SLOVENSKI STANDARD
SIST EN 60068-2-44:2001

01-september-2001

Environmental testing - Part 2: Tests - Guidance on Test T: Soldering

Environmental testing -- Part 2: Tests - Guidance on Test T: Soldering

Umweltprüfungen -- Teil 2: Prüfungen - Leitfaden für die Prüfung T: Löten

Essais d'environnement -- Partie 2: Essais - Guide pour l'essai T: Soudure

Ta slovenski standard je istoveten z: **EN 60068-2-44:1995**

ICS:

19.040	Preskušanje v zvezi z okoljem	Environmental testing

SIST EN 60068-2-44:2001 **en**

EUROPEAN STANDARD

NORME EUROPÉENNE

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EN 60068-2-44

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English version

Environmental testing
Part 2: Tests
Guidance on Test T: Soldering
(IEC 68-2-44:1995)

Essais d'environnement
Partie 2: Essais
Guide pour l'essai T: Soudure
(CEI 68-2-44:1995)

Umweltprüfungen
Teil 2: Prüfungen
Leitfaden für die Prüfung T: Löten
(IEC 68-2-44:1995)

This European Standard was approved by CENELEC on 1995-03-06. 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

The text of document 50(CO)265, future edition 2 of IEC 68-2-44, prepared by TC 50, Environmental testing, was submitted to the IEC-CENELEC parallel vote and was approved by CENELEC as EN 60068-2-44 on 1995-03-06.

This European Standard supersedes HD 323.2.44 S1:1988.

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) 1996-03-01
- latest date by which the national standards conflicting with the EN have to be withdrawn (dow) 1996-03-01

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 68-2-44:1995 was approved by CENELEC as a European Standard without any modification.

ANNEX ZA (normative)

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

NOTE : 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
68-2-20	1979	Environmental testing - Part 2: Tests Test T: Soldering	HD 323.2.20 S3*	1988
68-2-54	1985	Test Ta: Soldering - Solderability testing by the wetting balance method	HD 323.2.54 S1	1987
68-2-58	1989	Test Td: Solderability, resistance to dissolution of metallization and to soldering heat of Surface Mounting Devices (SMD)	HD 323.2.58 S1	1991
249	series	Base materials for printed circuits	HD 313 S1 EN 60249	series series
326-2	1990	Printed boards - Part 2: Test methods	-	-

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* HD 323.2.20 S3 includes A1:1987 + A2:1988 to IEC 68-2-20

NORME INTERNATIONALE
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CEI
IEC
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Deuxième édition
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Essais d'environnement –

Partie 2:
Essais – Guide pour l'essai T: Soudure

Environmental testing –

Part 2:
Tests – Guidance on Test T: Soldering

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For price, see current catalogue

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

ENVIRONMENTAL TESTING –

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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 cooperation 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, 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.

3) They have the form of recommendations for international use published in the form of standards, technical reports or guides and they are accepted by the National Committees in that sense.

4) In order to promote international unification, IEC National Committees undertake to apply IEC International Standards transparently to the maximum extent possible in their national and regional standards. Any divergence between the IEC Standard and the corresponding national or regional standard shall be clearly indicated in the latter.

International Standard IEC 68-2-44 has been prepared by IEC technical committee 50: Environmental testing.

This second edition cancels and replaces the first edition published in 1979 and constitutes a technical revision.

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

DIS	Report on voting
50(CO)265	50/353/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: Tests – Guidance on Test T: Soldering

Section 1: General

1 Scope

The purpose of this International Standard is to provide background information and recommendations for writers of specifications containing references to IEC 68-2-20, IEC 68-2-54 and IEC 68-2-58.

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this part of IEC 68. At the time of publication of this standard, the editions indicated were valid. All normative documents are subject to revision, and parties to agreements based on this part of IEC 68 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 68-2-20: 1979, *Environmental testing – Part 2: Tests – Test T: Soldering*
Amendment 2 (1987)

IEC 68-2-54: 1985, *Basic environmental testing procedures – Part 2: Tests – Test Ta: Soldering – Solderability testing by the wetting balance method*

IEC 68-2-58: 1989, *Environmental testing – Part 2: Tests – Test Td: Solderability, resistance to dissolution of metallization and to soldering heat of Surface Mounting Devices (SMD)*

Series IEC 249, *Base materials for printed circuits*

IEC 326-2: 1990, *Printed boards – Part 2: Test methods*

Section 2: General principles

3 Introduction

The conditions on which the ease of making and the reliability of a soldered joint depend may be classified in three groups as follows:

a) The joint design, determined by the choice of the two metallic elements to be joined (their shape, size, composition, etc.) and of the assembly method (relative position, initial fastening, etc.).

b) The wettability of the surfaces to be joined.

c) The conditions adopted for the soldering operation (temperature, time, flux, solder alloy, equipment etc.).

