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Connectors for electronic equipment - Tests and measurements - Part 2-1:  
Electrical continuity and contact resistance tests - Test 2a: Contact resistance -  
Millivolt level method (IEC 60512-2-1:2002)

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EUROPEAN STANDARD

**EN 60512-2-1**

NORME EUROPÉENNE

EUROPÄISCHE NORM

April 2002

ICS 31.220.10

English version

**Connectors for electronic equipment –  
Tests and measurements  
Part 2-1: Electrical continuity and contact resistance tests –  
Test 2a: Contact resistance –  
Millivolt level method  
(IEC 60512-2-1:2002)**

Connecteurs pour équipements  
électroniques –  
Essais et mesures  
Partie 2-1: Essais de continuité électrique  
et de résistance de contact –  
Essai 2a: Résistance de contact  
Méthode du niveau des millivolts  
(CEI 60512-2-1:2002)

Steckverbinder für elektronische  
Einrichtungen –  
Mess- und Prüfverfahren  
Teil 2-1: Prüfungen des elektrischen  
Durchgangs und Durchgangswiderstands -  
Prüfung 2a: Durchgangswiderstand -  
Millivoltmethode  
(IEC 60512-2-1:2002)

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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.

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**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 48B/1130/FDIS, future edition 1 of IEC 60512-2-1, prepared by SC 48B, Connectors, of IEC TC 48, Electromechanical components and mechanical structures for electronic equipment, was submitted to the IEC-CENELEC parallel vote and was approved by CENELEC as EN 60512-2-1 on 2002-04-01.

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) 2003-01-01
- latest date by which the national standards conflicting with the EN have to be withdrawn (dow) 2005-04-01

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## Endorsement notice

The text of the International Standard IEC 60512-2-1:2002 was approved by CENELEC as a European Standard without any modification.

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**60512-2-1**

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2002-02

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**Connecteurs pour équipements électroniques –  
Essais et mesures –**

**Partie 2-1:  
Essais de continuité électrique et  
de résistance de contact –  
Essai 2a: Résistance de contact –  
Méthode du niveau des millivolts**

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**Connectors for electronic equipment –  
Tests and measurements –**

**Part 2-1:  
Electrical continuity and contact  
resistance tests –  
Test 2a: Contact resistance –  
Millivolt level method**

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## INTERNATIONAL ELECTROTECHNICAL COMMISSION

**CONNECTORS FOR ELECTRONIC EQUIPMENT –  
TESTS AND MEASUREMENTS –****Part 2-1: Electrical continuity and contact resistance tests –  
Test 2a: Contact resistance – Millivolt level method**

## 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 co-operation 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.
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- 6) Attention is drawn to the possibility that some of the elements of this International Standard may be the subject of patent rights. The IEC shall not be held responsible for identifying any or all such patent rights.

International Standard IEC 60512-2-1 has been prepared by subcommittee 48B: Connectors, of IEC technical committee 48: Electromechanical components and mechanical structures for electronic equipment.

This standard cancels and replaces test 2a of IEC 60512-2, issued in 1985, and constitutes a technical revision.

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

FDIS	Report on voting
48B/1130/FDIS	48B/1181/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.

This publication has been drafted in accordance with the ISO/IEC Directives, Part 3.

The committee has decided that the contents of this publication will remain unchanged until 2007. At this date, the publication will be

- reconfirmed;
- withdrawn;
- replaced by a revised edition, or
- amended.

## CONNECTORS FOR ELECTRONIC EQUIPMENT – TESTS AND MEASUREMENTS –

### Part 2-1: Electrical continuity and contact resistance tests – Test 2a: Contact resistance – Millivolt level method

#### 1 Scope and object

This part of IEC 60512, when required by the detail specification, is used for testing electromechanical components within the scope of IEC technical committee 48. This test may also be used for similar devices when specified in a detail specification.

The object of this test is to define a standard test method to measure the electrical resistance across a pair of mated contacts or a contact with a measuring gauge.

#### 2 General measuring requirements

Measurements may be carried out with direct current or alternating current. For a.c. measurements, the frequency shall not exceed 2 kHz. In case of dispute, the d.c. measurements shall govern.

The accuracy of the measuring apparatus shall be such that the total error does not exceed 1 %.

#### 3 Method of measurement

[SIST EN 60512-2-1:2003](https://standards.iteh.ai/catalog/standards/sist/02c3d779-6d43-4511-aaae-2c9f27ab2512/sist-en-60512-2-1-2003)

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##### 3.1 Measurement details

The contact resistance shall be derived normally from the voltage drop measured between the zones intended for connection of the wiring to the contacts at the points specified in the detail specification.

The contact shall not be operated while the measuring voltage is applied.

Care must be taken during the measurement to avoid exerting abnormal pressure on the contacts under test and to avoid movement of the test cables.

Where the connection points specified in the detail specification are not directly accessible, the resistance of the cable or wire used shall be subtracted from the measured value. The corrected value shall be recorded.

The contacts to be measured shall be chosen in accordance with the detail specification.

##### 3.2 Test current and voltage

The test voltage shall not exceed 20 mV d.c. or peak voltage a.c. in order to prevent the breakdown of possible insulating films on the contacts.

The test current shall not exceed 100 mA, a.c. or d.c.

## 4 Measuring cycles

### 4.1 Measurement with direct current

One measuring cycle consists of:

- a) application of the voltage;
- b) measurement with current flowing in one direction;
- c) measurement with current flowing in the opposite direction;
- d) disconnection of the voltage source.

### 4.2 Measurement with alternating current

One measuring cycle consists of:

- a) application of the voltage;
- b) making the measurement;
- c) disconnection of the voltage source.

NOTE Unless otherwise specified, the contact(s) made should not be disturbed between the end of the preceding test and the application of the voltage in this test.

## 5 Requirements

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The value of the contact resistance shall not exceed, for any measurement, the value specified in the detail specification.

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The contact resistance measurement with d.c. shall be the average of the two readings obtained with forward and reverse current.

Use of the following equation will ensure that the calculated resistance is always correct:

$$R = \frac{|V_{mf} - V_{mr}|}{|I_f| + |I_r|}$$

NOTE In the equation, the sign of the voltage measurements must be included.

where

$R$  is the resistance;

$V_{mf}$  is the measured forward voltage;

$V_{mr}$  is the measured reverse voltage;

$I_f$  is the forward current;

$I_r$  is the reverse current.

NOTE Any deviation from the standard test procedure should be clearly indicated in the test report.