

**Environmental testing - Part 2-21: Tests - Test
U: Robustness of terminations and integral
mounting devices**

EESTI STANDARDI EESSÕNA

NATIONAL FOREWORD

Käesolev Eesti standard EVS-EN 60068-2-21:2002 sisaldab Euroopa standardi EN 60068-2-21:1999 ingliskeelset teksti.

Standard on kinnitatud Eesti Standardikeskuse 18.12.2002 käskkirjaga ja jõustub sellekohase teate avaldamisel EVS Teatajas.

Standard on kättesaadav Eesti standardiorganisatsioonist.

This Estonian standard EVS-EN 60068-2-21:2002 consists of the English text of the European standard EN 60068-2-21:1999.

This standard is ratified with the order of Estonian Centre for Standardisation dated 18.12.2002 and is endorsed with the notification published in the official bulletin of the Estonian national standardisation organisation.

The standard is available from Estonian standardisation organisation.

ICS 19.040, 31.190

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English version

Environmental testing
Part 2-21: Tests - Test U: Robustness of terminations and
integral mounting devices
(IEC 60068-2-21:1999)

Essais d'environnement
Partie 2-21: Essais
Essai U: Robustesse des sorties et
des dispositifs de fixation
(CEI 60068-2-21:1999)

Umweltprüfungen
Teil 2-21: Prüfungen
Prüfgruppe U: Mechanische
Widerstandsfähigkeit der Anschlüsse
(IEC 60068-2-21:1999)

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.

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CENELEC members are the national electrotechnical committees of Austria, Belgium, Czech Republic, 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

The text of document 91/156/FDIS, future edition 5 of IEC 60068-2-21, prepared by IEC TC 50, Environmental testing and published by IEC TC 91, Surface mounting technology, was submitted to the IEC-CENELEC parallel vote and was approved by CENELEC as EN 60068-2-21 on 1999-04-01.

This European Standard supersedes EN 60068-2-21:1997 and its amendments A2:1997 and A3:1997.

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) 2002-01-01

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

In this standard, annex ZA is normative.

Annex ZA has been added by CENELEC.

Endorsement notice

The text of the International Standard IEC 60068-2-21:1999 was approved by CENELEC as a European Standard without any modification.

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 60068-1	1988	Environmental testing Part 1: General and guidance	EN 60068-1 ¹⁾	1994
IEC 60068-2-20	1979	Part 2: Tests - Test T: Soldering	HD 323.2.20 S3 ²⁾	1988
IEC 60068-2-61	1991	Part 2: Test methods - Test Z/ABDM: Climatic sequence	EN 60068-2-61	1993
IEC 60249-2-4	1987	Base materials for printed circuits Part 2: Specifications - Specification No. 4: Epoxide woven glass fabric copper-clad laminated sheet, general purpose grade	EN 60249-2-4 ³⁾ + corr. March	1994 1994
IEC 61191-2	1998	Printed board assemblies Part 2: Sectional specification Requirements for surface mount soldered assemblies	EN 61191-2	1998

1) EN 60068-1 includes the corrigendum October 1988 and A1:1992 to IEC 60068-1.

2) HD 323.2.20 S3 includes A2:1987 to IEC 60068-2-20.

3) EN 60249-2-4 includes A2:1992 to IEC 60249-2-4.

INTERNATIONAL STANDARD

IEC
60068-2-21

Fifth edition
1999-01

Environmental testing –

Part 2-21:

**Tests – Test U: Robustness of terminations
and integral mounting devices**

Essais d'environnement –

Partie 2-21:

*Essais – Essai U: Robustesse des sorties
et des dispositifs de fixation*



Reference number
IEC 60068-2-21:1999(E)

Numbering

As from 1 January 1997 all IEC publications are issued with a designation in the 60000 series.

Consolidated publications

Consolidated versions of some IEC publications including amendments are available. For example, edition numbers 1.0, 1.1 and 1.2 refer, respectively, to the base publication, the base publication incorporating amendment 1 and the base publication incorporating amendments 1 and 2.

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Terminology, graphical and letter symbols

For general terminology, readers are referred to IEC 60050: *International Electrotechnical Vocabulary* (IEV).

For graphical symbols, and letter symbols and signs approved by the IEC for general use, readers are referred to publications IEC 60027: *Letter symbols to be used in electrical technology*, IEC 60417: *Graphical symbols for use on equipment. Index, survey and compilation of the single sheets* and IEC 60617: *Graphical symbols for diagrams*.

