

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

**Part 8: Connector tests (mechanical)
and mechanical tests on contacts and
terminations**

UDC 621.315.68.001.4:620.17

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This British Standard, having been prepared under the direction of the Electronic Components Standards Committee, was published under the authority of the Board of BSI and comes into effect on 31 January 1985

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First published November 1979
First revision January 1985

The following BSI references relate to the work on this standard:
Committee reference ECL/21
Draft for comment 80/27954 DC

ISBN 0 580 14316 3

Amendments issued since publication

Amd. No.	Date of issue	Comments
5076	May 1990	Indicated by a sideline in the margin

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National foreword

This revision of BS 5772-8 has been prepared under the direction of the Electronic Components Standards Committee. It is identical with IEC Publication 512-8:1984 “*Electromechanical components for electronic equipment: basic testing procedures and measuring methods — Part 8: Connector tests (mechanical) and mechanical tests on contacts and terminations*” published by the International Electrotechnical Commission (IEC). This Part of BS 5772 supersedes BS 5772-8:1979, BS 5772-8:Supplement 1:1981 and BS 5772-8:Supplement 2:1982, all of which are withdrawn.

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 Standards	Corresponding British Standards
IEC 68-2-21:1983	BS 2011 <i>Basic environmental testing procedures</i> Part 2.1U:1984 Test U. <i>Robustness of terminations and integral mounting devices</i> (Identical)
IEC 352-1:1983	BS 6516 <i>Solderless connections</i> Part 1:1984 <i>Specification for solderless wrapped connections. General requirements, test methods and practical guidance</i> (Identical)
IEC 512-2:1976	BS 5772 <i>Specification for electromechanical components for electronic equipment: basic testing procedures and measuring methods</i> Part 2:1979 <i>General examination, electrical continuity and contact resistance tests, insulation tests and voltage stress tests</i> (Identical)
IEC 512-2A:1980	Part 2:Supplement 1:1981 <i>Test 4C</i> . (Identical)

Additional information. The scope of this British Standard is as given in BS 5772-1:1985.

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 and ii, pages 1 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.

Scope

The tests contained herein, when required by the detail specification, shall be used for electromechanical components within the scope of Technical Committee No. 48¹⁾. They may also be used for similar devices when specified in a detail specification.

Section 1. Connector tests (Mechanical)

1 Test 15a: Contact retention in insert

1.1 Object

The object of this test is to detail a standard method to assess the ability of the contact retaining system to withstand the axial mechanical stresses likely to be encountered during normal usage.

1.2 Preparation of the specimen

The specimen shall consist of a component with all contacts installed in accordance with the detail specification.

Loosen or remove any accessories which are not essential for the contact retaining system.

1.3 Test method

Select 20 % of the contacts (but not less than six contacts) at random for the test. At least one contact shall be near the periphery and one near the centre of the component. For components having six contacts or less, all contacts shall be used for the test.

A specified axial force shall be applied to the contact in both directions consecutively. This force shall be reached by gradual increase at a rate not to exceed 10 N/s until the specified value is reached. This maximum value shall be maintained during 10 s.

After the contact is seated on the retention member, the contact movement shall be measured. The allowable axial displacement of the contacts in relation to the insert, while the force is applied and after the force is removed, shall be stated in the detail specification.

1.4 Final measurements

The specimen shall be visually examined (Test 1a 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).

1.5 Requirements

The amount of axial displacement of the contacts in relation to the insert, while the force is applied and after the force is removed, shall not exceed the amount specified and there shall be no damage to or loosening of parts such as would impair the operation of the component.

1.6 Details to be specified

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

- preparation of the specimen;
- mounting of the specimen;
- force to be applied and its application point;
- allowable displacement;
- any deviation from the standard test method.

2 Test 15b: Insert retention in housing (axial)

2.1 Object

The object of this test is to detail a standard method to assess the ability of the insert retaining system to withstand the axial mechanical stresses likely to be encountered during normal usage.

2.2 Preparation of the specimen

The specimen shall be prepared and mounted in accordance with the detail specification.

Cable fittings and accessories shall not be fitted.

2.3 Test method

An axial force or a test pressure as specified shall be applied to the insert in both directions consecutively. The force or pressure shall be increased steadily at a rate of approximately 50 N/s or 5 kPa/s, respectively, up to the specified value, and held at that value for 1 min.

WARNING. — Where air pressure is used, there is a danger of contacts and/or inserts being ejected at high velocity.

¹⁾ *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.

NOTE 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.

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

2.4 Final measurements

The specimen shall be subjected to visual examination (Test 1a of IEC Publication 512-2).

2.5 Requirements

There shall be no damage to or displacement of the insert from its original position in the housing such as would impair the operation of the component.

2.6 Details to be specified

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

- a) preparation of the specimen;
- b) mounting of the specimen;
- c) force or pressure to be applied, method and point(s) of application;
- d) any deviation from the standard test method.

3 Test 15c: Insert retention in housing (torsional)

3.1 Object

The object of this test is to detail a standard method to assess the ability of the insert retaining system to withstand the torsional stresses likely to be encountered during normal usage.

3.2 Preparation of the specimen

The specimen shall be prepared and mounted in accordance with the detail specification.

