BS EN 61076-2:2011

BSI Standards Publication

# Connectors for electronic equipment — Product requirements

## Part 2: Sectional specification for circular connectors

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**National foreword**

This British Standard is the UK implementation of EN 61076-2:2011. It is identical to IEC 61076-2:2011. It supersedes BS EN 61076-2:1999 which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee EPL/48, Electromechanical components and mechanical structures for electronic equipment.

A list of organizations represented on this committee can be obtained on request to its secretary.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

**Compliance with a British Standard cannot confer immunity from legal obligations.**

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# EN 61076-2

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Supersedes EN 61076-2:1999

English version

# Connectors for electronic equipment - Product requirements - Part 2: Sectional specification for circular connectors

(IEC 61076-2:2011)

Connecteurs pour équipements électroniques - Exigences de produit - Partie 2: Spécification intermédiaire pour les connecteurs circulaires (CEI 61076-2:2011)

Steckverbinder für elektronische Einrichtungen - Produktanforderungen - Teil 2: Rahmenspezifikation für Rundsteckverbinder (IEC 61076-2:2011)

This European Standard was approved by CENELEC on 2011-07-26. 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.

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European Committee for Electrotechnical Standardization
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## Foreword

The text of document (48B/2240/FDIS), future edition 2 of IEC 61076-2, 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 61076-2 on 2011-07-26.

This European Standard supersedes EN 61076-2:1999.

EN 61076-2:2011 includes the following significant technical changes with respect to EN 61076-2:1999:

a) This European Standard no longer includes the quality assessment procedures. As described in EN 61076-1 and EN 62197-1, a new document structure has been established. EN 61076-2 has been revised to reflect this updated structure.

b) Subclause 3.2*, Systems of levels* has been introduced.

c) The subclause on EN type designation has been removed.

d) Clauses 4 *Dimensional information* and 5 *Characteristics* have been added.

e) Some clauses and test groups have been rearranged. Test group HP has been added.

This standard is to be used in conjunction with EN 61076-1 and EN 62197-1.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN and CENELEC shall not be held responsible for identifying any or all such patent rights.

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) | 2012-04-26 |
| – latest date by which the national standards conflicting with the EN have to be withdrawn | (dow) | 2014-07-26 |

Annex ZA has been added by CENELEC.

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## Endorsement notice

The text of the International Standard IEC 61076-2:2011 was approved by CENELEC as a European Standard without any modification.

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# Annex ZA
(normative)

## Normative references to international publications with their corresponding European publications

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

NOTE When an international publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

| Publication | Year | Title | EN/HD | Year |
|---|---|---|---|---|
| IEC 60068-1 | - | Environmental testing - Part 1: General and guidance | EN 60068-1 | - |
| IEC 60352 | Series | Solderless connections | EN 60352 | Series |
| IEC 60512 | Series | Connectors for electronic equipment - Tests and measurements | EN 60512 | Series |
| IEC 60512-1-100 | - | Connectors for electronic equipment - Tests and measurements - Part 1-100: General - Applicable publications | EN 60512-1-100 | - |
| IEC 61076-1 | 2006 | Connectors for electronic equipment - Product requirements - Part 1: Generic specification | EN 61076-1 | 2006 |
| IEC 61076-2-001 | - | Connectors for electronic equipment - Product requirements - Part 2-001: Circular connectors - Blank detail specification | EN 61076-2-001 | - |
| IEC 62197-1 | - | Connectors for electronic equipment - Quality assessment requirements - Part 1: Generic specification | EN 62197-1 | - |

CONTENTS

# CONNECTORS FOR ELECTRONIC EQUIPMENT – PRODUCT REQUIREMENTS –

## Part 2: Sectional specification for circular connectors

## 1 Scope

This part of IEC 61076 establishes uniform specifications and technical information for circular connectors. It should be used in conjunction with the generic specification IEC 61076-1:2006 for product requirements and with IEC 62197-1 for quality requirements as the basis for preparation of consistent detail product specifications for circular connectors.

