

Connectors with assessed quality, for use in d.c., low-frequency analogue and in digital high-speed data applications —

Part 4: Printed board connectors —

Section 100: Detail specification for two-part connector modules having a grid of 2,5 mm (0,098 in) for printed boards and backplanes

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British Standard

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National foreword

This British Standard is the English language version of EN 61076-4-100:1998. It is identical with IEC 61076-4-100:1994. This standard is a harmonized specification within the IEC quality assessment system for electronic components (IECQ). In the IECQ system, this specification is numbered QC 480301XX0001.

The UK participation in its preparation was entrusted by Technical Committee EPL/48, Electromechanical components for electronic equipment, to Subcommittee EPL/48/2, Connectors for Electronic equipments, which has the responsibility to:

- aid enquirers to understand the text;
- present to the responsible international/European committee any enquiries on the interpretation, or proposals for change, and keep the UK interests informed;
- monitor related international and European developments and promulgate them in the UK.

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

From 1 January 1997, all IEC publications have the number 60000 added to the old number. For instance, IEC 27-1 has been renumbered as IEC 60027-1. For a period of time during the change over from one numbering system to the other, publications may contain identifiers from both systems.

Cross-references

Attention is drawn to the fact that CEN and CENELEC Standards normally include an annex which lists normative references to international publications with their corresponding European publications. The British Standards which implement international or European publications referred to in this document may be found in the BSI Standards Catalogue under the section entitled “International Standards Correspondence Index”, or by using the “Find” facility of the BSI Standards Electronic Catalogue.

A British Standard does not purport to include all the necessary provisions of a contract. Users of British Standards are responsible for their correct application.

Compliance with a British Standard does not of itself confer immunity from legal obligations.

Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, the EN title page, pages 2 to 74, an inside back cover and a back cover. This standard has been updated (see copyright date) and may have had amendments incorporated. This will be indicated in the amendment table on the inside front cover.

Amendments issued since publication

Amd. No.	Date	Comments

This British Standard, having been prepared under the direction of the Electrotechnical Sector Board, was published under the authority of the Standards Board and comes into effect on 15 November 1998

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Part 4: Printed board connectors
Section 100: Detail specification for two-part connector modules
having a grid of 2,5 mm (0,098 in) for printed boards and
backplanes

(IEC 61076-4-100:1994)

Connecteurs sous assurance de la qualité, pour utilisation dans le cadre d'applications analogiques en courant continu et à basse fréquence et dans le cadre d'applications numériques utilisant des débits élevés pour le transfert des données

Partie 4: Connecteurs pour cartes imprimées
Section 100: Spécification particulière pour modules de connecteurs en deux parties pour cartes imprimées et fonds de panier, au pas de 2,5 mm (0,098 in)

(CEI 61076-4-100:1994)

Steckverbinder mit bewerteter Qualität für Gleichspannungs- und Niederfrequenz-anwendungen sowie digitale Anwendungen mit hoher Übertragungsrate
Teil 4: Steckverbinder für gedruckte Schaltungen

Hauptabschnitt 100: Bauartspezifikation für indirekte Steckverbinder für gedruckte Schaltungen und Rückplatten, modulare Bauweise, Raster 2,5 mm (0,098 in)

(IEC 61076-4-100:1994)

This European Standard was approved by CENELEC on 1998-08-01. 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, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

CENELEC

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

Central Secretariat: rue de Stassart 35, B-1050 Brussels

Foreword

The text of the International Standard IEC 61076-4-100:1994, prepared by SC 48B, Connectors, of IEC TC 48, Electromechanical components and mechanical structures for electronic equipment, was submitted to the formal vote and was approved by CENELEC as EN 61076-4-100 on 1998-08-01 without any modification.

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) 1999-08-01
- latest date by which the national standards conflicting with the EN have to be withdrawn (dow) 1999-08-01

Annexes designated “normative” are part of the body of the standard.

In this standard, Annex A and Annex ZA are normative.

Annex ZA has been added by CENELEC.

Endorsement notice

The text of the International Standard IEC 61076-4-100:1994 was approved by CENELEC as a European Standard without any modification.

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1 Scope

This specification contains a range of modular two-part connectors having a grid of 2,5 mm (0,098 in) for printed boards and backplanes. The connectors cover a variety of multiple modules $n \times 25$ mm ($n \times 0,984$ in), with $n = 1, 2, 4, 9, 10$, in five rows (1 to 475 contacts) with optional coding, shielding and special contacts.

Fixed connectors are provided either with press-in contacts, press-in plus wrap contacts or press-in plus wrap plus mating area contacts.

Free connectors are provided either with solder or with press-in contacts. The mounting of the free connectors is achieved by press-in pivots.

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this section of IEC 1076-4. At the time of publication, the editions indicated were valid. All normative documents are subject to revision, and parties to agreements based on this section of IEC 1076-4 are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

IEC 68-1:1988, *Environmental testing — Part 1: General and guidance*.

IEC 297-3:1984, *Dimensions of mechanical structures of the 482,6 mm (19 in) series — Part 3: Subracks and associated plug-in units*.

IEC 326-3:1991, *Printed boards — Part 3: Design and use of printed boards*.

IEC 352-1:1983, *Solderless connections — Part 1: Solderless wrapped connections — General requirements, test methods and practical guidance*.

IEC 352-5:XXXX, *Solderless connections — Part 5: Solderless press-in connections — General requirements, test methods and practical guidance*. (under consideration)

IEC 410:1973, *Sampling plans and procedures for inspections by attributes*.

IEC 512-1:1984, *Electromechanical components for electronic equipment; basic testing procedures and measuring methods — Part 1: General*.

Amendment No. 1 (1988)

IEC 512-2:1985, *Electromechanical components for electronic equipment; basic testing procedures and measuring methods — Part 2: General examination, electrical continuity and contact resistance tests, insulation tests and voltage stress tests*.

IEC 512-3:1976, *Electromechanical components for electronic equipment; basic testing procedures and measuring methods — Part 3: Current-carrying capacity tests*.

IEC 512-4:1976, *Electromechanical components for electronic equipment; basic testing procedures and measuring methods — Part 4: Dynamic stress tests*.

IEC 512-5:1992, *Electromechanical components for electronic equipment; basic testing procedures and measuring methods — Part 5: Impact tests (free components), static load tests (fixed components), endurance tests and overload tests*.

IEC 512-6:1984, *Electromechanical components for electronic equipment; basic testing procedures and measuring methods — Part 6: Climatic tests and soldering tests*.

IEC 512-7:1993, *Electromechanical components for electronic equipment; basic testing procedures and measuring methods — Part 7: Mechanical operating tests and sealing tests*.

IEC 512-8:1993, *Electromechanical components for electronic equipment; basic testing procedures and measuring methods — Part 8: Connector tests (mechanical) and mechanical tests on contacts and terminations*.

