INTERNATIONAL STANDARD

IEC 61076-3

QC 480200

First edition
1999-11

Connectors for use in d.c., low-frequency analogue and digital high-speed data applications –

Part 3:
Rectangular connectors with assessed quality – Sectional specification

Connecteurs pour applications analogiques en courant continu et basse fréquence et pour applications numériques utilisant des débits élevés pour le transfert des données –

Partie 3:
Connecteurs rectangulaires sous assurance de la qualité – Spécification intermédiaire

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Consolidated versions of some IEC publications including amendments are available. For example, edition numbers 1.0, 1.1 and 1.2 refer, respectively, to the base publication, the base publication incorporating amendment 1 and the base publication incorporating amendments 1 and 2.

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- **IEC web site***
- **Catalogue of IEC publications**
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  (On-line catalogue)*
- **IEC Bulletin**
  Available both at the IEC web site* and as a printed periodical

Terminology, graphical and letter symbols

For general terminology, readers are referred to IEC 60050: *International Electrotechnical Vocabulary* (IEV).

For graphical symbols, and letter symbols and signs approved by the IEC for general use, readers are referred to publications IEC 60027: *Letter symbols to be used in electrical technology*, IEC 60417: *Graphical symbols for use on equipment. Index, survey and compilation of the single sheets* and IEC 60617: *Graphical symbols for diagrams*.

* See web site address on title page.

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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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International Standard IEC 61076-3 has been prepared by subcommittee 48B: Connectors, of IEC technical committee 48: Electromechanical components and mechanical structures for electronic equipment.

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

FDIS	Report on voting
48B/790/FDIS	48B/819/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.

This part 3 constitutes the sectional specification in the IEC quality assessment system for electronic components (IECQ) for rectangular connectors.

The other parts form the generic specification and the sectional specifications, some being under consideration or in preparation. For these publications, the QC 480XXX has been reserved.

IEC 61076 was reserved for these series of documents as well as QC 480000; the documents available or under preparation are:

IEC 61076-1: Generic specification

IEC 61076-2: Sectional specification – Circular connectors

IEC 61076-3: Sectional specification – Rectangular connectors

IEC 61076-4: Sectional specification – Printed board connectors

IEC 61076-5: Sectional specification – In-line socket devices

IEC 61076-6: Sectional specification – Loose part contacts

The QC number that appears on the cover of this publication is the specification number of the IEC Quality Assessment System for Electronic Components (IECQ).

The committee has decided that this publication remains valid until 2004. At this date, in accordance with the committee's decision, the publication will be

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

A bilingual version of this standard may be issued at a later date.

CONNECTORS FOR USE IN DC, LOW-FREQUENCY ANALOGUE AND DIGITAL HIGH-SPEED DATA APPLICATIONS –

Part 3: Rectangular connectors with assessed quality – Sectional specification

1 General

1.1 Scope

This part of IEC 61076 establishes uniform specifications, type testing requirements and quality assessment procedures for a subfamily of rectangular connectors. It should be used in conjunction with the generic specification IEC 61076-1 and with relevant detail specifications.

1.2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this part of IEC 61076. For dated references, subsequent amendments to or revisions of, any of these publications do not apply. However, parties to agreements based on this part of IEC 61076 are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies. Members of IEC and ISO maintain registers of currently valid International Standards.

IEC 60068-1:1988, *Environmental testing – Part 1: General and guidance*

IEC 60352-1:1997, *Solderless connectors – Part 1: Wrapped connections – General requirements, test methods and practical guidance*

IEC 60352-2:1990, *Solderless connections – Part 2: Solderless crimped connections – General requirements, test methods and practical guidance*

IEC 60352-3:1993, *Solderless connections – Part 3: Solderlesss accessible insulation displacement connections – General requirements, test methods and practical guidance*

IEC 60352-4:1994, *Solderless connections – Part 4: Solderless non-accessible insulation displacement connections – General requirements, test methods and practical guidance*

IEC 60352-5:1995, *Solderless connections – Part 5: Solderless press-in connections – General requirements, test methods and practical guidance*

IEC 60410:1973, *Sampling plans and procedures for inspection by attributes*

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

IEC 61076-1:1995, *Connectors with assessed quality, for use in d.c. low-frequency analogue and digital high-speed data applications – Part 1: Generic specification*

2 Technical information

The detail specification shall contain information which contributes to a proper application of the connectors. It will also provide specificities to enable a better understanding of the connectors and/or the connector family.

