

Okoljski preskusi - 2-31. del: Preskusi - Preskus Ec: Udari zaradi neustreznega ravnanja, predvsem za vzorčno opremo

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

iTeh STANDARD PREVIEW
(standards.iteh.ai)

[SIST EN 60068-2-31:2008](https://standards.iteh.ai/catalog/standards/sist/9179abc8-7635-4f80-93a2-92a79fa49226/sist-en-60068-2-31-2008)

<https://standards.iteh.ai/catalog/standards/sist/9179abc8-7635-4f80-93a2-92a79fa49226/sist-en-60068-2-31-2008>



104/402/CDV

**COMMITTEE DRAFT FOR VOTE (CDV)
PROJET DE COMITÉ POUR VOTE (CDV)**

Project number Numéro de projet		IEC 60068-2-31 Ed. 2.0	
IEC/TC or SC: 104 CEI/CE ou SC:		Secretariat / Secrétariat Sweden	
<input checked="" type="checkbox"/> Submitted for parallel voting in CENELEC <input type="checkbox"/> Soumis au vote parallèle au CENELEC	Date of circulation Date de diffusion 2006-10-13	Closing date for voting (Voting mandatory for P-members) Date de clôture du vote (Vote obligatoire pour les membres (P)) 2007-03-16	
Also of interest to the following committees Intéresse également les comités suivants ISO TC 108		Supersedes document Remplace le document 104/376/CD and 104/401/CC	
Functions concerned Fonctions concernées			
<input type="checkbox"/> Safety Sécurité	<input type="checkbox"/> EMC CEM	<input type="checkbox"/> Environment Environnement	<input type="checkbox"/> Quality assurance Assurance qualité

CE DOCUMENT EST TOUJOURS À L'ÉTUDE ET SUSCEPTIBLE DE MODIFICATION. IL NE PEUT SERVIR DE RÉFÉRENCE.

LES RÉCIPIENDAIRES DU PRÉSENT DOCUMENT SONT INVITÉS À PRÉSENTER, AVEC LEURS OBSERVATIONS, LA NOTIFICATION DES DROITS DE PROPRIÉTÉ DONT ILS AURAIENT ÉVENTUELLEMENT CONNAISSANCE ET À FOURNIR UNE DOCUMENTATION EXPLICATIVE.

THIS DOCUMENT IS STILL UNDER STUDY AND SUBJECT TO CHANGE. IT SHOULD NOT BE USED FOR REFERENCE PURPOSES.

RECIPIENTS OF THIS DOCUMENT ARE INVITED TO SUBMIT, WITH THEIR COMMENTS, NOTIFICATION OF ANY RELEVANT PATENT RIGHTS OF WHICH THEY ARE AWARE AND TO PROVIDE SUPPORTING DOCUMENTATION.

iTeh STANDARD PREVIEW

Titre : CEI 60068-2-31 Ed. 2.0: Essais d'environnement – Partie 2-31: Essais. Essai Ec: Chute et culbute, essai destiné en premier lieu aux matériels

Titre : IEC 60068-2-31, Ed.2.0: Environmental testing – Part 2-31: Tests – Test Ec: Rough Handling Shocks, primarily for equipment-type specimens

<https://standards.iteh.ai/catalog/standards/sist/9179abc8-7635-4f80-93a2-92a79fa49226/sist-en-60068-2-31-2008>

Note d'introduction

La version française sera diffusée ultérieurement.

Introductory note

TC 104 MT 17 has in this document combined IEC 60068-2-31 and 60068-2-32 in line with a decision taken in Lindenstruth Germany in 2003.

The convener and MT 17 have prepared the document for circulation as CDV following the discussions at the last meeting in Stockholm in June 2006.

**ATTENTION
VOTE PARALLÈLE
CEI – CENELEC**

L'attention des Comités nationaux de la CEI, membres du CENELEC, est attirée sur le fait que ce projet de comité pour vote (CDV) de Norme internationale est soumis au vote parallèle.

Un bulletin de vote séparé pour le vote CENELEC leur sera envoyé par le Secrétariat Central du CENELEC.

**ATTENTION
IEC – CENELEC
PARALLEL VOTING**

The attention of IEC National Committees, members of CENELEC, is drawn to the fact that this Committee Draft for Vote (CDV) for an International Standard is submitted for parallel voting.

A separate form for CENELEC voting will be sent to them by the CENELEC Central Secretariat.

Copyright © 2006 International Electrotechnical Commission, IEC. All rights reserved. It is permitted to download this electronic file, to make a copy and to print out the content for the sole purpose of preparing National Committee positions. You may not copy or "mirror" the file or printed version of the document, or any part of it, for any other purpose without permission in writing from IEC.