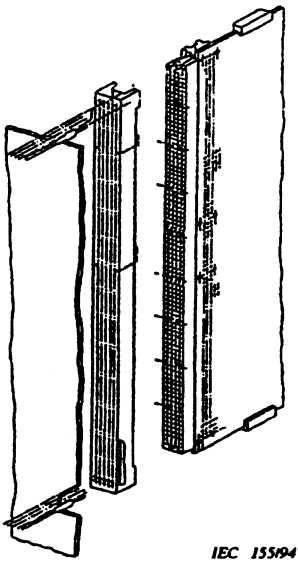
IEC 512-9:1992, *Electromechanical components for electronic equipment; basic testing procedures and measuring methods — Part 9: Miscellaneous tests*.

IEC 917:1988, *Modular order for the development of mechanical structures for electronic equipment practices*.

IEC 1076-1, *Generic specification: Connectors for frequencies below 3 MHz, with assessed quality*. (under consideration)

IEC 1076-4, *Sectional specification: Connectors for frequencies below 3 MHz, for use with printed boards with assessed quality. (under consideration)*
ISO 468:1982, *Surface roughness — Parameters, their values and general rules for specifying requirements.*

3 General data

IEC SC 48B: LF Connectors Specification available from IEC Central Office or from the address shown on the inside cover ELECTRONIC COMPONENTS OF ASSESSED QUALITY IN ACCORDANCE WITH: — GENERIC SPECIFICATION IEC 1076-1 Draft Issue 1 (Dec. 1991) See 4 for dimensions  IEC 155/94	IEC 1076-4-100 Issue 1 March 1994 QC 480301XX0001
	Page 6 of 72 pages
	Modular two-part connector for printed boards and backplanes, grid of 2,5 mm (0,098 in) in accordance with IEC 917.
	Connector with height multiple modules $n \times 25$ mm ($n \times 0,984$ in), (with $n = 1, 2, 4, 9, 10$) five rows with optional coding, shielding and special contacts.
	Performance levels (PL): 1, 2, 3. Assessment levels: B and G^a Combinations of performance and assessment levels: 1G, 2B, 2G, 3B.

^a See 7.2 and 7.3.

Figure 1 — Generic specification

3.1 Recommended method of mounting

The free connectors are provided either with solder or with press-in contacts.

The mounting of the free connector is achieved by press-in pivots. The terminations of the free connectors shall fit into holes in the printed board according to IEC 326, located on a grid of 2,5 mm (0,098 in).

The fixed connectors are provided either with:

- press-in contacts;
- press-in + wrap contacts;
- press-in + wrap + mating area contacts.

The connector is fixed on the press-in contacts. Fixing holes on the backplane are not necessary. The distance of termination centre lines is 2,5 mm (0,098 in), or a multiple of it. The terminations of the fixed connectors are suited for backplanes having a grid dimension of 2,5 mm (0,098 in).

NOTE Information about manufacturers who have components qualified to this detail specification is given in the Qualified Products List.

3.2 Minimum and maximum number of contacts

Table 1 — Number of contacts and contact arrangements

Height of styles	mm	25	50	100	225 ^b	250	25	50
	in	0,984	1,969	3,937	8,858	9,843	0,984	1,969
Styles	without coding	A	B	D	G	H	J ^c	K ^c
	with coding	N	P	R	U	V	W ^c	X ^c
Contact arrangement ^a		Number of contacts						
1		35	85	185	425	475	—	—
2 and 6		18	43	93	214	239	—	—
3 and 7		12	27	57	132	147	—	—
4		28	68	148	340	380	—	—
5		21	51	111	255	285	—	—
Number of cavities for special contacts		—	—	—	—	—	2	4

^a Contact arrangements according to 5.1.5.2 and 5.1.6.2.
^b This style allow a limited downward compatibility to equipment practice, according to IEC 297-3.
^c Under consideration.

3.3 Ratings and characteristics

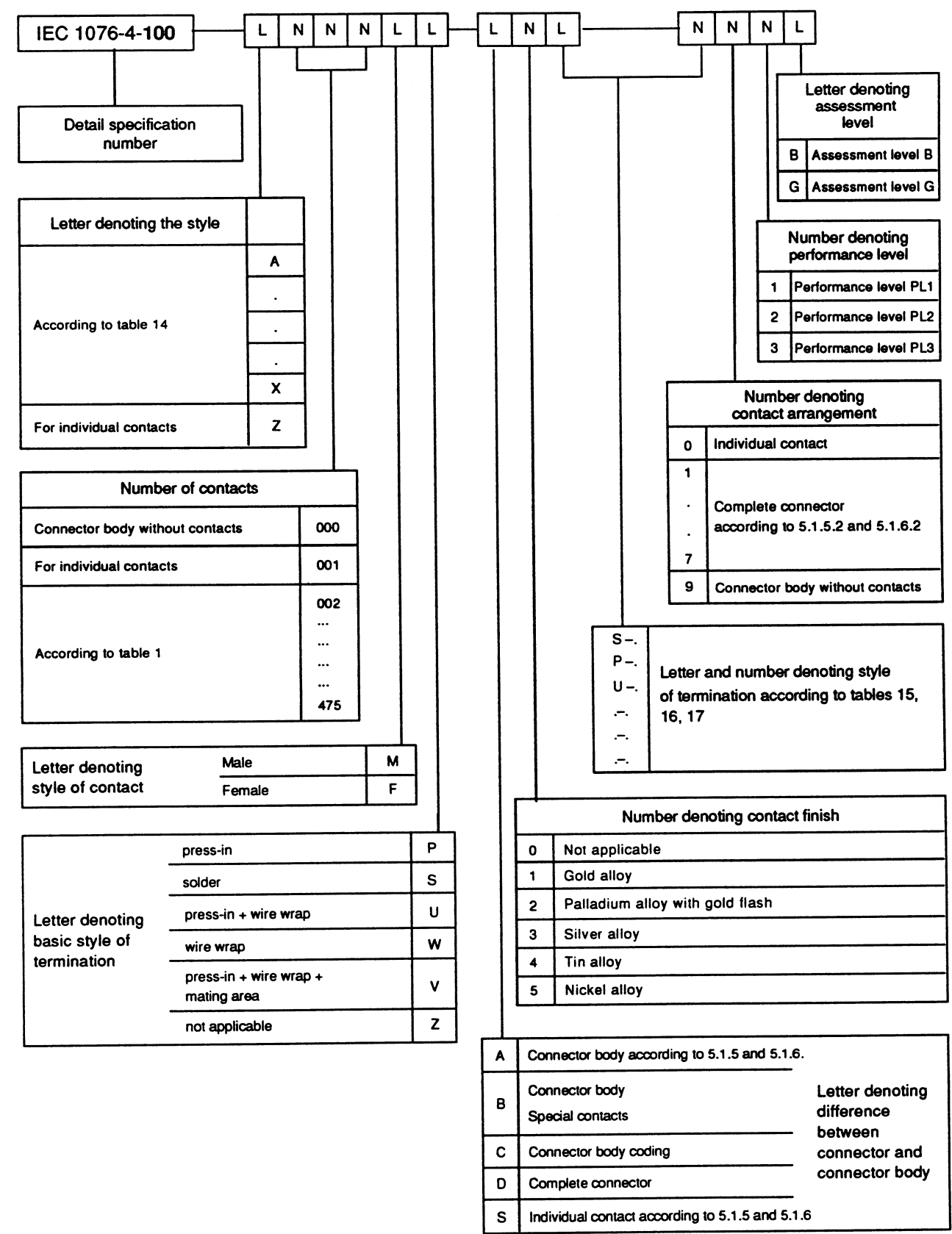
Working voltage:	Contact/contact 750 V a.c.
Current rating:	1 A at 70 °C (all LF contacts)
Insulation resistance:	10 ⁶ MΩ min. for PL1 and PL2 10 ⁵ MΩ min. for PL3
Climatic category:	PL1: 55/125/56 PL2: 55/125/21 PL3: 25/100/00
Printed board:	Thickness: 1,6 mm (0,063 in) to 3,2 mm (0,126 in)
Backplane:	Thickness: 1,6 mm (0,063 in) to 4,0 mm (0,157 in)
Contact spacing:	2,5 mm (0,098 in)