2.1 Terminology

In addition to the terminology used in, and applicable to, the detail specification, as stated in 2.1 of IEC 61076-1, it is recommended that those definitions which are unique to the connectors specified in the detail specification be listed.

2.2 Classification into climatic categories

Unless impractical, the lower and upper temperatures and the duration for the damp heat, steady-state test shall be described in a table similar to the example given in 2.2 of IEC 61076-1.

2.3 Creepage and clearance distances

The detail specification shall specify creepage and clearance distances in accordance with requirements of 2.3 of IEC 61076-1.

2.4 Current-carrying capacity

The detail specification shall specify the current-carrying capacity of connectors in accordance with the requirements of 2.4 of IEC 61076-1.

2.5 IEC type designation

Connectors to which this standard applies shall be designated by the following indications and in the order given.

a) The letters "IEC"

b) The number of the detail specification (without dashes), being nine characters (e.g. 610763100)

c) A letter denoting the style of the connector (the system shall be specified in the detail specification).

d) The number of contacts of connectors or of contact cavities of connector bodies, the number of digits used shall be in accordance with the maximum possible number of contacts or cavities.

e) A letter denoting the type of contact of two-part connectors or the number of electrically independent rows of edge-socket connectors. The following letters shall be used.

– Two-part connector	F	female contact
	H	hermaphroditic contact
	M	male contact
– Edge-socket connector	D	double row (separated)
	S	single row

f) A number, being a combination of three digits, describing the contact arrangement, which may include

- pre-mating contact levels;
- loaded contact rows;
- loaded contact patterns.

g) A letter denoting the basic type of the terminations, followed by a character defining the variation.

The following letters shall be used.

A	screw	S	solder
C	crimp	T	tab
I	insulation displacement/piercing	W	wrap
		Z	no terminations

h) If prescribed in the detail specification, the type designation may optionally be extended to cover further information, such as climatic category, printed board dimensions, contact finish, etc.

i) Where the detail specification provides for a variation of performance and assessment levels, a single digit and a letter shall be used to denote performance level (PL) and assessment level (AL) respectively. The digit and letter shall be prescribed in the detail specification and shall be included as the final characters of the type designation.

j) Grouping information

The indications (a-i) above shall be grouped to clarify the type of entity:

– basic description: a, b, c, d, and e;
– contact arrangement: f;
– terminations: g;
– performance: h, i.

2.6 Marking

Each connector and its associated package shall be marked in accordance with the requirements specified in 2.6 of IEC 61076-1.

3 Quality assessment procedures

See clause 3 of IEC 61076-1.

4 Tests and test schedules

4.1 General

See clause 4 of IEC 61076-1.

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

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 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 practices.

4.2 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 referee 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.

4.3 Pre-conditioning

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

4.4 Wiring and mounting of specimens

4.4.1 Wiring

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

4.4.2 Mounting

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

4.5 Test schedules

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

The *basic* (minimum) test schedule is given in 4.5.1.

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

It is a requirement of this standard that in no case shall the tests required by the detail specification be less than those listed in 4.5.1.

A *full* test schedule is laid down in 4.5.2.

For many connector types, an *intermediate* test schedule may be appropriate. Such intermediate test schedule shall then be formed by using the full test schedule and omitting entire groups and/or those tests and/or conditionings that are not necessary.

Test phase numbers shall not be modified but used as given in 4.5.2.

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 specification.

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

Where a detail specification includes additional characteristics which require testing and/or specific test sequences, the appropriate existing or new test (in the form of an annex to the detail specification) shall be in the appropriate place in the test table.

These characteristics may be specified in an additional test group, see for example test group HP.

NOTE 1 When the terminations of the connector require the use of a solderless connection method, appropriate tests should be specified in test group GP.

NOTE 2 It is necessary for the detail specification to select the appropriate basic, intermediate or full test schedule.