NOTE 1 It is intended that a detail quality specification, IEC 62197-2-1XX, be prepared, based on the blank detail specification for circular connectors IEC 62197-2-001, to be used in addition to the corresponding detail product specification IEC 61076-2-1XX..

NOTE2 The quality assessment requirements for connectors according to the IEC 61076series are detailed in IEC 62197-1.

In the event of conflict between this sectional specification and the detail product specification, it is intended that the requirements of the detail product specification prevail.

## 2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 60068-1, *Environmental testing – Part 1: General and guidance*

IEC 60352 (all parts), *Solderless connections*

IEC 60512 (all parts), *Connectors for electronic equipment – Basic testing procedures and measuring methods*

IEC 60512-1-100, *Connectors for electronic equipment – Tests and measurements – Part 1-100: General – Applicable publications*

IEC 61076-1:2006, *Connectors for electronic equipment – Product requirements – Part 1: Generic specification*

IEC 61076-2-001, *Connectors for electronic equipment – Part 2-001: Circular connectors – Blank detail specification*

IEC 62197-1, *Connectors for electronic equipment – Quality assessment requirements – Part 1: Generic specification*

## 3 Technical information

### 3.1 Terms and definitions

Terminology used in and applicable to this International Standard is stated in 2.1 of IEC 61076-1. IEC 60512-1 also contains applicable terms.

### 3.2 System of levels

#### 3.2.1 Performance levels

If appropriate, the detail product specification shall contain information about the different performance levels.

The term ‘performance level’ reflects the grouping of the environmental and mechanical stresses at which a component is tested, and also such features as long-term stability of electrical characteristics. If different levels are defined in the detail product specification, they have to be numbered, where the lowest number (1) usually indicates the highest performance.

#### 3.2.2 Compatibility levels, according to IEC 61076-1

As a function of the standardization degree, four levels characterize the compatibility of connectors from different sources. These levels are defined in 2.2.3.2 to 2.2.3.5 of IEC 61076-1:2006 and should, when appropriate, be indicated in the detail product specification of circular connectors.

### 3.3 Classification into climatic categories

Unless impractical, the lower and upper temperatures and the duration of the damp heat, steady state test should be described in a table similar to the example given in 2.3 of IEC 61076-1:2006.

### 3.4 Creepage and clearance distances

Permissible working or rated voltages depend on the application and on the applicable or specified safety requirements.

Therefore, clearance and creepage distances as well as proof voltages under specified air pressure shall be specified in the detail product specification.

### 3.5 Current-carrying capacity

For each connector, the current-carrying capacity shall be specified in the detail product specification, preferably by the de-rating curve determined in accordance with test 5b of IEC 60512-5-2.

### 3.6 Marking

Each connector and its associated package shall be marked in accordance with the requirements specified in 2.7 of IEC 61076-1:2006.

## 4 Dimensional information

Dimensions provided in the detail product specification for circular connectors shall provide

– mating information;
– mounting information;
– overall dimension;
– locking and sealing information, if appropriate;
– information on termination and cable fixing.

For more details see 3.1 to 3.5 of IEC 61067-1 Ed. 2.0.

# 5 Characteristics

To provide information on specified essential electrical and mechanical characteristics, preferred methods on tests and measurements are listed; additional characteristics may be added to the detail product specification, when appropriate.

# 6 Tests and test schedules

## 6.1 General aspects

See Clause 5 of IEC 61076-1:2006.

The detail product specification shall state the test sequence(s) (in accordance with this standard), and the number of specimens for each test sequence (not less than four mated pairs).

Individual variants may be submitted to type tests for approval of those particular variants.

It is permissible to limit the number of variants tested to a selection representative of the whole range for which approval is required (which may be less than the range covered by the detail product specification), but each feature and characteristic shall be proved.

The connectors shall have been processed in a careful and workmanlike manner, in accordance with good current practice.

## 6.2 Test schedules

### 6.2.1 General

To provide for different applications of connectors, the extent of the test schedule may be different in the various detail product specifications.

The *basic* (minimum) test schedule is given in 6.2.2.

The detail product specification shall state the tests to be carried out and shall specify the requirements to be fulfilled.