3.4 Marking

Marking of the connector and the package shall be in accordance with 2.6 of IEC 1076-4.

3.4.1 IEC type designation

Connectors, connector bodies and contacts according to this standard shall be designated by the following system:



NOTE "L" stands for "Letter".
"N" stands for "Number".

Example — Connector style B, having 85 female contacts with gold alloy contact finish with press-in terminations. Complete free connector for boards-with a thickness of 1,6 mm to 4 mm (0,063 in to 0,157 in), with performance level 2 and assessment level G: IEC 1076-4-100 — B 085FP — DIP — 312G.

3.5 Ordering information

For ordering connectors according to this detail specification, the type designation described in 3.4.1 shall be used.

4 Characteristics

4.1 Climatic category

Table 2 — Climatic category

Performance level	Climatic category	Category temperature		Damp heat, steady state		Days
		lower °C	upper °C	temperature °C	relative humidity %	
1	55/125/56	− 55	125	40	93	56
2	55/125/21	− 55	125	40	93	21
3	25/100/00	− 25	100	Not applicable		

4.2 Electrical

4.2.1 Creepage and clearance distances

The permissible operating voltages depend on the application, and on the applicable or specified requirements.

Therefore, the clearance and creepage distances are given as operating characteristics. In practice, reductions in creepage or clearance distances may occur due to the conductive pattern of the printed board or the wiring used, and shall duly be taken into account.

Table 3 — Creepage and clearance distances of male connector

Contact and termination arrangement according to 5.1.5.2 (male connector)	Minimum distance between contact rows				Minimum distance between adjacent contacts			
	Creepage		Clearance		Creepage		Clearance	
	mm	in	mm	in	mm	in	mm	in
1	1,4	0,055	1,4	0,055	1,2	0,047	1,2	0,047
2	2,1	0,083	2,1	0,083	3,6	0,142	3,6	0,142
3	3,9	0,154	3,9	0,154	3,6	0,142	3,6	0,142
4,5	1,4	0,055	1,4	0,055	1,2	0,047	1,2	0,047
6	2,1	0,083	2,1	0,083	3,6	0,142	3,6	0,142
7	3,9	0,154	3,9	0,154	3,6	0,142	3,6	0,142

Table 4 — Creepage and clearance distances of female connector

Contact and termination arrangement according to 5.1.6.2 (female connector)	Minimum distance between contact rows				Minimum distance between adjacent contacts			
	Creepage		Clearance		Creepage		Clearance	
	mm	in	mm	in	mm	in	mm	in
1	0,6	0,024	0,6	0,024	0,8	0,031	0,8	0,031
2	0,8	0,031	0,8	0,031	2,9	0,114	2,9	0,114
3	1,4	0,055	1,4	0,055	2,9	0,114	2,9	0,114
4, 5, 6	0,8	0,031	0,8	0,031	0,8	0,031	0,8	0,031
7	1,4	0,055	1,4	0,055	2,9	0,114	2,9	0,114

4.2.2 Voltage proof (applicable for PL1, 2, 3)

Conditions: IEC 512-2, Test 4a
Standard atmospheric conditions
Mated connectors

Table 5 — Voltage proof

Contact and termination arrangement according to 5.1.6.2	1	2	3	4	5	6	7
	Voltage proof						
Contact/contact	750 V r.m.s.	1 000 V r.m.s.	1 400 V r.m.s.	1 000 V r.m.s.			1 400 V r.m.s.
Contact/test panel	Not applicable						

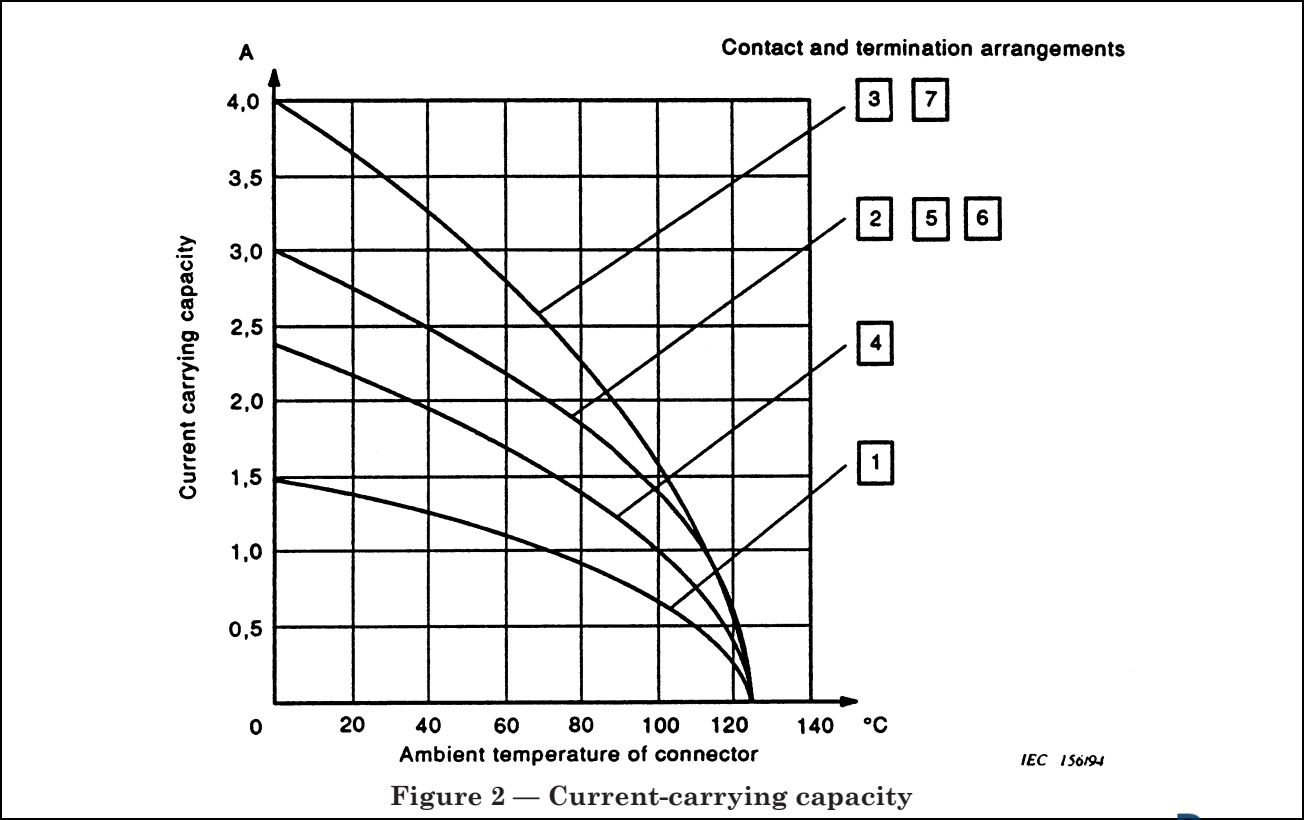
4.2.3 Current-carrying capacity (applicable for PL1, 2, 3)