CONTENTS

Clause	Page
1 Scope.....	5
2 General Description.....	5
3 Normative references	6
4 Testing procedures.....	6
5 Testing	6
6 Final Measurements	7
7 Description of the test (drop and topple).....	7
8 Description of the test (free fall)	7
9 Information to be included in the relevant specification.....	8
10 Information to be given in the test report	9
Annex A (NORMATIVE) Test apparatus for repeated free fall Test Ed, proc. 2.....	11
Annex B Informative Guidance: Selection of test severities for free fall tests.....	13

iTeh STANDARD PREVIEW
(standards.iteh.ai)

[SIST EN 60068-2-31:2008](https://standards.iteh.ai/catalog/standards/sist/9179abc8-7635-4f80-93a2-92a79fa49226/sist-en-60068-2-31-2008)

<https://standards.iteh.ai/catalog/standards/sist/9179abc8-7635-4f80-93a2-92a79fa49226/sist-en-60068-2-31-2008>

INTERNATIONAL ELECTROTECHNICAL COMMISSION

ENVIRONMENTAL TESTING –

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

FOREWORD

- 1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of 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, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). 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. 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 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 IEC National Committees.
- 3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
- 4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.
- 5) IEC provides no marking procedure to indicate its approval and cannot be rendered responsible for any equipment declared to be in conformity with an IEC Publication.
- 6) All users should ensure that they have the latest edition of this publication.
- 7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
- 8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
- 9) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

International Standard IEC 60068-2-31 Ed. 2.0 has been prepared by IEC technical committee 104: Environmental conditions, classification and methods of test

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

FDIS	Report on voting
XX/XX/FDIS	XX/XX/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.

The committee has decided that the contents of this publication will remain unchanged until the maintenance result date¹⁾ 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.

iTeh STANDARD PREVIEW (standards.iteh.ai)

[SIST EN 60068-2-31:2008](https://standards.iteh.ai/catalog/standards/sist/9179abc8-7635-4f80-93a2-92a79fa49226/sist-en-60068-2-31-2008)

<https://standards.iteh.ai/catalog/standards/sist/9179abc8-7635-4f80-93a2-92a79fa49226/sist-en-60068-2-31-2008>

¹⁾ The National Committees are requested to note that for this publication the maintenance result date is 2017

ENVIRONMENTAL TESTING – Part 2: Tests – Test Ec: Rough Handling Shocks, primarily for equipment-type specimens

1 Scope

The purpose of the rough handling shocks is to simulate, 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.

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 would stand only on one face (for example the normal base) the test is generally only applied to that face.

2 General Description

2.1 Rough Handling Shocks

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

- | | |
|-------------------|---|
| 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. |
| Free fall proc. 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. |
| Free fall proc. 2 | - 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 clause 2.1.2 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 clauses 7.1, 7.2, and 7.3 are illustrated by Figures 1, 2 and 3.

2.1.2 The drop and topple test includes three distinct procedures:

- a) Dropping on to a face (clause 7.1).
- b) Dropping on to an edge or a corner (clause 7.2).
- c) Toppling (or pushover) (clause 7.3).

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 $\pm 10\%$ is allowed on the heights and angles prescribed in clause 7.

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

For specimens intended to withstand handling of the kind (topple) considered in this recommendation, two dimensional ratios are important:

- a) 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.
- b) The ratio of the height of the specimen to the smaller dimension of the base – 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.

3 Normative references

Test Ea: Shock simulates the effects of repetitive and non-

IEC 60068-2-27: *ENVIRONMENTAL TESTING – Part 2: Tests – Test Ea and guidance: Shock

IEC 60068-2-55: 1987 ENVIRONMENTAL TESTING – Part 2: Tests – Test Ee and guidance: Bounce

ISO 48: 1994 Rubber, vulcanized or thermoplastic -- Determination of hardness (hardness between 10 IRHD and 100 IRHD)

ISO 48:1994/Amd 1:1999

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

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.

4 Testing procedures

4.1 Initial measurements

The specimen shall be visually examined and electrically and mechanically checked as required by the relevant specification.

5 Testing

5.1 Drop and topple

Having taken into account the manner in which the specimen will be handled in use and during repair, the relevant specification shall state the test procedure to be used and whether covers, cables, etc., are to be in position or not. The relevant specification shall also state whether the specimen is, or is not, operational during the test.

In the test procedures for dropping on to a face or corner, it is possible for the specimen to topple onto the next face instead of falling back onto the test face as intended. This shall be avoided by a suitable method.

In any of the test procedures, the specimen shall not be allowed to continue rolling about to the next edge.

Where the number of bottom edges exceeds four, the number of drops or topples shall be limited to four and the relevant specification shall prescribe the edges to be used for the test.

5.2 Free Fall, procedure 1

The specimen shall be allowed to fall freely in its normal attitudes in carrying or use, as prescribed in the relevant specification.

Unless otherwise prescribed in the relevant specification, the specimen shall be subjected to two falls from each prescribed attitude.