In no case shall the tests required by the detail product specification be less than those listed in 6.2.2.

A *full* test schedule is laid down in 6.2.3. This should be used to evaluate connectors used in severe environments (e.g. aircraft or marine environments).

For most connector types, an *intermediate* test schedule may be appropriate. This intermediate test schedule shall then be formed by omitting entire groups and/or conditionings from the full test schedules that are not necessary.

Test phase numbers shall not be modified but used as given in 6.2.3.

The same is applicable when the sequence of the test phases in a test group is not entirely appropriate to a particular type or style. In that case, the sequence of the tests, but not the measurement to be performed subsequent to tests, may be altered for that particular detail product specification.

The test phase number shall be retained for each test thereby affording clarity should such alteration in sequence be conducted.

Where a detail product specification includes additional characteristics which require testing and/or specific test sequences, the appropriate existing or new test (in the form of a normative annex to the detail product specification) shall be in the appropriate place in the test table. These may be specified in an additional test group or groups; see test group HP.

NOTE It is necessary for the detail product specification to select the appropriate basic, intermediate or full test schedule.

### 6.2.2 Basic (minimum) test schedule

Where the basic (minimum) test schedule is appropriate, the detail product specification shall call for the following tests listed in Table 1 and shall specify the characteristics to be examined and the requirements to be fulfilled.

**Table 1 – Basic tests (minimum)**

| Test phase | Test | | | Measurement to be performed | | |
|---|---|---|---|---|---|---|
| | Title | IEC 60512 Test No. | Severity or condition of test in DS | Title | IEC 60512 Test No. [a] | Require-ments in DS |
| 1 | General examination | 1 | | Visual examination<br>Examination of dimension and mass | 1a<br>1b | X<br>X |
| 2.1<br><br><br>2.2 | | | | Engaging and separating forces<br>or<br>Insertion and withdrawal forces | 13a<br><br><br>13b | X<br><br><br>X |
| 3 | | | | Contact resistance – Millivolt level method<br>or<br>Contact resistance – Specified test current method | 2a<br>or<br>2b | X |
| 4 | | | | Insulation resistance | 3a | X |
| 5 | | | | Voltage proof | 4a | X |
| 6.1<br><br>6.2 | Soldering<br>or<br>Other applicable terminations | One or several of the tests of the 12a to 12e series<br><br>b | X | Contact resistance – Millivolt level method<br>or<br>Contact resistance – Specified test current method | 2a<br>or<br>2b | X |

X To be specified in the detail product specification.

a See IEC 60512-1-100 for a list and the numbers of the test methods.

b Where applicable, other appropriate connection tests shall be additional to, or replace, the specified tests, for example, tests of IEC 60512 or tests of the applicable parts of IEC 60352.

### 6.2.3 Full test schedule

#### 6.2.3.1 General

Where the full test schedule is appropriate, the detail product specification shall call for the following tests (Tables 2 to 12) and shall specify the characteristics to be examined and the requirements to be fulfilled.

The schedule detailed below is recommended for preparing detail product specifications, however, specific design and application features shall carefully be taken into account when preparing the detail product specification. The schedule detailed below shall be used as a guide. The test phase numbering should be used as specified below.

To comply with the different applications of connectors, the test schedule of the detail product specifications may be extended to provide performance for different fields of application.

For solderless terminations, test sequences of the applicable part of IEC 60352 shall be integrated into the appropriate full test schedule.

#### 6.2.3.2 Test group P – Preliminary tests

All specimens shall be subjected to the following tests. All the test group specimens shall be subjected to the preliminary group P tests in the following sequence.