Conditions: IEC 512-3, Test 5b
Standard atmospheric conditions
All contacts

Table 6 — Current-carrying capacity at 70 °C

	Styles				
	A	B	D	G	H
Without coding					
With coding	N	P	R	U	V
Contact arrangements ^a	Current-carrying capacity at 70 °C				
1	1 A				
2, 5, 6	2 A				
3,7	2,5 A				
4	1,5 A				

^a Contact arrangements according to 5.1.5.2 and 5.1.6.2.



4.2.4 Initial contact resistance (applicable for PL1, 2, 3)

Conditions: IEC 512-2, Test 2a
 Standard atmospheric conditions
 Mated connectors
 Connection points

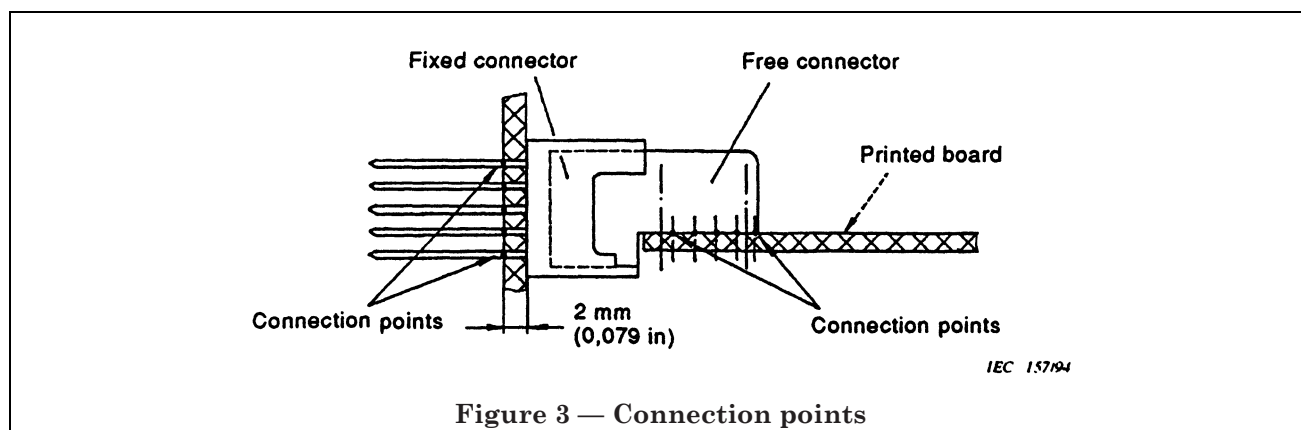


Figure 3 — Connection points

Test backplane of 2 mm (0,079 in) thickness, press-in mounted

Contact arrangements: 1 to 3 = 25 mΩ max.
 4 to 7 = 20 mΩ max.

4.2.5 Initial insulation resistance

Conditions: IEC 512-2, Test 3a: Method A
 Standard atmospheric conditions
 Test voltage: (100 ± 15) V d.c.
 Mated connectors

Performance levels PL1 and PL2: 10⁶ MΩ min.

Performance level PL3: 10⁵ MΩ min.

4.3 Mechanical

4.3.1 Mechanical operation

Conditions: IEC 512-5, Test 9a
 Standard atmospheric conditions
 Maximum speed of operation: 10 mm/s

Table 7 — Number of mechanical operations

Performance level	1	2	3
Operations	500	250	50

4.3.2 Insertion and withdrawal forces

Conditions: IEC 512-7, Test 13b
 Standard atmospheric conditions
 Maximum speed 100 mm/min

Table 8 — Insertion and withdrawal forces

Total insertion force	Total withdrawal force
$n \times 1$ N max.	$n \times 0,6$ N min.
n is the number of contacts	

4.3.3 Contact retention in insert

Not applicable.

4.3.4 Static load, axial

Not applicable.

4.3.5 Vibrations (sinusoidal)

Conditions: IEC 512-4, Test 6d
Standard atmospheric conditions
Mated connectors
The fixed and free connector shall be rigidly installed in a suitable fixture as specified in **6.1.2**

Table 9 — Vibration severity

Performance level	Severity
1	10 Hz to 2 000 Hz and 1,5 mm (0,059 in) or 20 g
2	10 Hz to 500 Hz and 0,35 mm (0,014 in) or 5 g
3	Not applicable

5 Dimensional information

5.1 Drawings and dimensions

5.1.1 General

Dimensions in millimetres are original.

Drawings are shown in the first angle projection. The shape of the connectors may deviate from those given in the following figures as long as the specified dimensions are not influenced.

The information about the bending in **5.1.5** and **5.1.6** is valid for the condition of delivery. The permissible bending of the mounted connector is stated in **6.1.7**.

Missing dimensions can be chosen according to the common characteristics and the intended use.