The choice of conditions of classes (a) and (c) concerns the manufacturer of equipment or subassemblies, who shall know the importance of each of the conditions and the limits of their variation. Condition (b) depends for the most part on the component manufacturer, except in cases of unusual handling or storage conditions by the equipment manufacturer. The wettability of surfaces needs to be defined with whatever degree of precision is necessary to allow the equipment manufacturer to make the appropriate choice of conditions of classes (a) and (c) appropriate to that wettability. On the other hand, components of satisfactory surface quality will not necessarily prevent rejectable joints arising from faults in joint design or joining conditions.

This often complex overlapping of responsibility between component manufacturers and equipment manufacturers creates a need to be able to define with considerable precision the wettability of component terminations or, more generally, the solderability of components.

4 Solderability of components and wettability of their terminations

It is not sufficient that an electronic component should have terminations that are suitable for soldering (capable of being wetted by molten solder). For mass-soldering operations it shall fulfil three other requirements:

a) it shall possess thermal characteristics ("thermal demand") small enough for a temperature sufficiently higher than the liquidus of the solder alloy used, to be reached and maintained for the length of time for wetting to occur;

b) it shall withstand without short-term of long-term change the thermal stresses associated with the soldering cycle (including rework and possible repair by soldering iron);

c) it shall withstand without short-term or long-term damage the mechanical and chemical stresses accompanying cleaning operations for the removal of flux residues. Cleaning considerations are not emphasized in this Guide.

Thus certain electronic components containing lubricated mechanical parts (e.g. switches), or being unsealed are sensitive to contamination (e.g. relays, potentiometers), or containing a plastics material with poor heat resistance (e.g. certain capacitors with thermoplastic dielectric), shall be excluded from mass-soldering operations because of their inability to withstand one or more of the stresses associated with the process.

For these reasons careful distinction must be made between the solderability of the component, which refers to the total suitability for industrial soldering, and the wettability of the termination, which refers only to the ease of coating the termination with solder.

Unfortunately, these concepts are often confused in ordinary language, and such confusion can prevent smooth running of production.

Furthermore, unsuitability of a component for soldering under the general conditions specified (see clause 6) does not mean that its terminations cannot be soldered to a printed circuit board or other support; it means only that it is necessary to take special precautions depending on the condition it does not satisfy, such as having thermally-sensitive insulation, or incompatibility with some or all solvents. Only defective wettability of the terminations prevents the use of soldering for mounting the component; this quality is of prime importance, but does not exclude consideration of the others.

The standardized tests referred to here are all directed to simulating some part of the effects of this set of conditions.

The appropriate choice of a group of these tests, in conjunction with electrical and mechanical measurements, allows one to answer the question, "Is this component solderable by the methods normally used in electronics?". This is one of the questions which the equipment manufacturer shall ask himself before putting a component on a soldering line.

The principle of each standardized test and the degree of information it supplies are defined in clause 5.

In this way the component specifier can, in full knowledge of the reasons, select the number and type of tests needed to establish the behaviour of the component during soldering; and the requirements that he will lay down in every case reflect the general requirements of the method of manufacture.

Similarly, the person conducting the tests will appreciate the degree of information they will give him.

5 Place of solderability in environmental testing

In previous sections the exact significance of the tests has been examined to show how they may be used to answer the question, "Is this component solderable in practice by normal methods?".

The reply can be as discriminating as necessary; the tools for making the necessary distinctions exist. But this question, however important, is never the only one.

Solderability is but one element in the characterization of a component; performance, robustness, expected life, etc., also play a part.

If the sequence of tests is not specifically covered in solderability test specifications, the result can be influenced by the conditions the component has encountered during previous tests.

Therefore, it is necessary to be very careful in placing the solderability tests in the test sequence.

Neglect of this may produce false results for solderability, and may equally falsify the results of other tests on component characteristics.

EXAMPLES:

– if, in a sequence of tests, a long-term damp heat or corrosion test is required before a wettability test, a component could be rejected even if, had it been tested as received, the wettability would have been perfectly acceptable.