

BS EN 61076-2-001:2011



BSI Standards Publication

Connectors for electronic equipment — Product requirements

Part 2-001: Circular connectors —
Blank detail specification

bsi.

...making excellence a habit.
AVA Documents™
Document Sharing Hub

National foreword

This British Standard is the UK implementation of EN 61076-2-001:2011. It is identical to IEC 61076-2-001:2011. It supersedes BS EN 61076-2-001:2002 which is withdrawn.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.

© BSI 2011

ISBN 978 0 580 67058 9

ICS 31.220.10

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

This British Standard was published under the authority of the Standards Policy and Strategy Committee on 31 August 2011.

Amendments issued since publication

Amd. No.	Date	Text affected
----------	------	---------------

EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN 61076-2-001

August 2011

ICS 31.220.10

Supersedes EN 61076-2-001:2001

English version

**Connectors for electronic equipment -
Product requirements -
Part 2-001: Circular connectors -
Blank detail specification
(IEC 61076-2-001:2011)**

Connecteurs pour équipements
électroniques -
Exigences de produit -
Partie 2-001: Connecteurs circulaires -
Spécification particulière cadre
(CEI 61076-2-001:2011)

Steckverbinder für elektronische
Einrichtungen -
Produktanforderungen -
Teil 2-001: Rundsteckverbinder -
Vordruck für Bauartspezifikation
(IEC 61076-2-001:2011)

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.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Bulgaria, Croatia, Cyprus, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and the United Kingdom.

CENELEC

European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

Management Centre: Avenue Marnix 17, B - 1000 Brussels

© 2011 CENELEC - All rights of exploitation in any form and by any means reserved worldwide for CENELEC members.

Ref. No. EN 61076-2-001:2011 E

 **Documents**
Document Sharing Hub

Foreword

The text of document 48B/2241/FDIS, future edition 2 of IEC 61076-2-001, 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 61076-2-001 on 2011-07-26.

This European Standard supersedes EN 61076-2-001:2001.

EN 61076-2-001:2011 includes the following significant technical changes with respect to EN 61076-2-001:2001:

- 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 61076-2-001 has been revised to reflect this updated structure.
- b) Subclause 3.2, *Systems of levels* has been introduced.
- c) The subclause *IEC 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.

EN 61076-2-001:2011 should be used in conjunction with EN 61076-1, EN 61076-2 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.

Endorsement notice

The text of the International Standard IEC 61076-2-001:2011 was approved by CENELEC as a European Standard without any modification.

In the official version, for Bibliography, the following note has to be added for the standard indicated:

IEC 60664-1	NOTE Harmonized as EN 60664-1.
-------------	--------------------------------

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.

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
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	-	Connectors for electronic equipment - Tests and measurements - Part 1: General	EN 60512-1	-
IEC 60512-1-100	-	Connectors for electronic equipment - Tests and measurements - Part 1-100: General - Applicable publications	EN 60512-1-100	-
IEC 60999-1	-	Connecting devices - Electrical copper conductors - Safety requirements for screw- type and screwless-type clamping units - Part 1: General requirements and particular requirements for clamping units for conductors from 0,2 mm ² up to 35 mm ² (included)	EN 60999-1	-
IEC 60999-2	-	Connecting devices - Electrical copper conductors - Safety requirements for screw- type and screwless-type clamping units - Part 2: Particular requirements for clamping units for conductors above 35 mm ² up to 300 mm ² (included)	EN 60999-2	-
IEC 61076-1	2006	Connectors for electronic equipment - Product requirements - Part 1: Generic specification	EN 61076-1	2006
IEC 61076-2	2011	Connectors for electronic equipment - Product requirements - Part 2: Sectional specification for circular connectors	EN 61076-2	2011
IEC 62197-1	-	Connectors for electronic equipment - Quality assessment requirements - Part 1: Generic specification	EN 62197-1	-