5.1.2 Isometric view and common features

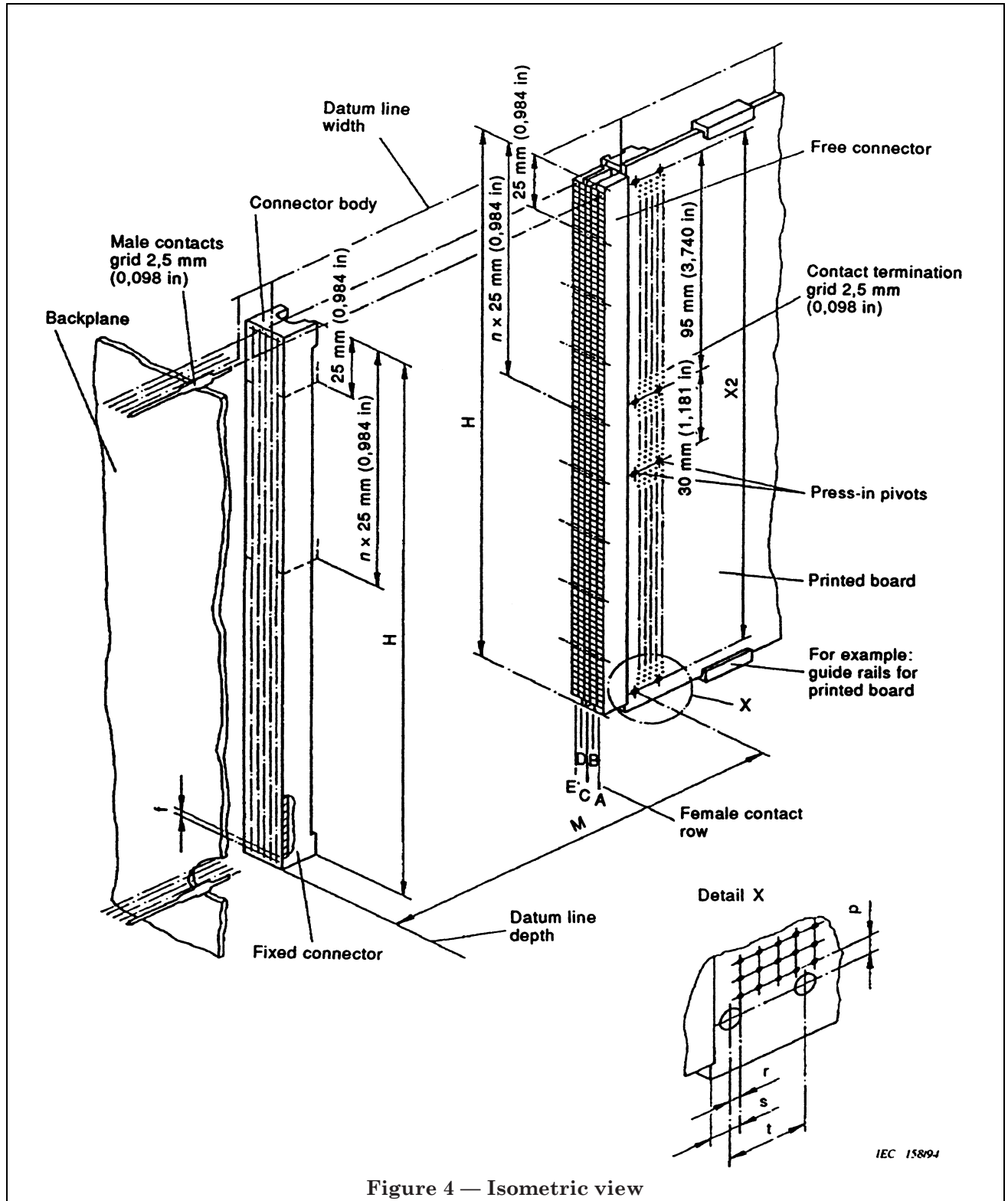


Figure 4 — Isometric view

Table 10 — Isometric view and common feature

Reference letter	Dimensions		Legend
	mm	in	
H	$n \times 25$	$n \times 0,984$	Maximum height of the modular fixed connector with $n = 1, 2, 4, 9, 10$
M	15 – 17,5	0,591 – 0,689	Contact range in plug-in direction (see Figure 8) NOTE For information only. see 5.1.3.
X2	H – 5	H – 0,197	Distance between centre lines of the press-in pivots of free connector
f	2,5	0,098	Grid dimensions of the terminations of fixed connector
P	2,5	0,098	Distance between the centre lines of the press-in pivots and the first (or last) row of holes for contact termination of free connector
r	1,25	0,049	Distance between the centre lines of the press-in pivots and the first row of holes for contact termination of free connector
s	3,75	0,148	Distance between edge of the printed board and centre lines of the first row of holes for contact termination of free connector
t	10	0,394	Distance between centre lines of the press-in pivots of free connector

5.1.2.1 Common features**5.1.2.1.1 Reference system**

Co-ordination dimensions are dimensions without tolerance and indicate the maximum dimension to guarantee the modular arrangement.

These co-ordination dimensions are based upon the 0,5 mm (0,02 in) module, and the multi-modules 2,5 mm (0,098 in) and 25 mm (0,984 in) specified in IEC 917. The datum lines are indicated in 5.1.2.1.2, 5.1.2.1.3 and 5.1.2.1.4.