**Table 2 – Test group P**

| Test phase | Test | | | Measurement to be performed | | |
|---|---|---|---|---|---|---|
| | Title | IEC 60512 Test No. | Severity or condition of test in DS | Title | IEC 60512 Test No. | Require-ments in DS |
| P1 | General examination | 1 | | Visual examination<br>Examination of dimension and mass | 1a<br>1b | X<br>X |
| P2 | Polarizing method | 13e | X | | | |
| P3 | Restricted entry | 16b | | | | |
| P4 | | | | Contact resistance – Millivolt level method<br>or<br>Contact resistance – Specified test current method | 2a<br>or<br>2b | X |
| P5 (Note 1) | | | | Insulation resistance | 3a | X |
| P6 (Note 2) | | | | Voltage proof | 4a | X |
| P7<br>P7.1 | Sealing (gross air leakage)<br>Sealing (fine air leakage) | 14a<br>14b | 5 min in each direction | | | |
| P8 | Electrical engagement length | 1c | | | | X |
| P9 | Residual magnetism | 24a | | | | |
| P10 | Contact protection effectiveness (scoop proof) | 1d | | | | |

X To be specified in the detail product specification.

NOTE 1 If specified in the detail product specification the insulation resistance shall also be measured between one termination and housing having minimum spacing.

NOTE 2 When applicable the detail product specification shall specify whether the connectors are to be mated or unmated for this test. The specimen shall be subjected to the test voltage between one termination and the housing having a minimum spacing.

The specimens shall then be divided into the appropriate number of groups. All connectors in each group shall undergo the following tests as described in the detail product specification and in the sequence given, unless the detail product specification requires alteration of the sequence of tests or adds new tests to verify additional connector characteristics (see 6.2).

The specimens shall be divided into these groups. All connectors in each group shall undergo the tests specified for the relevant group.

#### 6.2.3.3 Test group AP – Dynamic/climatic tests

**Table 3 – Test group AP**

| Test phase | Test | | | Measurement to be performed | | |
|---|---|---|---|---|---|---|
| | Title | IEC 60512 Test No. | Severity or condition of test in DS | Title | IEC 60512 Test No. | Require-ments in DS |
| AP1 | Probe damage | 16a | X | | | |
| AP2 | Gauge retention force (resilient contacts) | 16e | X | | | X |
| AP3 (note 2) | | | | Engaging and separating forces | 13a | X |
| | | | | | | |
| AP4 (note 2) | | | | Voltage proof | 4a | X |
| AP5 | Mechanical strength impact | 7b | X | | | |
| AP6 | Contact retention in insert | 15a | X | | | |
| | | | | Visual examination | 1a | X |
| AP7 | Insert retention in housing (torsional) | 15c | X | | | |
| | | | | Visual examination | 1a | X |
| AP8 | Bump | 6b | X | Contact disturbance | 2e | X |
| AP9 | Vibration or random vibration | 6d 6e | X | Contact resistance variation (during test) | 2c | X |
| AP10 | Shock | 6c | X | Contact disturbance | 2e | X |
| AP11 | Acceleration, steady-state | 6a | X | | | |
| AP12 | Rapid change of temperature | 11d | X | | | |
| | | | | Voltage proof | 4a | X |
| | | | | Insulation resistance | 3a | X |
| AP13 | Static load, transverse | 8a | X | | | |
| AP14 | Static load, axial | 8b | X | | | |

**Table 3 – Test group AP** *(concluded)*

| Test phase | Test | | | Measurement to be performed | | |
|---|---|---|---|---|---|---|
| | Title | IEC 60512 Test No. | Severity or condition of test in DS | Title | IEC 60512 Test No. | Require-ments in DS |
| AP15 | | | | Sealing (gross air leakage)<br>Sealing (fine air leakage) | 14a<br>14b | 5 min in each direction |
| AP16 | | | | Visual examination | 1a | X |
| AP17 | Climatic sequence | 11a | X | | | |
| AP18-1 (Note 2) | Dry heat | 11i | X | | | |
| AP18-2 | Low air pressure | 11k | X | | | |
| AP18-3 | Damp heat, cyclic (first cycle) | 11m | X | | | |
| AP18-4 | Cold | 11j | X | | | |
| AP18-5 | Low air pressure | 11k | X | | | |
| AP18-6 | Damp heat, cyclic (remaining cycles) | 11m | X | | | |
| AP19 | Impacting water | 14g * | X | | | |
| | | | | Insulation resistance | 3a | X (Note 1) |
| | | | | Contact resistance – Millivolt level method<br>or<br>Contact resistance – Specified test current method | 2a<br><br>2b | X |
| | | | | Voltage proof | 4a | X (Note 2) |
| AP20 (note 2) | | | | Engaging and separating forces | 13a | X |
| | | | | Visual examination | 1a | X |
| AP21 | Contact retention system, resistance to tool application | 15h | X | | | |
| AP22 | Interfacial sealing | 14f [a] | X | | | |
| | | | | Voltage proof | 4a | X (Note 2) |
| AP23 | Insert retention in housing (axial) | 15b | X | | | |

X To be specified in the detail product specification.

