

Environmental testing —

Part 2: Tests —

Guidance on Test T. Soldering

The European Standard EN 60068-2-44:1995 has the status of a British Standard

Committees responsible for this British Standard

The preparation of this British Standard was entrusted to Technical Committee GEL/50, Environmental testing of electrotechnical products, upon which the following bodies were represented:

- Federation of the Electronics Industry
- Gambica (BEAMA) Ltd.
- Ministry of Defence
- Society of Motor Manufacturers and Traders Limited

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National foreword

This Part of BS EN 60068 has been prepared by Technical Committee GEL/50 and is the English Language version of EN 60068-2-44:1995 *Environmental testing. Part 2: Tests — Guidance on Test T: Soldering*, published by the European Committee for Electrotechnical Standardization (CENELEC).

It is identical with IEC 68-2-44:1995 *Environmental testing Part 2: Tests — Guidance on Test T. Soldering*, published by the International Electrotechnical Commission (IEC), including the corrigenda of May 1995 and August 1995.

This standard supersedes BS 2011-2.2T:1981 which is withdrawn.

Cross-references

Publication referred to	Corresponding British Standard
	BS 2011 <i>Environmental testing</i> Part 2.1 <i>Tests</i>
HD 323.2.20 S3:1988 (IEC 68-2-20:1979)	Part 2.1T:1981 <i>Test T. Soldering</i>
HD 323.2.54 S1:1987 (IEC 68-2-54:1985)	Part 2.1Ta:1989 <i>Test Ta. Soldering. Solderability testing by the wetting balance method</i>
HD 323.2.58 S1:1991 (IEC 68-2-58:1989)	Part 2.1Td:1990 <i>Test Td. Solderability, resistance to dissolution of metallization and to soldering heat of surface mounting devices (SMD)</i>
EN 60249 series	BS EN 60249 <i>Base materials for printed circuits</i>
HD 313 S1 series (IEC 249 series)	BS 4584 <i>Metal-clad base materials for printed wiring boards</i>
IEC 326-2:1990	BS 6221 <i>Printed wiring boards</i> Part 2:1991 <i>Methods of test</i>

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Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, the EN title page, pages 2 to 16, an inside back cover and a back cover.

This standard has been updated (see copyright date) and may have had amendments incorporated. This will be indicated in the amendment table on the inside front cover.

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.

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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 choose 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 or 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.