

Basic environmental testing procedures —

Part 2.1 Tests —

Test T: Soldering

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National foreword

This revision of BS 2011-2.1Ta and BS 2011-2.1Tb has been prepared under the direction of the General Electrotechnical Engineering Standards Committee, and it is identical with IEC Publication 68-2-20:1979 “*Basic environmental testing procedures, Part 2: Tests — Test T: Soldering*”, published by the International Electrotechnical Commission (IEC) and Amendment No. 2 published in 1987. Like all other Parts of IEC Publication 68 it is subject to CENELEC Harmonized Document (HD) 323.

This standard has been prepared as a result of international discussions in which the UK took an active part.

This standard supersedes BS 2011-2.1Ta:1977 and BS 2011-2.1Tb:1977, which are therefore withdrawn. It incorporates new versions of the three tests as Test Ta, Test Tb and Test Tc. The new versions of all three tests set more stringent requirements, and the complete group of tests is laid out in a more logical and comprehensible format.

The first revision of BS 2011-2.2T:1977 “Test T Guide to soldering” is identical with IEC Publication 68-2-44:1979, “*Basic environmental testing procedures, Part 2: Tests — Tests — Guidance on Test T: Soldering*”, and is being published concurrently with this standard. The two standards are closely related.

Terminology and conventions. The text of the international standard has been approved as suitable for publication as a British Standard without deviation. Some terminology and certain conventions are not identical with those used in British Standards. Attention is especially drawn to the following.

In some headings italic (sloping) type is used for unit symbols instead of roman (upright) type as required by convention.

Wherever page numbers are quoted in connection with references to figures, they are IEC page numbers.

Cross-references

International standard	Corresponding British Standard
IEC 68-1:1978	BS 2011 Basic environmental testing procedures Part 1.1:1980 General (Identical)
IEC 68-2-2:1974	BS 2011 Basic environmental testing procedures Part 2.1B:1977 Tests B. Dry heat (Identical)
IEC 68-2-3:1969	BS 2011 Basic environmental testing procedures Part 2.1Ca:1977 Test Ca. Damp heat, steady state (Identical)

The Technical Committee has reviewed the provisions of IEC 249, IEC 326 and ISO 2176, referred to in the text, and has decided that they are acceptable for use in conjunction with this standard. British Standards that are related to these international standards are listed below.

IEC 249	BS 4584 Metal-clad base materials for printed circuits
IEC 326	BS 4025:1966 General requirements and methods of test for printed circuits BS 4597:1970 General requirements and methods of test for multilayer printed wiring boards using plated through holes
ISO 2176-1972	BS 2877:1976 Method for the determination of dropping point of lubricating grease

NOTE BS 4025 and BS 4597 are to be made technically equivalent to IEC 326 when they are next revised.

Additional information. All Parts of BS 2011 are listed in BSI Sectional List 26 (SL 26), which is usually revised annually.

With reference to **C.1**, “WW” is a common designation of very white (pure) colophony that is well known by experts all over the world and used by all suppliers of colophony.

The “ball and ring” method is known and used in laboratories where colophony is tested. BS 4692 “Method for determination of softening point of bitumen (ring and ball)” refers.

The flow point (or dropping point) method, known as “Ubbelohde method” is known and commonly used in laboratories where colophony is tested. It is a variant of the method of test for the “dropping point of lubricating grease” given in ISO 2176.

A British Standard does not purport to include all the necessary provisions of a contract. Users of British Standards are responsible for their correct application.

Compliance with a British Standard does not of itself confer immunity from legal obligations.

Summary of pages

This document comprises a front cover, an inside front cover, pages i to iv, pages 1 to 15 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.

1 Scope

This standard is applicable to all electrical and electronic components liable to be submitted to the tests described below.

2 Object

To determine the ability of component terminations and printed circuits to wet easily, and to check that the component itself will not be damaged by assembly soldering processes.

3 Terminology

3.1 Colophony

A natural resin obtained as the residue after removal of turpentine from the oleo-resin of the pine tree, consisting mainly of abietic acid and related resin acids, the remainder being resin acid esters.

NOTE "Rosin" is a synonym for colophony, and is deprecated because of the common confusion with the generic term "resin".

3.2 Contact angle

In general the angle enclosed between two planes, tangent to a liquid surface and a solid/liquid interface at their intersection (see Figure 1). In particular the contact angle of liquid solder in contact with a solid metal surface.

3.3 Wetting

The formation of an adherent coating of solder on a surface. A small contact angle is indicative of wetting.

3.4 Non-wetting

The inability to form an adherent coating of solder on a surface. In this case the contact angle is much greater than 90°.

3.5 De-wetting

The retraction of molten solder on a solid area that it has initially wetted. In some cases an extremely thin film of solder may remain. As the solder retracts the contact angle increases.

3.6 Solderability

The property of a surface which allows it to be readily wetted by molten solder.

3.7 Soldering time

The time required for a defined surface area to be wetted under specific conditions.

3.8 Resistance to soldering heat

The ability of a specimen to withstand the heating stresses produced by soldering.

4 Test Ta: Solderability of wire and tag terminations

4.1 Object

To determine the solderability of the areas on wire and tag terminations that are required to be wetted by solder, and, if required, to determine any de-wetting.

4.2 General description of the test

Test Ta provides three different test methods, viz.:

Method 1: Solder bath at 235 °C

Method 2: Soldering iron at 350 °C

Method 3: Solder globule at 235 °C

Method 1 with suitable changes in times and temperatures is used to determine de-wetting behaviour.

The test method to be used shall be indicated in the relevant specification. The solder bath method is the one which simulates most closely the soldering procedures that are generally used in practice; however, it is not practicable to express the results as a number.

With the solder globule method a specimen of round wire termination bisects a globule of molten solder of a given weight. It is easy to apply and the soldering time is a precise inspection criterion.

The soldering iron method may be used in cases where the other two methods are impracticable.

If required by the relevant specification, the test conditioning may be preceded by accelerated ageing. The relevant specification shall indicate one of the following ageing procedures:

Ageing 1a: 1 h steam ageing

Ageing 1b: 4 h steam ageing

Ageing 2: 10 days damp heat, steady state condition (Test Ca)

Ageing 3: 16 h at 155 °C dry heat (Test Ba).

4.3 Specimen preparation

4.3.1 The surface to be tested shall be in the "as received" condition and shall not be subsequently touched by the fingers or otherwise contaminated.