NOTES See Table 2.

[a] As an alternative, a test for the second numeral of the IP degree of protection according to IEC 60529 can be performed, when assigned by the DS or the manufacturer.

#### 6.2.3.4 Test group BP – Mechanical/climatic tests

**Table 4 – Test group BP**

| Test phase | Test | | | Measurement to be performed | | |
|---|---|---|---|---|---|---|
| | Title | IEC 60512 Test No. | Severity or condition of test in DS | Title | IEC 60512 Test No. | Require-ments in DS |
| BP1 (Note 2) | | | | Engaging and separating forces | 13a | X |
| BP2 | Mechanical operation (half of the specified number of operations) | 9a | X | | | |
| BP3 | Climatic test | | X | | | |
| BP3.1 | Corrosion, salt mist or | 11f | X | | | |
| BP3.2 | Corrosion, industrial atmosphere or | 11g | X | | | |
| BP3.3 | Climatic sequence or | 11a | X | | | |
| BP3.4 | Damp heat, steady-state<br>or<br>Damp heat, cyclic | 11c<br><br>11m | X<br><br>X | | | |
| | | | | Contact resistance – Millivolt level method<br>or<br>Contact resistance – Specified test current method | 2a<br><br>2b | X |
| BP4 | Mechanical operation (the remaining number of operations) | 9a | X | | | |
| | | | | Insulation resistance | 3a | X (Note 1) |
| | | | | Housing (shell) electrical continuity | 2f | X |
| | | | | Voltage proof | 4a | X (Note 2) |
| BP5 (Note 2) | | | | Engaging and separating forces (cold) | 13a | X |
| BP6 | | | | Gauge retention force (resilient contacts) | 16e | X |
| BP7 | Contact insertion, release and extraction force [a] | 15d | X | | | |
| BP8 | Contact retention in insert, cable nutation [b] | 15e | X | | | |
| BP9 | Static load, axial | 8b | X | Visual examination | 1a | |

X To be specified in the detail product specification.

NOTES See Table 2.

[a] Not on contacts to be tested in phase P.

[b] Applicable to removable contacts only.

#### 6.2.3.5 Test group CP – Moisture

**Table 5 – Test group CP**

| Test phase | Test | | | Measurement to be performed | | |
|---|---|---|---|---|---|---|
| | Title | IEC 60512 Test No. | Severity or condition of test in DS | Title | IEC 60512 Test No. | Require-ments in DS |
| CP1 | Immersion at low air pressure | 14e | X | Insulation resistance | 3a | X (Note 1) |
| CP2 | Damp heat, steady-state | 11c | X | Insulation resistance | 3a | X (Note 1) |
| | | | | Housing (shell) electrical continuity | 2f | X |
| | | | | Contact resistance – Millivolt level method<br>or<br>Contact resistance – Specified test current method | 2a<br><br>2b | X<br><br>X |
| | | | | Voltage proof | 4a | X (Note 2) |
| | | | | Engaging and separating forces | 13a | X (Note 2) |
| CP3 | | | | Sealing (gross air leakage)<br>Sealing (fine air leakage) | 14a<br>14b | 5 min in each direction<br>X |
| CP4 | | | | Visual examination | 1a | X |
| CP5 | | | | Contact retention in insert | 15a | X |
| X To be specified in the detail product specification. | | | | | | |
| NOTES See Table 2. | | | | | | |

