
British Standard

Basic testing procedures and measuring methods for electromechanical components for electronic equipment

Part 6. Climatic tests and soldering tests

Procédures d'essai de base et méthodes de mesure des composants électromécaniques
pour équipements électroniques
Partie 6. Essais climatiques et essais de soudure

Grundlegende Meß — und Prüfverfahren für elektrisch — mechanische Bauelemente
für elektronische Geräte
Teil 6. Klimatische Prüfungen und Prüfung der Lötbarkeit

National foreword

This revision of this British Standard has been prepared under the direction of the Electronic Components Standards Committee. It is identical with IEC Publication 512-6 : 1984 'Electromechanical components for electronic equipment ; basic testing procedures and measuring methods, Part 6 : Climatic tests and soldering tests,' published by the International Electrotechnical Commission (IEC). This Part of BS 5772 supersedes BS 5772 : Part 6 : 1979, which is withdrawn.

This Part should be read in conjunction with BS 5772 : Part 1 'General' and BS 5772 : Part 2 'General examination, electrical continuity and contact resistance tests, insulation tests and voltage stress tests'.

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.

Cross-references

International standard	Corresponding British Standard
	BS 2011 Basic environmental testing procedures
IEC 68-2-1 : 1974	Part 2.1A : 1977 Test A. Cold (Identical)
IEC 68-2-2 : 1974	Part 2.1B : 1977 Tests B. Dry heat (Identical)
IEC 68-2-3 : 1969	Part 2.1Ca : 1977 Test Ca. Damp heat, steady state (Identical)
IEC 68-2-10 : 1968	Part 2.1J : 1977 Test J. Mould growth (Identical)
IEC 68-2-11 : 1981	Part 2.1Ka : 1982 Test Ka. Salt mist (Identical)
IEC 68-2-13 : 1983	Part 2.1M : 1984 Test M. Low air pressure (Identical)
IEC 68-2-14 : 1974	Part 2.1N : 1977 Test N. Change of temperature (Identical)
IEC 68-2-20 : 1979	Part 2.1T : 1981 Test T. Soldering (Identical)
IEC 68-2-30 : 1980	Part 2.1Db : 1981 Test Db and guidance : Damp heat, cyclic (12 + 12 hour cycle) (Identical)
IEC 68-2-39 : 1976	Part 2.1Z/AMD : 1977 Test Z/AMD. Combined sequential cold, low air pressure and damp heat test (Identical)
IEC 352-1 : 1983	BS 6516 Solderless connections Part 1 : 1984 Specification for solderless wrapped connections. General requirements, test methods and practical guidance (Identical)
	BS 5772 Specification for electromechanical components for electronic equipment : basic testing procedures and measuring methods
IEC 512-2 : 1976	Part 2 : 1979 General examination, electrical continuity and contact resistance tests, insulation tests and voltage stress tests (Identical)
IEC 512-5 : 1977	Part 5 : 1979 Impact tests (free components), static load tests (fixed components), endurance tests and overload tests (Identical)

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

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British Standard

Basic testing procedures and measuring methods for electromechanical components for electronic equipment

Part 6. Climatic tests and soldering tests

Scope

The tests contained in this standard, when required by the detail specification, shall be used for electromechanical components within the scope of Technical Committee No. 48*.

They may also be used for similar devices when specified in a detail specification.

SECTION ONE — CLIMATIC TESTS

1. Test 11a: Climatic sequence

1.1 *Object*

The object of this test is to define a standard test method to assess the ability of a component to function in a specified manner in a specified environment which might be encountered during normal use, including storage.

1.2 *Preparation of the specimen*

1.2.1 *Mechanical preparation*

The specimen, equipped with normal accessories, shall be mounted and wired in accordance with the detail specification.

When required by the detail specification, the specimen shall be operated the number of times specified prior to the test.

For each test carried out, the detail specification shall specify the condition of the component, for example operated or non-operated, mated or unmated.

1.2.2 *Preconditioning*

Preconditioning shall be carried out in accordance with the requirements of the detail specification.