CONTENTS

INTRODUCTION	7
1 Scope	9
2 Normative references	11
3 Technical information	13
3.1 Terms and definitions	13
3.2 Systems of levels	13
3.2.1 Performance levels	13
3.2.2 Compatibility levels, according to IEC 61076-1 Ed. 2.0	13
3.3 Classification into climatic categories	13
3.4 Creepage and clearance distances	15
3.5 Current-carrying capacity	15
3.6 Marking	15
4 Dimensional information	17
4.1 General	17
4.2 Isometric view and common features	17
4.2.1 Common features	19
4.2.2 Reference system	19
4.3 Engagement (mating) information	21
4.3.1 Engaging (mating) direction	21
4.3.2 Perpendicular to the engaging (mating) direction	21
4.3.3 Inclination	21
4.4 Fixed connectors	21
4.4.1 Dimensions	21
4.4.2 Terminations	21
4.5 Free connectors	23
4.5.1 Dimensions	23
4.5.2 Terminations	23
4.6 Accessories	23
4.7 Mounting information for connectors	23
4.7.1 Mounting on panels	25
4.8 Gauges	25
4.8.1 Sizing gauges and retention force gauges	25
4.8.2 Mechanical function, engaging/separating/insertion/withdrawal force gauges	27
4.8.3 Probes	27
4.8.4 Contact resistance gauge	27
4.8.5 Test panel (for voltage proof test)	27
4.8.6 Test panel (for EMC/ crosstalk etc.)	27
5 Characteristics	29
5.1 General	29
5.2 Pin assignment and other definitions	29
5.3 Classification into climatic categories	29
5.4 Electrical characteristics	29
5.4.1 Creepage and clearance distances	29
5.4.2 Voltage proof	31

5.4.3	Current-carrying capacity.....	31
5.4.4	Contact and shield resistance.....	31
5.4.5	Insulation resistance.....	31
5.4.6	Impedance.....	33
5.5	Mechanical characteristics	35
5.5.1	Mechanical operation	35
5.5.2	Effectiveness of connector coupling devices	35
5.5.3	Engaging and separating forces (or insertion and withdrawal forces).....	35
5.5.4	Contact retention in insert.....	35
5.5.5	Polarizing and coding method.....	35
5.6	Other characteristics	37
5.6.1	Shock and vibration (method either random or sine)	37
5.6.2	Degree of protection provided by enclosures (IP code)	37
5.6.3	Screen and shielding properties	37
5.7	Environmental aspects	39
5.7.1	Marking of insulation material (plastics).....	39
5.7.2	Design/ use of material.....	39
6	Test schedule.....	41
6.1	General.....	41
6.1.1	Climatic category.....	41
6.1.2	Creepage and clearance distances	43
6.1.3	Arrangement for contact resistance measurement	43
6.1.4	Arrangement for dynamic stress tests.....	43
6.1.5	Arrangement for testing static load; axial	43
6.1.6	Wiring of specimens	43
6.2	Test schedules	45
6.2.1	Basic (minimum) test schedule	45
6.2.2	Full test schedule	49
6.3	Test procedures and measuring methods	73
6.4	Pre-conditioning	73
6.5	Wiring and mounting of specimens	73
6.5.1	Wiring.....	73
6.5.2	Mounting	73
Annex A (normative)	New tests and additional test phases	74
Bibliography.....		75
Table 1 – Performance levels		13
Table 2 – Isometric view and common features.....		17
Table 3 – Performance levels, example		28
Table 4 – Performance levels		29
Table 5 – Creepage and clearance distances.....		29
Table 6 – Performance levels		41
Table 7 – Creepage and clearance distances.....		43
Table 8 – Tests, example.....		44
Table 9 – Basic tests		45
Table 10 – Number of test specimens and contacts		49
Table 11 – Test group P		

Table 12 – Test group AP	53
Table 13 – Test group BP	59
Table 14 – Test group CP	63
Table 15 – Test group DP	65
Table 16 – Test group EP	67
Table 17 – Test group FP	67
Table 18 – Test group GP	69
Table 19 – Test group HP	69
Table 20 – Test group KP	71
Table 21 – Test group LP	71

INTRODUCTION

This blank detail product specification is a supplementary document to the sectional product specification IEC 61076-2 and contains requirements for style, layout and content of detail product specifications for circular connectors. It should be used in conjunction with the following publications: IEC 61076-1 and IEC 61076-2 for product requirements as well as IEC 62197-1 for quality requirements.

The main content of this blank detail product specification is divided into two parts: on one page the example for a blank detail product specification, on the other page the guidance notes referring to the example. The guidance notes have the same numbering as the relevant paragraphs of the example pages.

The sample pages can be used like a template when preparing a detail product specification within the scope of this document. This document is not intended to replace the templates and guidance notes of IEC, but to assist in their application. All users are reminded to adhere to relevant directives and guidelines of the IEC when preparing a standard.

NOTE 1 A detail quality specification IEC 62197-2-1xx should be prepared, based on the blank detail quality specification for circular connectors IEC 62197-2-001 and its references and should be used in conjunction with the detail product specification IEC 61076-2-1xx.

NOTE 2 The quality assessment requirements for connectors according to the IEC 61076 series are detailed in IEC 62197-1.