5.3 Free Fall Repeated, procedure 2

The specimen shall be placed in the test apparatus and subjected to the prescribed number of falls. If the specimen is normally attached to a cable, the relevant specification should state the type of cable to be used. A free length of 100 mm of cable shall remain connected to the specimen during the test unless otherwise prescribed in the relevant specification.

6 Final Measurements

The specimen shall be visually examined and electrically and mechanically checked, as required by the criteria prescribed in the relevant specification.

7 Description of the test (drop and topple)

The test facility shall be smooth, hard, rigid, unyielding, horizontal and, for example, made of concrete or steel. The steel shall be wet floated or bonded to the concrete. The seismic reaction mass of the facility shall be at least 20 times the mass of the specimen under test. The thickness of the steel plate shall be a minimum of 25 mm. With a specimen in excess of 500 kg, the steel plate shall be at least 75 mm thick, level within two degrees to the horizontal and with a Brinell hardness of 200 – 300.

7.1 Dropping onto a face

The specimen, standing in its normal position of use, is tilted about one bottom edge so that the distance between the opposite edge and the test surface is 25 mm, 50 mm or 100 mm, as prescribed by the relevant specification, or so that the angle made by the bottom and the test surface is 30°, whichever condition is less severe.

It is then allowed to fall freely on to the test surface.

The specimen shall be subjected to one drop about each of four bottom edges.

7.2 Dropping on to an edge or a corner

The specimen, standing in its normal position of use, is raised above the test surface by placing a wooden stud 10 mm high under one corner, and a 20 mm wooden stud under the other adjacent corner of one of the bottom edges. The specimen is then lifted above the test surface by rotating it about the edge on the two studs, until the other corner adjacent to the 10 mm stud is raised 25 mm, 50 mm or 100 mm, as prescribed in the relevant specification, or so that the angle made by the specimen and the test surface is 30°, whichever condition is less severe.

It is then allowed to fall freely on the test surface.

The specimen shall be subjected to one drop on each of four bottom corners by applying the test along four bottom edges in turn.

7.3 Topple (or push-over)

The specimen, standing in its normal position of use, is tilted about one bottom edge until it reaches a position of instability. It is then allowed to fall over freely from this position on to an adjacent face.

The specimen shall be subjected to one topple about each of four bottom edges.

8 Description of the test (free fall)

8.1 Free fall, procedure 1

The specimen shall be dropped onto a smooth, hard, rigid surface of concrete or steel, see clause 7, from a height taken from the series below (see clause 8.1.5).

The height shall be measured from the part of the specimen nearest to the test surface, when the specimen is suspended prior to letting it fall.

The method of releasing the specimen shall allow free fall from the position of suspension with a minimum of disturbance at the moment of release.

Where justified, other impact surfaces and hitting angle of the specimen may be prescribed in the relevant specification.

The height of the fall shall be taken from the following series taking into account the mass of the specimen and unless real usage conditions are known or otherwise specified:

25 mm				mass < 50 kg
50 mm,	100 mm,	250 mm,	500 mm	mass < 10 kg
750 mm,	1 000 mm	1500 mm		mass < 1 kg

The values in bold type are preferred values.

NOTE – For specimen in their transit case or for the packed specimen use the fall heights given in ISO 4180-2.

8.2 Free fall repeated, procedure 2

Each specimen is tested individually, and to simulate practical conditions a length of cable (see clause 5.3.1) is normally attached to the specimen during the test, which consists of subjecting the specimen to a prescribed number of falls from a specified height onto a hard surface. The effect of the test is checked in relation to the changes, if any, in the mechanical and electrical parameters of the specimen.

The apparatus shall be such that the prescribed number of falls from the specified height may be applied to individual specimens in accordance with the requirements of the relevant specification. Annex A describes one suitable form of apparatus employing a rotating barrel.

NOTE – The tumbling barrel may not be appropriate for heavy specimens or if the shape of specimen prevents repeated free fall.

The number of falls selected from the list given below should be related to the intended usage of the item.

The total number of falls shall be as prescribed in the relevant specification and shall be taken from the following series:

50, 100, 200, 500, 1 000

8.3 The height of fall shall be 500 mm and/or 1000 mm.

NOTE The height of the falls should be related to the intended usage of the specimen.

The rate of falls shall be approximately ten falls per min.

The specimen shall fall on a smooth, hard, rigid test surface which, unless otherwise prescribed by the relevant specification, shall be of steel of 3 mm thickness, backed by hardwood of between 10 mm and 19 mm thickness.

9 Information to be included in the relevant specification

When the test is included in the relevant specification, the following details shall be given as far as they are applicable.

9.1 For Drop and Topple:

	Subclause
a) Initial measurements	4.1
b) testing	5.1
c) Fitting of cables, covers, etc.	5.1
d) Whether the specimen is operational or not during the test	5.1