to be experienced due to rough handling. It is also suitable to demonstrate a degree of robustness.

c) Free fall – Procedure 2

A test that additionally simulates repetitive shocks likely to be received by certain component-type specimens, for example connectors in service.

The topple test need not be applied to specimens which have dimensions which make them stable whilst being handled. Reference to points 1) and 2) below should be made for information on the "*c – g* ratio" and "height ratio" to establish if the test is necessary.

The falling or topple actions produced by the test procedures given in 5.1.3.1, 5.1.3.2 and 5.1.3.3 are illustrated by Figures 1, 2 and 3.

The drop and topple test includes three distinct procedures:

i) dropping on to a face (5.1.3.1);

ii) dropping on to an edge or a corner (5.1.3.2);

iii) toppling (or pushover) (5.1.3.3).

The purpose of each of these procedures is basically the same, but they represent different kinds of handling.

The test is not intended to be a precise test and a tolerance of ±10 % is allowed on the heights and angles prescribed in 5.1.2.

NOTE For a more precise shock test, test Ea: Shock (IEC 60068-2-27) should be used.

The topple test need not be applied to specimens which have dimensions which make them stable while being handled. When considering the applicability of the topple test, two dimensional ratios are important:

1) the ratio of the height of the centre of gravity from the base, to the smaller dimension of the base, hereinafter referred to as the *c – g* ratio;

2) the ratio of the height of the specimen to the smaller dimension of the base, hereinafter referred to as the height ratio.

If the *c – g* ratio is small, for example less than 0,25, the specimen is unlikely to fall over due to sudden sideways displacements. If the height ratio is small, for example less than 0,5, the specimen is unlikely to topple over due to a sudden sideways force or blow at the top. In such cases the writer of the relevant specification should consider whether the topple test is applicable.