Guidance notes

The following pages give a recommended layout of a detail product specification. The contents of this page give guidance on the information which should, wherever possible, be given on the front page of a detail product specification (see IEC Guide 102).

For the scope and definition of a detail product specification, see 1.2.3 of IEC 61076-1.

The numbers between brackets on the front page of the detail product specification correspond to the following information.

Identification of the detail product specification

- [1] The International Electrotechnical Commission or the national standards organization under whose authority the detail product specification is drafted. It shall also be stated where the detail product specification may be obtained.
- [2] The IEC number of the detail product specification and date of issue.
- [3] The IEC number and issue number of the generic and the sectional specifications.
- [4] The national number of the detail product specification, if it differs from the IEC number.

Identification of the connector

- [5] A short description of the type of connector.
- [6] Information on the typical construction of the connector, for example, it should be stated whether the connector is suitable for mounting on printed boards.
- [7] Outline drawing, preferably of isometric or similar projection, from which the connector may be clearly identified.
- [8] Information on performance level(s) and assessment level(s) specified in the document, if applicable.
- [9] Reference data on the most important properties, to allow comparison between the various connector types.

NOTE It may be convenient to give some of this information in tabular form.

[1]	IEC Detail product specification number [2]
Generic specification number Electronic components of assessed quality in accordance with: [3]	National number of detail product specification (it is not necessary to use this if the IEC number is identical) [4]
Outline drawing [7]	Product description [5]
	[6]
	[8] Performance level(s): Assessment level(s): Combination of performance levels and assessment levels:
	Reference data [9]

1 Scope

Guidance notes

2 Normative references

It may be necessary to refer to other documents in addition to those stated, in which case the list of related documents shall be extended beyond those referenced.

If standards are referenced which are already listed in IEC 61076-1 and IEC 61076-2, their reference shall not be repeated in 1.2 of the detail product specification.

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 connectors*

IEC 60512 (all parts), *Connectors for electronic equipment – Tests and measurements*

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

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

IEC 60999-1, *Connecting devices – Electrical copper conductors – Safety requirements for screw-type and screwless-type clamping units – Part 1: General requirements and particular requirements for clamping units for conductors from 0,2 mm² up to 35 mm² (included)*

IEC 60999-2, *Connecting devices – Electrical copper conductors – Safety requirements for screw-type and screwless-type clamping units – Part 2: Particular requirements for clamping units for conductors above 35 mm² up to 300 mm² (included)*

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

IEC 61076-2:2011, *Connectors for electronic equipment – Product requirements – Part 2: Sectional specification for circular connectors*

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

Guidance notes

3 Technical information

The detail product specification should contain information which contributes to a proper application of the connectors. It will also provide specificities for a better understanding of the detail product specification.

3.1 Terms and definitions

Terminology used in and applicable to this specification is stated in 2.1 of IEC 61076-1:2006. IEC 60512-1 also contains applicable terms. Any term used in the detail product specification which is currently not defined in the above cited terminology shall be defined in the detail product specification under this clause.

3.2 Systems of levels

If appropriate, the detail product specification shall contain information about the different performance levels and/ or the compatibility levels. These levels, if they are appropriate, shall be indicated in the detail product specification according to the definitions of IEC 61076-1 Ed.2.0.

The information may be provided in a table. Table 1 may serve as an example.

3.3 Classification into climatic categories

This classification requires the assignment of the following parameters to the connector:

- lower limiting temperature;
- upper limiting temperature;
- duration (days) of the relevant damp heat steady state test of IEC 60512.

See also 5.3 in this standard.

3 Technical information

3.1 Terms and definitions

3.2 Systems of levels

3.2.1 Performance levels

Table 1 – Performance levels

Connector style	Performance level				

3.2.2 Compatibility levels, according to IEC 61076-1 Ed. 2.0

3.3 Classification into climatic categories

Guidance notes

3.4 Creepage and clearance distances

See 6.1.2 in this standard.

3.5 Current-carrying capacity

See 5.4.3 in this standard.

3.6 Marking

The marking of the connector and the package shall be in accordance with 2.7 of IEC 61076-1.

3.4 Creepage and clearance distances

3.5 Current-carrying capacity

3.6 Marking

Guidance notes

4 Dimensional information

In order to facilitate comparison of various specifications, a uniform presentation of drawing information is recommended in accordance with 3.1 to 3.5 of IEC 61076-1:2006.

Drawings and dimensions shall cover

- a) isometric view showing the basic design including common characteristics of related connectors;
- b) fixed connectors;
- c) free connectors and/or board-edge of printed boards;
- d) mating information;
- e) accessories;
- f) mounting information for fixed connectors;
- g) mounting information for free connectors, if applicable;
- h) mounting information for connectors with accessories;
- i) testing gauges, probes and test panels.