4.5.1 Basic (minimum) test schedule

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

Table 1 – Basic tests

Test phase	Test			Measurement to be performed		Requirements	
	Title	IEC 60512 Test No. *	Severity or condition of test	Title	IEC 60512 Test No. *	PL	All connector styles
1	General examination			Visual examination	1a		X
				Examination of dimensions and mass	1b		X
2.1				Engaging and separating forces	13a		X
				or			
2.2				Insertion and withdrawal forces	13b		X
3				Contact resistance	2a or 2b		X
4				Insulation resistance	3a		X
5				Voltage proof	4a		X
6.1	Soldering	12	X	Contact resistance including termination	2a or 2b		X
	or						
6.2	Other applicable connection methods	**	X				

* See corrigendum 60512-1 for cross-reference list to new test method document numbers.

** 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, such as subgroup GP of the full test schedule.

X To be specified in the detail specification.

4.5.2 Full test schedule

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

For solderless terminations, test sequences of the applicable part of IEC 60352 shall form a part of the full test schedule (see test group GP).

4.5.2.1 Test group P – Preliminary

Specimens shall be subjected to the following tests.

Table 2 – Test group P

Test phase	Test			Measurement to be performed		Requirements	
	Title	IEC 60512 Test No.*	Severity or condition of test	Title	IEC 60512 Test No.*	PL	All connector styles
P1	General examination			Visual examination	1a		X
				Examination of dimensions and mass***	1b		X
P2**	Polarizing method	13e	X				
P3				Contact resistance	2a		X
P4				Insulation resistance	3a		X
P5				Voltage proof	4a		X

* See corrigendum of IEC 60512-1 for cross-reference list to the new test method standard numbers.

** If applicable.

*** Inspection records made at the time of manufacture of the parts may totally or partially discharge this requirement, so as to be accepted by the NSI.

X To be specified in the detail specification.

4.5.2.2 Test group AP – Dynamic/climatic

Table 3 – Test group AP

Test phase	Test			Measurement to be performed		Requirements	
	Title	IEC 60512 Test No.*	Severity or condition of test	Title	IEC 60512 Test No.*	PL	All connector styles
AP1.1				Engaging and separating forces	13a		X
				or			
AP1.2				Insertion and withdrawal forces	13b		X
AP2	Probe damage **	16a	X	Gauge retention force	16e		X
AP3.1	Solderability	12a or 12b	X				
	or						
AP3.2	Resistance to solder heat	12d or 12e	X	Visual examination	1a		X
	or						
AP3.3 ***	To be defined	To be defined	X				
AP4 ****				Voltage proof	4a		X
AP5	Contact retention in insert	15a	X				
				Visual examination	1a		X
AP6	Bump	6b	X	Contact disturbance	2e		X
				Visual examination	1a		X
				Contact resistance	2a or 2b		X

* See corrigendum of IEC 60512-1 for cross-reference list to the new test method standard numbers.

** If applicable; if not, measurement shall still be performed.

*** Other applicable termination tests may be covered by other test sequences.

**** To be performed only when a soldering test is carried out with contacts installed.

X = To be specified in the detail specification.

Table 3 – Test group AP (continued)

Test phase	Test			Measurement to be performed		Requirements	
	Title	IEC 60512 Test No.*	Severity or condition of test	Title	IEC 60512 Test No.*	PL	All connector styles
AP7	Vibration	6d	X	Contact disturbance	2e		X
				Visual examination	1a		X
				Contact resistance	2a or 2b		X
AP8	Shock	6c	X	Contact disturbance	2e		X
				Visual examination	1a		X
				Contact resistance	2a or 2b		X
AP9 **	Acceleration, steady state	6a	X	Visual examination	1a		X
				Contact resistance	2a or 2b		X
AP10	Rapid change of temperature	11d	X	Insulation resistance	3a		X
				Voltage proof	4a		X
				Visual examination	1a		X
AP11	Climatic sequence	11a	X				
AP11.1	Dry heat	11i	X	Insulation resistance at high temperature	3a		X
AP11.2	Damp heat, cyclic, first cycle	11m	X	Visual examination	1a		X
AP11.3	Cold	11j	X	Visual examination	1a		X
AP11.4	Low air pressure	11k	X	Voltage proof	4a		X

* See corrigendum of IEC 60512-1 for cross-reference list to the new test method standard numbers.