#### 6.2.3.6 Test group DP – Endurance

**Table 6 – Test group DP**

| Test phase | Test | | | Measurement to be performed | | |
|---|---|---|---|---|---|---|
| | Title | IEC 60512 Test No. | Severity or condition of test in DS | Title | IEC 60512 Test No. | Require-ments in DS |
| DP1 | Rapid change of temperature | 11d | X | | | |
| DP2 | Mechanical operation | 9a | X | | | |
| DP3 | Electrical load and temperature | 9b | X | Insulation resistance | 3a | X (Note 1) |
| | | | | Contact resistance – Millivolt level method<br>or<br>Contact resistance – Specified test current method | 2a<br><br>2b | X |
| | | | | Voltage proof | 4a | X (Note 2) |
| DP4 | Durability of contact retention system and seals (maintenance, ageing) | 9d | X | | | |
| DP5 | | | | Sealing (gross air leakage)<br>Sealing (fine air leakage) | 14a<br>14b | X<br>X |
| DP6 | | | | Interfacial sealing | 14f | X |
| DP7 | | | | Visual examination | 1a | X |
| DP8 | Sand and dust | 11h | X | | | |
| DP9 | | | | Functional check of engaging and separating | 13a | By hand X |
| DP10 | Free fall (repeated) | 7a | X | | | |
| | | | | Visual examination | 1a | X |
| X To be specified in the detail product specification. | | | | | | |
| NOTES See Table 2. | | | | | | |

### 6.2.3.7 Test group EP – Mould/Fire

**Table 7 – Test group EP**

| Test phase | Test | | | Measurement to be performed | | |
|---|---|---|---|---|---|---|
| | Title | IEC 60512 Test No. | Severity or condition of test in DS | Title | IEC 60512 Test No. | Require-ments in DS |
| EP1 | Robustness of termination | 16f | X | | | |
| EP2 | Measurement of contact deformation after crimping | 16g | X | | | |
| EP3 | Mould growth | 11e | X | | | Initial approval only |
| | | | | Insulation resistance | 3a | X (Note 1) |
| | | | | Visual examination | 1a | X |
| EP4 | Flammability (needle flame) | 20a | X | | | |
| EP5 | Fireproofness | 20b | X | | | |
| X To be specified in the detail product specification. | | | | | | |
| NOTES See Table 2. | | | | | | |

### 6.2.3.8 Test group FP – Fluids

**Table 8 – Test group FP**

| Test phase | Test | | | Measurement to be performed | | |
|---|---|---|---|---|---|---|
| | Title | IEC 60512 Test No. | Severity or condition of test in DS | Title | IEC 60512 Test No. | Require-ments in DS |
| FP1 | Fluid resistance | 19c | X | | | |
| FP2 (Note 2) | | | | Engaging and separating forces | 13a | X |
| FP3 | | | | Contact resistance – Millivolt level method<br>or<br>Contact resistance – Specified test current method | 2a<br><br>2b | X |
| FP4 (Note 1) | | | | Insulation resistance | 3a | X |
| FP5 | | | | Contact retention in insert | 15a | X |
| FP6 | | | | Insert retention in housing (axial) | 15b | X |
| FP7 | | | | Visual examination | 1a | X |
| X To be specified in the detail product specification. | | | | | | |
| NOTES See Table 2. | | | | | | |

#### 6.2.3.9 Test group GP – Connection method tests

**Table 9 – Test group GP**

| Test phase | Test | | | Measurement to be performed | | |
|---|---|---|---|---|---|---|
| | Title | IEC 60512 Test No. | Severity or condition of test in DS | Title | IEC 60512 Test No. | Require-ments in DS |
| GP1 | Connections, solderless, | Applicable part of IEC 60352 | X | | | |
| GP2 | Solderability | 12a or 12b or 12c | X | | | X |
| X To be specified in the detail product specification. | | | | | | |