* *Scope of Technical Committee No. 48:* To prepare international standards regarding components having an inherent electromechanical connecting or switching function, intended for use in equipment for telecommunication and in electronic devices employing similar techniques.

Notes 1. — R.F. connectors will not be dealt with by this Technical Committee as they will be covered by Technical Committee No. 46 together with r.f. cables.

2. — Sockets for components such as crystals or electronic tubes shall be considered in co-operation with the relevant Technical Committee.

1.3 *Test method*

1.3.1 *Initial measurements*

Initial measurements shall be carried out in accordance with the detail specification.

1.3.2 *Dry heat*

1.3.2.1 This test shall be carried out in accordance with Test 11i, using the specified degree of severity.

1.3.2.2 The specimen shall be exposed to the specified temperature for a period of 16 h. At the end of this period and while still at high temperature, the insulation resistance shall be measured using Test 3a of IEC Publication 512-2: Electromechanical Components for Electronic Equipment; Basic Testing Procedures and Measuring Methods. Part 2: General Examination, Electrical Continuity and Contact Resistance Tests, Insulation Tests and Voltage Stress Tests, and shall be not less than the value specified by the detail specification.

1.3.2.3 The specimen shall then be allowed to recover under standard conditions as specified in Test 11i.

1.3.3 *Damp heat, cyclic, first cycle*

1.3.3.1 This test shall be carried out in accordance with Test 11m, using the specified degree of severity.

1.3.3.2 The specimen shall be subjected to this test for one cycle of 24 h.

1.3.3.3 The specimen shall then be allowed to recover under standard conditions as specified in Test 11m.

1.3.4 *Cold*

1.3.4.1 This test shall be carried out in accordance with Test 11j, using the specified degree of severity.

1.3.4.2 The specimen shall be exposed to the specified temperature for a period of 2 h.

1.3.4.3 The specimen shall then be allowed to recover under standard conditions as specified in Test 11j.

1.3.4.4 The specimen shall then be visually inspected and shall show no sign of deterioration.

1.3.5 *Low air pressure*

1.3.5.1 This test shall be carried out in accordance with Test 11k, using the specified degree of severity.

1.3.5.2 The duration of the test shall be 5 min, unless otherwise specified.

1.3.5.3 During this test, Tests 4a and 4b of IEC Publication 512-2 shall be carried out where specified.

1.3.5.4 During and after this test, there shall be no sign of glow discharge, breakdown, flashover or harmful deterioration of the specimen.

1.3.6 *Damp heat, cyclic, remaining cycle(s)*

1.3.6.1 This test shall be carried out in accordance with Test 11m, using the specified degree of severity.

1.3.6.2 The specimen shall be subjected to this test for the remaining number of cycles.

1.3.6.3 The specimen shall then be allowed to recover under standard conditions as specified in Test 11m.

1.4 *Final measurements*

The specimen shall then be subjected to the following tests as described in the different parts of IEC Publication 512 and shall meet the requirements specified by the detail specification:

- a) insulation resistance (Test 3a);
- b) voltage proof (Test 4a);
- c) contact resistance tests, as specified in the detail specification (Test 2);
- d) mechanical operating tests (Test 13), as applicable;
- e) cable clamping tests (Test 17), as applicable;
- f) visual examination (Test 1a), as applicable.

Notes 1. — The first two tests shall be carried out immediately following the final recovery period.

2. — The specimen shall not be disturbed prior to the first measurement of contact resistance after exposure.

3. — When required by the detail specification, the specimen shall be operated three times and then tested for electrical continuity and contact resistance.

1.5 *Details to be specified*

When this test is required by the detail specification, the following details shall be specified:

- a) method of mounting and wiring the specimen and operated condition of the component(s), if applicable;
- b) preconditioning time;
- c) initial measurements;
- d) severity of each step of the climatic sequence;
- e) minimum value of the insulation resistance at high temperature;
- f) when the low air pressure test is applicable, the tests to be used and the value of the test voltage;
- g) when the contact resistance test is applicable, the test to be used;
- h) requirements for the final measurements;
- i) applicable operational characteristics;
- j) any deviation from the standard test method.