5.1.2.1.2 Height dimensions

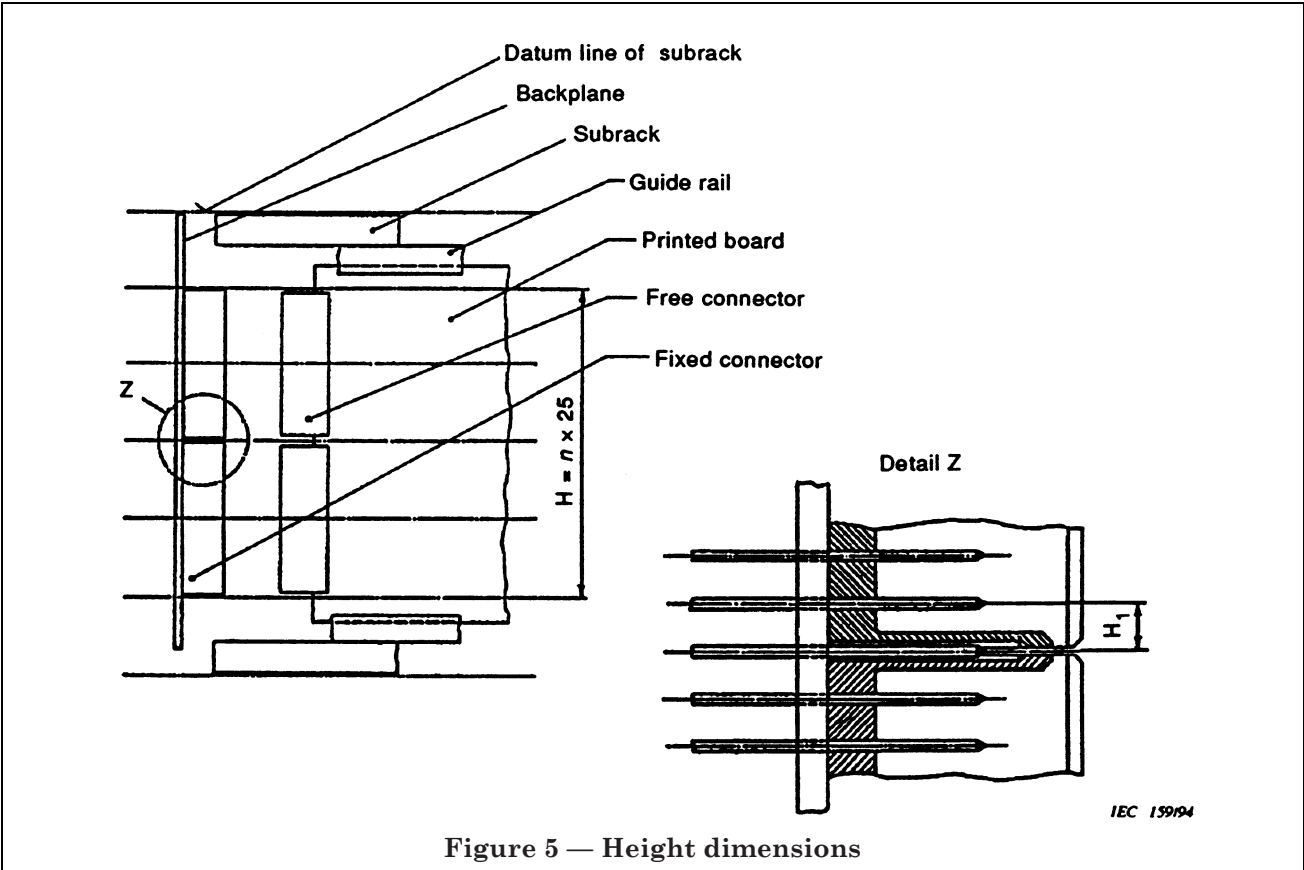


Table 11 — Height dimensions

Number of multimodules		1	2	4	9	10
H = connector height	mm	25	50	100	225	250
	in	0,984	1,969	3,937	8,858	9,843
H ₁ = spacing of terminations	mm	2,5				
	in	0,098				

5.1.2.1.3 Width dimensions

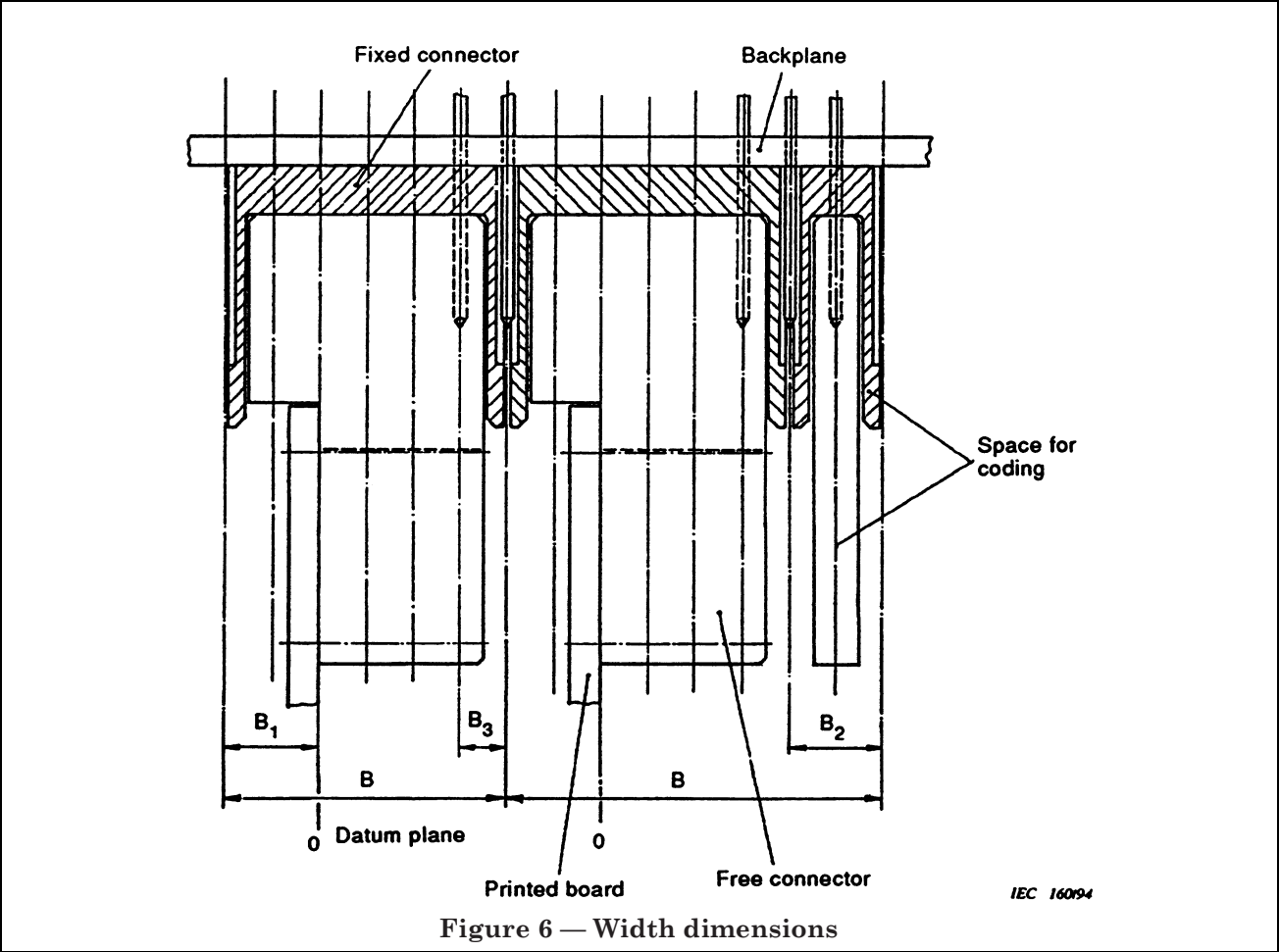


Table 12 — Width dimensions

		Without coding	With coding
B = connector width	mm	$6 \times 2,5 = 15$	$8 \times 2,5 = 20$
	in	$6 \times 0,098 = 0,591$	$8 \times 0,098 = 0,787$
B ₁ = width reference to printed board	mm	$2 \times 2,5 = 5$	
	in	$2 \times 0,098 = 0,197$	
B ₂ = width of connector coding	mm	$2 \times 2,5 = 5$	
	in	$2 \times 0,098 = 0,197$	
B ₃ = spacing of terminations	mm	2,5	
	in	0,098	

