IEC 61076-2

Edition 2.0 2011-06

INTERNATIONAL STANDARD

NORME INTERNATIONALE

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

Connecteurs pour équipements électroniques – Exigences de produit –
Partie 2: Spécification intermédiaire pour les connecteurs circulaires

IEC 61076-2:2011

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

CONNECTORS FOR ELECTRONIC EQUIPMENT – PRODUCT REQUIREMENTS –

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FOREWORD

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International Standard IEC 61076-2 has been prepared by subcommittee 48B: Connectors, of IEC technical committee 48: Electromechanical components and mechanical structures for electronic equipment.

This second edition cancels and replaces the first edition of IEC 61076-2 (1998). This edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to the previous edition.

– This International Standard no longer includes the quality assessment procedures. As described in IEC 61076-1 and IEC 62197-1, a new document structure has been established. IEC 61076-2 has been revised to reflect this updated structure.
– Subclause 3.2, *Systems of levels* has been introduced.
– The subclause on IEC type designation has been removed.

– Clauses 4 *Dimensional information* and 5 *Characteristics* have been added.
– Some clauses and test groups have been rearranged. Test group HP has been added.

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

FDIS	Report on voting
48B/2240/FDIS	48B/2247/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 2.

A list of all parts of the IEC 61076 series, published under the general title *Connectors for electronic equipment – Product requirements,* can be found on the IEC website.

The committee has decided that the contents of this publication will remain unchanged until the stability date indicated on the IEC web site under "http://webstore.iec.ch" in the data related to the specific publication. At this date, the publication will be

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- withdrawn,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

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 Examination of dimension and mass	1a 1b	X X
2.1 2.2				Engaging and separating forces or Insertion and withdrawal forces	13a 13b	X X
3				Contact resistance – Millivolt level method or Contact resistance – Specified test current method	2a or 2b	X
4				Insulation resistance	3a	X
5				Voltage proof	4a	X
6.1 6.2	Soldering or Other applicable terminations	One or several of the tests of the 12a to 12e series b	X	Contact resistance – Millivolt level method or Contact resistance – Specified test current method	2a or 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 Examination of dimension and mass	1a 1b	X X
P2	Polarizing method	13e	X			
P3	Restricted entry	16b				
P4				Contact resistance – Millivolt level method or Contact resistance – Specified test current method	2a or 2b	X
P5 (Note 1)				Insulation resistance	3a	X
P6 (Note 2)				Voltage proof	4a	X
P7 P7.1	Sealing (gross air leakage) Sealing (fine air leakage)	14a 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) Sealing (fine air leakage)	14a 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 or Contact resistance – Specified test current method	2a 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.