4.1 General

It shall be stated in the detail product specification if original dimensions are millimetres or inches.

It shall be stated in the detail product specification if drawings are shown in first-angle or in third-angle projection.

The system of lettering shall be as described by 3.2 of IEC 61076-1:2006.

The following statement shall be included in the detail product specification:

The shape of the connectors may deviate from those given in the following drawings as long as the specified dimensions are not influenced.

Wherever practical, the same dimension letters shall be used for corresponding dimensions of fixed and free connectors.

4.2 Isometric view and common features

An isometric view shall be included and shall show the main characteristics of the design including common features, if applicable.

It is convenient to show the dimension reference, the dimension and the feature description in the form of a table (see Table 2).

4 Dimensional information

4.1 General

The shape of the connectors may deviate from those given in the following drawings as long as the specified dimensions are not influenced.

4.2 Isometric view and common features

Table 2 – Isometric view and common features

Reference	Dimension	Feature description

Guidance notes

4.2.1 Common features

A description of all the common features relating to the style of connectors covered by the detail product specification shall be included.

Data which could be specified includes

- a) datum point or datum line with reference to the datum;
- b) position of the mounting hole(s) of the fixed connector;
- c) position of the terminations of the fixed connector;
- d) position of the free or edge-socket connector;
- e) position of the mounting holes of the free connector or the terminations of an edge-socket connector;
- f) position of the printed board;
- g) position of the grid of the printed board.

4.2.2 Reference system

The detail product specification shall state the coordination dimensions to allow for (modular) arrangement of the connector parts. When such a reference system is based on guidelines for mechanical structures, it is recommended to refer to such information.

4.2.1 Common features

4.2.2 Reference system

Coordination dimensions are dimensions without tolerances which indicate the boundary or centre-line references in order to allow for (modular) arrangement.

Guidance notes

4.3 Engagement (mating) information

Details of the limiting factors within which correct engagement (mating) is ensured relates to dimensional data on the following:

4.3.1 Engaging (mating) direction

The range over which the specified contact resistance is ensured in the plug-in direction.

4.3.1.1 Contact levels and sequencing

Dimensional parameters of the different contact levels and their sequence, if applicable.

4.3.2 Perpendicular to the engaging (mating) direction

The maximum allowable displacement in the perpendicular direction which can be accommodated.

4.3.3 Inclination

The maximum allowable inclination in the longitudinal and transverse axes in the form of appropriate drawings and tables.

NOTE The specification may be given with the aid of drawings if this ensures clarity.

4.4 Fixed connectors

4.4.1 Dimensions

The detail product specification shall include (an) outline drawing(s) of the fixed connector(s) showing the prime dimensions and associated geometrical tolerances.

For clarity the value of the dimensions may be included as tables which may be separated for those dimensions which are common to all styles/variants and those dimensions which are particular to styles/variants.

Details of marking of contact positions; within a row by numbers and marking of contact rows by letters shall be included in the drawing(s).

4.4.2 Terminations

When different types of terminations are possible, information on use shall be presented in the detail product specification in tabular form.

The detail product specification shall include termination length, width, thickness, and diagonal dimensions, as appropriate.

4.3 Engagement (mating) information

4.3.1 Engaging (mating) direction

4.3.1.1 Contact levels and sequencing

4.3.2 Perpendicular to the engaging (mating) direction

4.3.3 Inclination

4.4 Fixed connectors

4.4.1 Dimensions

4.4.2 Terminations

Guidance notes

4.5 Free connectors

4.5.1 Dimensions

(An) outline drawing(s) with prime dimensional and geometrical tolerances shall be included in the detail product specification.

4.5.2 Terminations

The detail product specification shall include termination length, width, thickness, and diagonal dimensions, as appropriate.

4.6 Accessories

When accessories provide an essential support to the application of the connectors, the features and use shall be outlined in the detail product specification, where applicable.

In cases where accessories may be used with the connectors, outline drawings with prime dimensions shall be included in the detail product specification.

Accessories may take the form of optional mounting hardware, coding devices, shielded contacts, high current contacts, etc., which are not normally provided fitted to the connector.

Information on accessories may be presented as outline drawings with associated tabular data similar to that used for the connector dimensional details.

When coding or mounting devices, which are not an integral part of the connector, are used, separate information shall be given in the detail product specification. The same is valid also for shielding and/or grounding features, which do not form an integral part of the connector or its accessories.

4.7 Mounting information for connectors