5.1.2.1.4 Depth dimensions

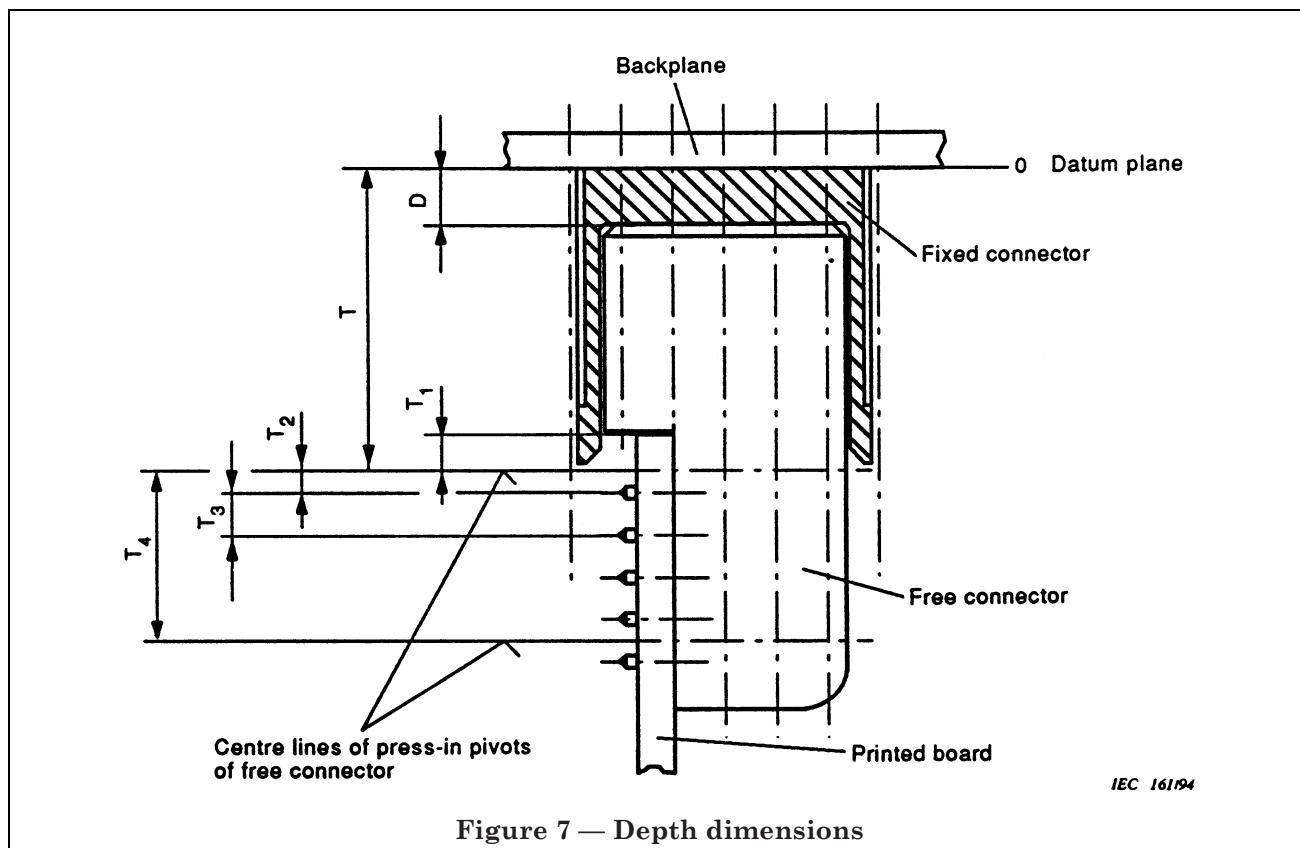


Figure 7 — Depth dimensions

Table 13 — Depth dimensions

T = centre line of press-in pivots (first row) of free connector to mounting plane fixed connector	mm	$6 \times 2,5 = 15$
	in	$6 \times 0,098 = 0,591$
D = thickness of connector bottom fixed connector	mm	2,5
	in	0,098
T ₁ = Distance between edge of printed board and centre line of press-in pivots free connector (first row)	mm	2,5
	in	0,098
T ₂ = distance between centre line of press-in pivots and first row of terminations free connector	mm	1,25
	in	0,049
T ₃ = spacing of terminations free connector	mm	2,5
	in	0,098
T ₄ = distance between centre lines of press-in pivots free connector	mm	10
	in	0,394

5.1.3 Mating information

5.1.3.1 Plug-in direction

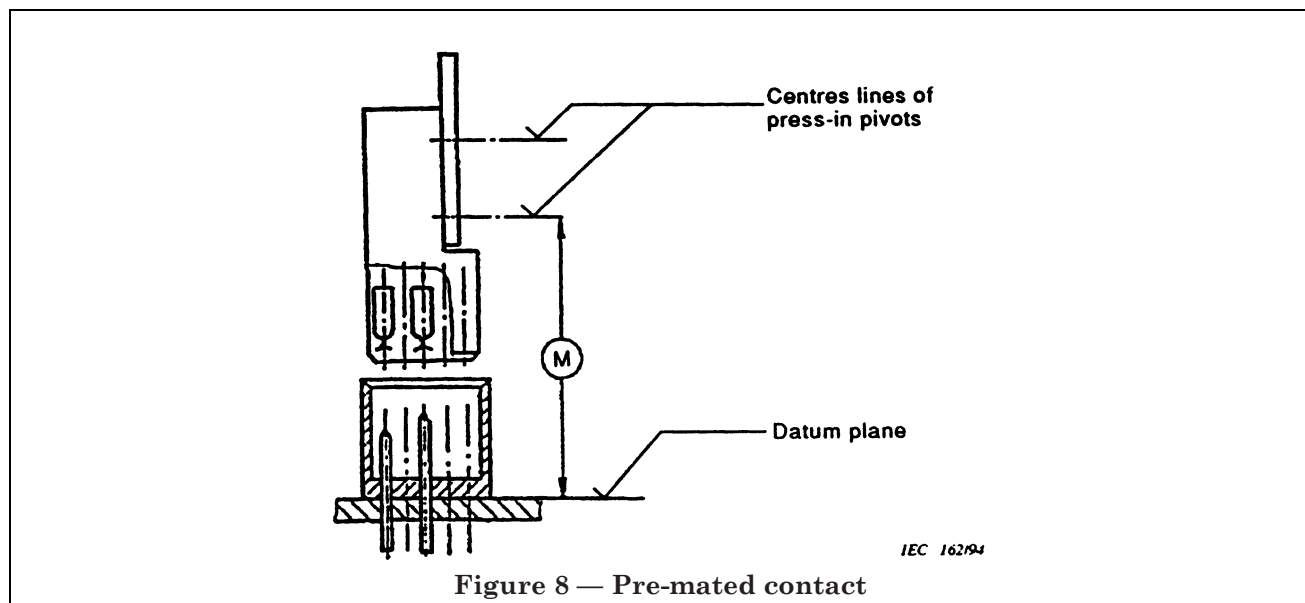
The specified contact resistance shall be maintained on a mated pair, within the range of $M = 15$ mm to 17,5 mm (0,591 in to 0,689 in).

Even when the connectors are inserted at less than $M = 15 \text{ mm}$ (0,591 in), the required contact resistance condition shall be fulfilled.

The common requirements for the pre-mated contacts are also included in this specification. The pre-mated contact shown in Figure 8 has no safety contact function; it is intended to switch adapted electrical potentials.

At worst case mating conditions and most unfavourable dimensions of mated pair, the pre-mating of the pre-mated contact is 0,15 mm (0,006 in).

The nominal pre-mating is 1,75 mm (0,069 in). Number and arrangement of the pre-mating contacts are to be agreed separately between user and producer.