Cable fittings and accessories shall not be mounted on the component.

3.3 Test method

With the housing of the component securely clamped, a specified torque shall be applied to the insert by a suitable test fixture. The torque shall be increased steadily at a rate of approximately 0.50 Nm/s up to the specified value and held for 1 min.

3.4 Final measurements

The specimen shall be subjected to visual examination (Test 1a of IEC Publication 512-2).

3.5 Requirements

There shall be no movement of the insert in relation to the housing such as to cause permanent displacement of the insert that would impair the operation of the component.

3.6 Details to be specified

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

- a) preparation of the specimen;
- b) mounting of the specimen;
- c) details of the test fixture;

- d) torque to be applied and applicable direction;
- e) requirements for final measurements;
- f) any deviation from the standard test method.

4 Test 15d: Contact insertion, release and extraction force

4.1 Object

The object of this test is to detail a standard method to determine the forces required to insert contacts into and extract contacts from their normal position in a component.

4.2 Preparation of the specimen

The specimen shall consist of a component and associated contacts. All contacts shall be wired with cable/wire as specified in the detail specification. All contacts shall be installed, except those to be used for the test.

Cable fittings and accessories shall not be mounted on the component.

Where applicable, retention devices shall be indexed to the release position.

The component shall be mounted securely in a suitable clamping device and in a position suitable for performing the measurements.

4.3 Test equipment

The test equipment shall consist of:

- a) appropriate insertion and extraction tools;
- b) a suitable device for holding the component;
- c) a suitable device for measuring the forces.

4.4 Test method

Select 20 % of the contacts (but not less than six contacts) at random for the test. For components having six contacts or less, all contacts shall be used for the test. At least one contact shall be near the periphery and one near the centre of the component.

4.4.1 Insertion force

The insertion force shall be measured by suitable means.

The insertion tool, with the contact, shall be inserted in the approved manner, maintaining axial alignment and applying sufficient force to insert the contact into its normal position. This insertion force shall not exceed the value stated in the detail specification.

Ascertain that the contacts are correctly inserted and locked.

4.4.2 Release and extraction force

The release and extraction forces shall be measured by suitable means.

The extraction tool shall be engaged in the normal manner for the purpose of releasing the contact, while maintaining axial alignment. The releasing force shall not exceed that stated in the detail specification.

While maintaining axial alignment, apply sufficient force to the wire and/or tool to extract/eject the contact from the component. The extraction force shall not exceed the value stated in the detail specification.

4.5 Final measurements

The specimen shall be subjected to visual examination (Test 1a of IEC Publication 512-2).

4.6 Requirements

There shall be no damage that would impair normal operation.

4.7 Details to be specified

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

- a) preparation, mounting and wiring of the specimen;
- b) appropriate insertion and extraction tools;
- c) maximum insertion, release and extraction forces;
- d) any deviation from the standard test method.

5 Test 15e: Contact retention in insert, cable nutation

5.1 Object

The object of this test is to detail a standard method to verify the capability of the contact retention system of a component to withstand dynamic mechanical loading of the contacts tending to dislodge them.

5.2 Preparation of test specimen

The contacts to be tested shall be crimped to a stranded steel cable and installed in the component. It may be necessary to enlarge the end of the cable slightly by brazing, welding or soldering prior to crimping to prevent the steel cable from pulling out of the contact during the test. Unless otherwise specified in the detail specification, two contacts shall be tested in each component. The contacts shall be tested individually.

5.3 Mounting of the test specimen

The component shall be mounted on a suitable test apparatus, such as that shown in the example in Figure 1, page 4, of this amendment.

Free components having no mounting flange shall be mated to a suitable fixed component housing. The specified mass M shall be suspended from the free end of the cable so that it is supported by the contact to be tested. The cable shall exit the rear of the component at an angle of $45 \pm 5^\circ$ from the longitudinal axis of the component. The component shall be mounted in such a way as to permit it to be swung in a circle without rotating around its longitudinal axis.

5.4 Mass

The mass M shall be selected to provide adequate tension to perform the test without deforming the specimen under test. Unless otherwise specified in the detail specification, the mass shall be $1.4 \text{ kg} \pm 2\%$. This mass has proven to be satisfactory for current component design.

5.5 Procedure

The fixture shall be rotated through 360° with the mass supported by the contact under test. This constitutes one cycle. The specimen shall be subjected to 100 cycles at a rate of 10 cycles to 20 cycles per min.

5.6 Requirements

The contacts shall not become permanently dislodged from their normal position.

5.7 Details to be specified

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

- a) contacts to be tested;
- b) mounting details;
- c) mass to be used, if other than 1.4 kg; and
- d) any deviation from the standard test method.

6 Test 15f: Effectiveness of connector coupling devices

6.1 Object

The object of this test is to detail a standard method to assess the ability of a coupling device to maintain engagement of mated connectors with coupling and/or retaining devices when subjected to specified forces applied to the cable/wire bundle or the housing.

6.2 Preparation of the specimen

The specimen, consisting of a mated pair, shall be prepared and wired in accordance with the detail specification.

The connectors shall be mated in the normal manner with any coupling and/or retaining device fully operated.