** If applicable.

NOTE According to IEC 60512-5, after conducting AP6, AP7 and AP8 also a "sealing" test should be applied.

X = To be specified in the detail specification.

Table 3 – Test group AP (continued)

Test phase	Test			Measurement to be performed		Requirements	
	Title	IEC 60512 Test No.*	Severity or condition of test	Title	IEC 60512 Test No.*	PL	All connector styles
AP11.5	Damp heat cyclic, remaining cycles	11m	X	Insulation resistance	3a		X
				Voltage proof	4a		X
				Contact resistance	2a or 2b		X
AP12.1 AP12.2				Engaging and separation forces or Insertion and withdrawal forces	13a 13b		X X
AP13				Visual examination	1a		X

* See corrigendum of IEC 60512-1 for cross-reference list to the new test method standard numbers.

X = To be specified in the detail specification.

4.5.2.3 Test group BP – Mechanical endurance

Table 4 – Test group BP

Test phase	Test			Measurement to be performed		Requirements	
	Title	IEC 60512 Test No.*	Severity or condition of test	Title	IEC 60512 Test No.*	PL	All connector styles
BP1				Gauge retention force	16e		X
BP2	Mechanical operation (half of the specified number of cycles)	9a	X	Visual examination	1a		X
				Contact resistance	2a or 2b		X
				Insulation resistance	3a		X
				Voltage proof	4a		X
				Polarizing method **	13e		X

* See corrigendum of IEC 60512-1 for cross-reference list to the new test method standard numbers.

** Measurement after BP2, if applicable.

X = To be specified in the detail specification.

Table 4 – Test group BP (continued)

Test phase	Test			Measurement to be performed		Requirements	
	Title	IEC 60512 Test No.*	Severity or condition of test	Title	IEC 60512 Test No.*	PL	All connector styles
BP3	Climatic tests:			Contact resistance	2a or 2b		X
BP3.1	Corrosion, salt mist	11f	X				
	or						
BP3.2	Flowing mixed gas corrosion	11g	X				
	or						
BP3.3	Climatic sequence	11a	X				
	or						
BP3.4	Damp heat, steady state	11c	X				
	or						
BP3.5	Damp heat, cyclic;	11m	X				
	or						
BP3.6	Dry heat	11i	X				
BP4	Mechanical operation (remaining half of specified number of operations)	9a	X	Visual examination	1a		X
				Contact resistance	2a or 2b		X
				Insulation resistance	3a		X
				Voltage proof	4a		X
				Polarizing method	13e		X
BP5	Probe damage **	16a	X	Gauge retention force	16e		X
BP6	Static load, axial	8b	X	Visual examination	1a		X

* See corrigendum of IEC 60512-1 for cross-reference list to the new test method standard numbers.

** If applicable; if not, measurement shall still be performed.

X = To be specified in the detail specification.

4.5.2.4 Test group CP – Moisture

Table 5 – Test group CP

Test phase	Test			Measurement to be performed		Requirements	
	Title	IEC 60512 Test No.*	Severity or condition of test	Title	IEC 60512 Test No.*	PL	All connector styles
CP1	Damp heat, steady state	11c	X	Insulation resistance	3a		X
				Voltage proof	4a		X
				Contact resistance	2a or 2b		X
				Engaging and separating forces or Insertion and withdrawal forces	13a 13b		X X
				Visual examination	1a		X

* See corrigendum of IEC 60512-1 for cross-reference list to the new test method standard numbers.

X = To be specified in the detail specification.

4.5.2.5 Test group DP – Electrical load

Table 6 – Test group DP

Test phase	Test			Measurement to be performed		Requirements	
	Title	IEC 60512 Test No.*	Severity or condition of test	Title	IEC 60512 Test No.*	PL	All connector styles
DP1	Mechanical operation (number of operations similar as specified in BP2)	9a	X				
DP2	Electrical load and temperature	9b	X				
				Contact resistance	2a or 2b		X
				Insulation resistance	3a		X
				Voltage proof	4a		X
				Visual examination	1a		X

* See corrigendum of IEC 60512-1 for cross-reference list to the new test method standard numbers.