2. **Test 11b: Combined/sequential cold, low air pressure and damp heat**

2.1 *Object*

The object of this test is to define a standard test method to assess the ability of a component to function in a specified manner during and after subjection to the conditions which prevail, to some extent, everywhere in an aircraft during ascent and descent, but which are particularly severe in unheated and/or unpressurized zones.

2.2 *Preparation of the specimen*

The specimen shall be wired as prescribed by the detail specification. If, exceptionally, any feature of the specimen (for example, the rear ends of the contacts of hermetically sealed fixed connectors) are to be protected in any way, the protection shall be in accordance with the detail specification.

Arrangements necessary for any monitoring required by the detail specification shall be made.

The state of the specimen, for example whether operated or not, or whether connectors are to be inserted or withdrawn/engaged or disengaged, shall also be in accordance with the detail specification.

2.3 *Test method*

If required by the detail specification, the component shall be preconditioned as prescribed.

The component shall be placed, in the attitude prescribed by the detail specification, in the test chamber. Any functional checks or measurements required by the detail specification shall be made before conditioning begins.

The polarizing voltage, if any, shall be applied according to the detail specification. Any leakage current resulting from such application is not to be taken into account.

Except when necessary for a functional check prescribed by the detail specification, at no time during the conditioning shall the component carry current.

The component shall then be subjected to the conditioning described in IEC Publication 68-2-39: Basic Environmental Testing Procedures, Part 2: Tests – Test Z/AMD: Combined Sequential Cold, Low Air Pressure, and Damp Heat Test, using the extremes of cold and low air pressure given in the detail specification.

At the junctures indicated in Test Z/AMD during and immediately at the conclusion of the conditioning, the functional checks and measurements prescribed in the detail specification shall be made.

2.4 *Details to be specified*

When this test is required by the detail specification, the following details shall be specified:

- a) preconditioning, if any;
- b) type and size of wire to be used;
- c) preparation of the specimen, including details of the protection (if any) to be afforded to any part of the component;
- d) the attitude in which the component is to be tested;
- e) initial measurements;
- f) polarizing voltage;
- g) operating conditions;
- h) measurements required;

- i) temperature and air pressure;
- j) number of cycles;
- k) any deviation from the standard test method.

3. Test 11c: Damp heat, steady state

3.1 Object

The object of this test is to define a standard test method to assess the ability of a component to be stored and/or to function in a specified manner under conditions of high relative humidity.

3.2 Preparation of the specimen

3.2.1 Mechanical preparation

The specimen, equipped with normal accessories, shall be mounted and wired in accordance with the detail specification.

When required by the detail specification, the specimen shall be operated the number of times specified prior to the test.

For each test carried out, the detail specification shall specify the condition of the component, for example operated or non-operated, mated or unmated.

3.2.2 Preconditioning

Preconditioning shall be carried out in accordance with the requirements of the detail specification.

3.3 Test method

3.3.1 Initial measurements

When required by the detail specification, the specified initial measurements shall be made under standard atmospheric conditions immediately after preconditioning.

3.3.2 Conditioning

Damp heat, steady state, shall be applied in accordance with Test Ca of IEC Publication 68-2-3: Test Ca: Damp Heat, Steady State, using the specified degree of severity.

3.3.2.1 Polarization voltage

When specified in the detail specification, a polarization voltage shall be applied to two of the specimens during conditioning. These specimens shall be wired; alternate terminations shall be connected together to form two groups.

On specimen No. 1, the polarization voltage shall be applied across the first group of terminations and the second group connected to the housing (shell) and/or the mounting plate. On specimen No. 2, the polarization voltage shall be applied across the second group of terminations and the first group connected to the housing (shell) and/or the mounting plate.

In the case of rotary switches, the points of application of the polarizing voltage shall be as specified in the detail specification.