5.1.3.2 Perpendicular to plug-in direction

The design of the free and fixed connector shall accept a displacement of at least 1 mm (0,039 in) in the transversal and longitudinal direction of the connectors. To achieve necessary alignment of both parts, one part of the connector pair is float mounted.

For the fixed mounted connector pairs, the mounting tolerances accordingly shall be kept in a sufficiently small range.

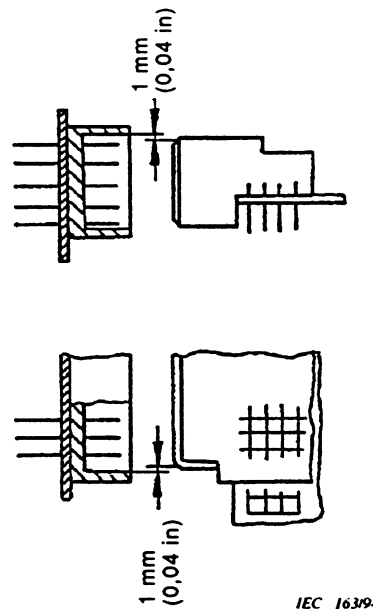


Figure 9 — Perpendicular to plug-in direction

5.1.3.3 Inclination

The design of the free and fixed connector shall accept an initial angular misalignment of $\pm 0,5^\circ$ in longitudinal and transverse axis.

In the mated position the condition according to 5.1.3.1 shall be met.

The permissible angular misalignment of $\pm 0,5^\circ$ is valid for 10 multi-modules maximum, and includes the total deviation from racks to subracks taking into account the pre-mated contacts.

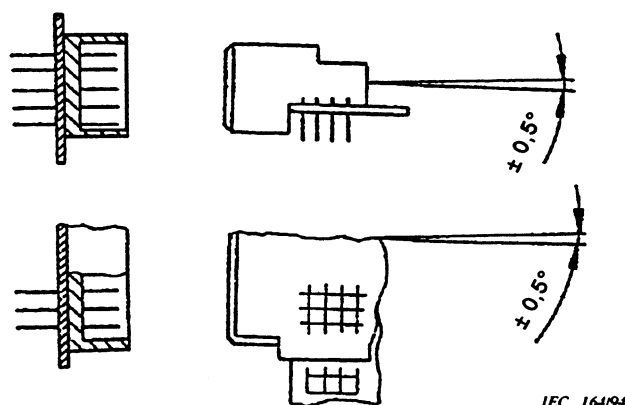


Figure 10 — Inclination

5.1.3.4 Bending

Permissible bending of mounted connector is shown in 6.1.7.

In order to guarantee the function of the pre-mated contact, the bend of the mounted connector per 250 mm (9,843 in) length shall not exceed 0,3 mm (0,012 in).

5.1.3.5 Mating information of fixed connectors in relation to backplane

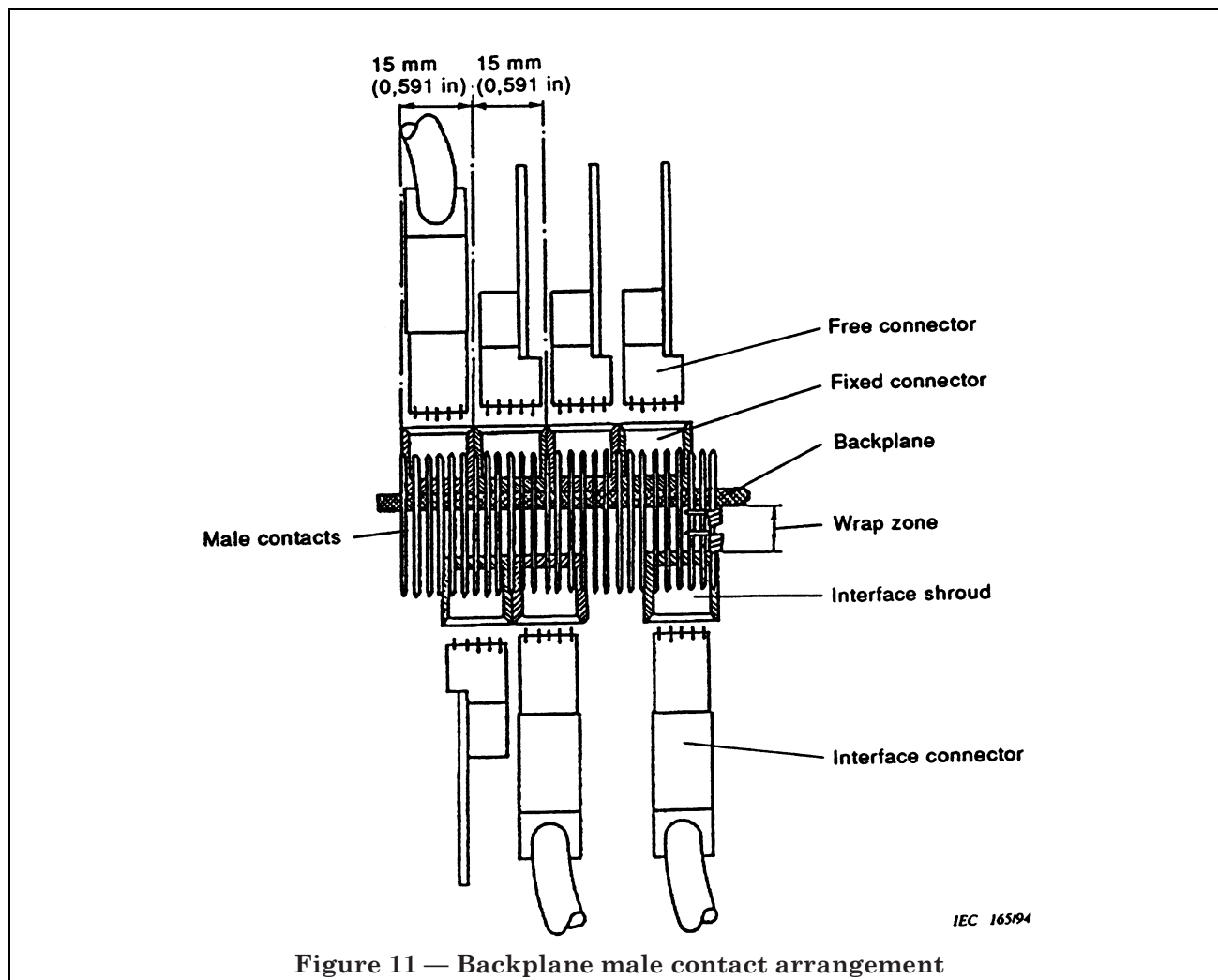


Figure 11 shows a backplane male contact arrangement for a continuous grid of 2,5 mm (0,098 in). Male contacts on the parting line of two connectors are permitted tolerances in height and width. Free and fixed connector bodies are designed to accept a continuous 2,5 mm (0,098 in) grid of male contacts.