X = To be specified in the detail specification.

4.5.2.6 Test group EP – Mechanical resistivity

Table 7 – Test group EP

Test phase	Test			Measurement to be performed		Requirements	
	Title	IEC 60512 Test No.*	Severity or condition of test	Title	IEC 60512 Test No.*	PL	All connector styles
EP1.1 or EP1.2 **	Robustness of termination Mechanical test for solderless terminations	16f Under consideration	X X	Visual examination	1a		X
EP2	Contact retention in insert	15a	X				
				Visual examination	1a		X
EP3 ***	Probe damage	16a	X	Gauge retention force	16e		X
EP4				Insulation resistance	3a		X
EP5 ****	Mould growth	11e	X	Insulation resistance	3a		X
				Visual examination	1a		X
EP6	Flammability needle flame	20a	X				

* See corrigendum of IEC 60512-1 for cross-reference list to the new test method standard numbers.

** Under consideration: i.d. test 16x – Mechanical strength (wired termination)

*** If applicable, this test should be performed at the end of this test group sequence.

**** Where evidence can be presented to the satisfaction of the NSI, confirming that the materials used in the manufacture of the connectors have been previously tested in accordance with the specified test and have satisfactorily passed it, test phases EP5 and EP6 may be omitted.

X = To be specified in the detail specification.

4.5.2.7 Test group FP – Chemical resistivity

Table 8 – Test group FP

Test phase	Test			Measurement to be performed		Requirements	
	Title	IEC 60512 Test No.*	Severity or condition of test	Title	IEC 60512 Test No.*	PL	All connector styles
FP1	Resistance to fluids	Under consideration					
FP2.1				Engaging and separating forces	13a		X
				or			
FP2.2				Insertion and withdrawal forces	13b		X
FP3				Contact resistance	2a or 2b		X
FP4				Insulation resistance	3a		X
FP5	General examination			Visual examination	1a		X

* See corrigendum of IEC 60512-1 for cross-reference list to the new test method standard numbers.

X = To be specified in the detail specification.

4.5.2.8 Test group GP – Terminations

Table 9 – Test group GP

Test phase	Test			Measurement to be performed		Requirements	
	Title	IEC 60512 Test No.*	Severity or condition of test	Title	IEC 60512 Test No.*	PL	All connector styles
GP1	Applicable tests of connection methods according to IEC 60352 and IEC 60512.						
GP"X"	Depending upon the type of solderless termination/connection method, if applicable, a test sequence from the relevant part of IEC 60352 shall be selected.						

* See corrigendum of IEC 60512-1 for cross-reference list to the new test method standard numbers.

NOTE Where test evidence can be presented to the satisfaction of the NSI, confirming that the connection methods used by the connectors have been previously tested in accordance with the specified tests of IEC 60352 and have satisfactorily passed them, test phases GP1 to GP"X" may be omitted.

4.5.2.9 Test group HP - Additional

Table 10 – Test group HP

Test phase	Test			Measurement to be performed		Requirements	
	Title	IEC 60512 Test No.*	Severity or condition of test	Title	IEC 60512 Test No.*	PL	All connector styles
HP1	Where the given test groups and test phases do not support specific tests for the connectors, additional tests shall be provided in this test group. New tests to be described in annex B.						
* See corrigendum of IEC 60512-1 for cross-reference list to the new test method standard numbers.							

4.5.3 Qualification approval test schedule

The following table 11 covers the test schedule given in 4.5.1 and 4.5.2.

The minimum number of specimens to be tested and also the maximum number of defectives permitted in each subgroup and in total shall be chosen to ensure that the assessment level required is achieved (see 3.3 of IEC 61076-1).

The detail specification shall specify minimum criteria appropriate to the intended application of the connector. Under no circumstances shall the detail specification specify minimum acceptance criteria at a lower level than shown in table 11 (see 3.4.1 of IEC 61076-1).