#### 6.2.3.10 Test group HP – Accessories

**Table 10 – Test group HP**

| Test phase | Test | | | Measurement to be performed | | |
|---|---|---|---|---|---|---|
| | Title | IEC 60512 Test No. | Severity or condition of test in DS | Title | IEC 60512 Test No. | Require-ments in DS |
| HP1 | Cable clamp robustness | 17a | X | | | |
| HP2 | Cable clamp resistance to cable rotation | 17b | X | | | |
| HP3 | Cable clamp resistance to cable pull (tensile) | 17c | X | | | |
| HP4 | Cable clamp resistance to cable torsion | 17d | X | | | |
| HP5 | Robustness of protective cover attachment | 15g | X | | | |
| X To be specified in the detail product specification. | | | | | | |

### 6.2.3.11 Test group KP – Climatic sequence

**Table 11 – Test group KP**

| Test phase | Test | | | Measurement to be performed | | |
|---|---|---|---|---|---|---|
| | Title | IEC 60512 Test No. | Severity or condition of test in DS | Title | IEC 60512 Test No. | Require-ments in DS |
| KP1 | Combined/sequential cold, low air pressure and damp heat | 11b | X | | | |
| KP2 | Ozone resistance | | X | | | |
| KP3 (note 1) | | | | Voltage proof | 4a | X |
| KP4 | | | X | Contact resistance – Millivolt level method<br>or<br>Contact resistance – Specified test current method | 2a<br><br>2b | X |
| X To be specified in the detail product specification. | | | | | | |
| NOTES See Table 2. | | | | | | |

### 6.2.3.12 Test group LP – Dynamic corrosion

**Table 12 – Test group LP**

| Test phase | Test | | | Measurement to be performed | | |
|---|---|---|---|---|---|---|
| | Title | IEC 60512 Test No. | Severity or condition of test in DS | Title | IEC 60512 Test No. | Require-ments in DS |
| LP1 | Visual examination | 1a | X | | | |
| LP2 | | | | Grounding contact spring holding force | 16i | X |
| LP3 | | | | Housing (shell) electrical continuity | 2f | X |
| LP4 | | | | RFI shielding – Frequency range 10 kHz to 100 MHz 100 MHz to 1 GHz | 23a | X |
| LP5 | Mechanical operation | 9a | X | | | |
| LP6 | Rapid change of temperature | 11d | X | | | |
| LP7 | Corrosion, salt mist | 11f | X | | | |
| | | | | Housing (shell) electrical continuity | 2f | X |
| | | | | RFI shielding – Frequency range 10 kHz to 100 MHz 100 MHz to 1 GHz | 23a | X |
| X To be specified in the detail product specification. | | | | | | |

### 6.3 Test procedures and measuring methods

The test methods specified and given in the relevant standards are the preferred methods but not necessarily the only ones which can be used. In case of dispute, however, the specified method shall be used as the reference method.

Unless otherwise specified, all tests shall be carried out under standard atmospheric conditions for testing as specified in IEC 60068-1.

Where approval procedures are involved and alternative methods are employed it is the responsibility of the manufacturer to satisfy the authority granting approval that any alternative methods which he may use give results equivalent to those obtained by the methods specified.

### 6.4 Pre-conditioning

Before the tests are made, the connectors shall be preconditioned under standard atmospheric conditions for testing as specified in IEC 60068-1 for a period of 24 h unless otherwise specified by the detail product specification.

### 6.5 Wiring and mounting of specimens

#### 6.5.1 Wiring

Where wiring of test specimens is required, the detail product specification shall contain information suitable to comply with the selected methods of test.

#### 6.5.2 Mounting

When mounting is required in a test, unless otherwise specified, the connectors shall be rigidly mounted on a metal plate or to specified accessories, whichever is applicable, using the specified connection methods, fixing devices and panel cut-outs as laid down in the detail product specification.

## 7 Blank detail product specification – General

A blank detail product specification forms a supplement to the sectional specification and contains requirements for style and layout and minimum content of the detail product specification, thus ensuring a uniform presentation.

Its contents shall be derived from the generic or sectional specification and shall list a selection of technical criteria necessary to describe a connector subfamily.

Detail product specifications not complying with these requirements may not be considered as being in accordance with IEC specifications nor shall they be so described.

In the preparation of the blank detail product specification for circular connectors, IEC 61076-2-001, the content of this sectional product specification shall be taken into account.

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