* See web site address on title page.

INTERNATIONAL STANDARD

IEC
60068-2-21

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Environmental testing –

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Commission Electrotechnique Internationale
International Electrotechnical Commission
Международная Электротехническая Комиссия

PRICE CODE

N

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

ENVIRONMENTAL TESTING –

Part 2-21: Tests –

Test U: Robustness of terminations and integral mounting devices

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.
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- 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 60068-2-21 has been prepared by IEC technical committee 50: Environmental testing, and is published by IEC technical committee 91: Surface mounting technology.

This fifth edition cancels and replaces the fourth edition, published in 1983, and its Amendments 1, 2 and 3 published in 1985, 1991 and 1992, respectively, and constitutes a technical revision.

The text of this edition is based on the following documents.

FDIS	Report on voting
91/156/FDIS	91/163/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.

ENVIRONMENTAL TESTING –

Part 2-21: Tests –

Test U: Robustness of terminations and integral mounting devices

1 Scope

This part of IEC 60068 is applicable to all electrical and electronic components whose terminations or integral mounting devices are liable to be submitted to stresses during normal assembly or handling operations.

Table 1 provides details of the applicable tests.

Table 1 – Application

Test	Type	Component	Mounted/ not mounted
Ua ₁	Tensile	Leaded devices	Not mounted
Ua ₂	Thrust	Leaded devices	Not mounted
Ub	Bending	Leaded devices	Not mounted
Uc	Torsion	Leaded devices	Not mounted
Ud	Torque	Threaded stud or screw termination	Not mounted
Ue ₁	Bending	Surface mounted devices	Mounted
Ue ₂	Pull/push	Surface mounted devices	Mounted
Ue ₃	Shear	Surface mounted devices	Mounted

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this part of IEC 60068. At the time of publication, the editions indicated were valid. All normative documents are subject to revision, and parties to agreements based on this part of IEC 60068 are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

IEC 60068-1:1988, *Environmental testing – Part 1: General and guidance*

IEC 60068-2-20:1979, *Environmental testing – Part 2: Tests – Test T: Soldering*

IEC 60068-2-61:1991, *Environmental testing – Part 2: Tests – Test Z/ABDM: Climatic sequence*

IEC 60249-2-4:1987, *Base materials for printed circuits – Part 2 : Specifications – Specification No. 4: Epoxy woven glass fibre copper-clad laminated sheet, general purpose grade*

IEC 61191-2: — *Printed board assemblies – Part 2: Sectional specification – Surface mount soldered assemblies* ¹⁾

¹⁾ To be published.

ISO 31-3:1992, *Quantities and units – Part 3: Mechanics*

ISO 272:1982, *Fasteners – Hexagon products – Widths across flats*

ISO 9453:1990, *Soft solder alloys – Chemical compositions and forms*

3 Test U_{a1}: tensile

This test is applicable to all types of terminations.

3.1 Object

The purpose of this test is to verify that the terminations and attachment of the terminations to the body of the component will withstand such axial stresses as are likely to be applied during normal assembly or handling operations.

3.2 General description

With the termination in its normal position and the component held by its body, a force is applied to the termination in the direction of its axis and acting in a direction away from the body of the component. The force shall be applied progressively (without any shock) and then maintained for a period of $10\text{ s} \pm 1\text{ s}$.

3.3 Preconditioning

The method of preconditioning shall be as prescribed in the relevant specification.

3.4 Initial measurements

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

3.5 Test method

Refer to figure 2a.

3.5.1 Application

This test applies to all types of terminations. It shall be carried out on all the terminations, except where a component has more than three terminations, in which case the specification shall state the number of terminations per component to be tested. The test shall be carried out in such a manner that all the terminations of the component have an equal probability of being subjected to test.

3.5.2 Procedure

With the termination in its normal position and the component held by its body, a force with a value as stated in table 2 shall be applied to the termination in the direction of its axis and acting in a direction away from the body of the component. The force shall be applied progressively (without any shock) and then maintained for a period of $10\text{ s} \pm 1\text{ s}$.

The value of the applied force is as follows:

- a) Wire terminations (circular section or strip) or pins

The value of the force applied shall be that indicated in table 2.

NOTE – For components with oversized wire terminations, the appropriate force should be given in the relevant specification.