NORME INTERNATIONALE

INTERNATIONAL STANDARD

CEI
IEC
60807-3

Première édition
First edition
1990-05

Connecteurs rectangulaires utilisés aux fréquences inférieures à 3 MHz

Partie 3:
Spécification particulière pour une gamme de connecteurs ayant les boîtiers métalliques de forme trapézoïdale et les contacts ronds – Types de contacts à sertir démontables avec fûts fermés, à insérer et à extraire par l'arrière de l'isolant

Rectangular connectors for frequencies below 3 MHz

Part 3:
Detail specification for a range of connectors with trapezoidal shaped metal shells and round contacts – Removable crimp contact types with closed crimp barrels, rear insertion/rear extraction

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Commission Electrotechnique Internationale
International Electrotechnical Commission
Международная Электротехническая Комиссия

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CONTENTS

Page

FOREWORD 5

PREFACE 5

Clause

1. Scope 7
2. IEC type designation 9
3. Common features and isometric view 9
   - 3.1 Isometric view 9
   - 3.2 Mating information 11
   - 3.3 Survey of variants of style A (removable contact connector) 11
4. Dimensions 11
   - 4.1 General 11
   - 4.2 Connectors with male contacts 12
   - 4.3 Connectors with female contacts 20
   - 4.4 Mating information 25
   - 4.5 Accessories 25
   - 4.6 Mounting information for fixed connectors (connectors with male or female contacts) . . . 25
   - 4.7 Mounting information for free connectors 25
   - 4.8 Mounting information for connectors with accessories 25
5. Gauges 29
   - 5.1 Sizing gauges and retention force gauges 29
   - 5.2 Test panel 29
   - 5.3 Test probe for probe damage 29
   - 5.4 Test pin for restricted entry 31
   - 5.5 Test prod for static load 31
6. Characteristics 31
   - 6.1 Climatic category 31
   - 6.2 Electrical 33
   - 6.3 Mechanical 37
7. Test schedule 39
   - 7.1 Test schedule for closed crimp barrel contacts 39
   - 7.2 General 43

INTERNATIONAL ELECTROTECHNICAL COMMISSION

RECTANGULAR CONNECTORS FOR FREQUENCIES BELOW 3 MHz

Part 3: Detail specification for a range of connectors with trapezoidal shaped metal shells and round contacts – Removable crimp contact types with closed crimp barrels, rear insertion/rear extraction

FOREWORD

1) The formal decisions or agreements of the IEC on technical matters, prepared by Technical Committees on which all the National Committees having a special interest therein are represented, express, as nearly as possible, an international consensus of opinion on the subjects dealt with.

2) They have the form of recommendations for international use and they are accepted by the National Committees in that sense.

3) In order to promote international unification, the IEC expresses the wish that all National Committees should adopt the text of the IEC recommendation for their national rules in so far as national conditions will permit. Any divergence between the IEC recommendation and the corresponding national rules should, as far as possible, be clearly indicated in the latter.

4) The IEC has not laid down any procedure concerning marking as an indication of approval and has no responsibility when an item of equipment is declared to comply with one of its recommendations.

PREFACE

This standard has been prepared by IEC Sub-Committee 48B: Connectors, of IEC Technical Committee No. 48: Electromechanical components for electronic equipment.

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

Six Months' Rule	Report on Voting
48B(CO)163	48B(CO)173

Full information on the voting for the approval of this standard can be found in the Voting Report indicated in the above table.

The following publication is quoted in this standard:

ISO Standard 468 (1982): Surface roughness – Parameters, their values and general rules for specifying requirements.

INTERNATIONAL ELECTROTECHNICAL COMMISSION

RECTANGULAR CONNECTORS FOR FREQUENCIES BELOW 3 MHz

Part 3: Detail specification for a range of connectors with trapezoidal shaped metal shells and round contacts – Removable crimp contact types with closed crimp barrels, rear insertion/rear extraction

1. Scope

This standard covers a range of rectangular connectors with round contacts. The contacts have crimp terminations. Connector polarization is achieved by the trapezoidal configuration of the shell.

Applications for this range of connectors include uses in telecommunication and data-processing equipment and other electronic devices employing similar techniques.

This standard covers only removable contacts with closed crimp barrels. Refer to IEC 807-2 for a specification on fixed solder contact types.

This standard shall be used in conjunction with the following IEC publications:

Publications Nos. 50(581) (1978): International Electrotechnical Vocabulary (IEV), Chapter 581: Electromechanical components for electronic equipment.

352-2 (1990): Solderless connections, Part 2: Solderless crimped connections. General requirements, test methods and practical guidance.

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

512-2 (1985): Part 2: General examination, electrical continuity and contact resistance tests, insulation tests and voltage stress tests.

512-3 (1976): Part 3: Current-carrying capacity tests.

512-4 (1976): Part 4: Dynamic stress tests.

512-5 (1977): Part 5: Impact tests (free components), static load tests (fixed components), endurance tests and overload tests.

512-6 (1984): Part 6: Climatic tests and soldering tests.

512-7 (1978): Part 7: Mechanical operating tests and sealing tests.

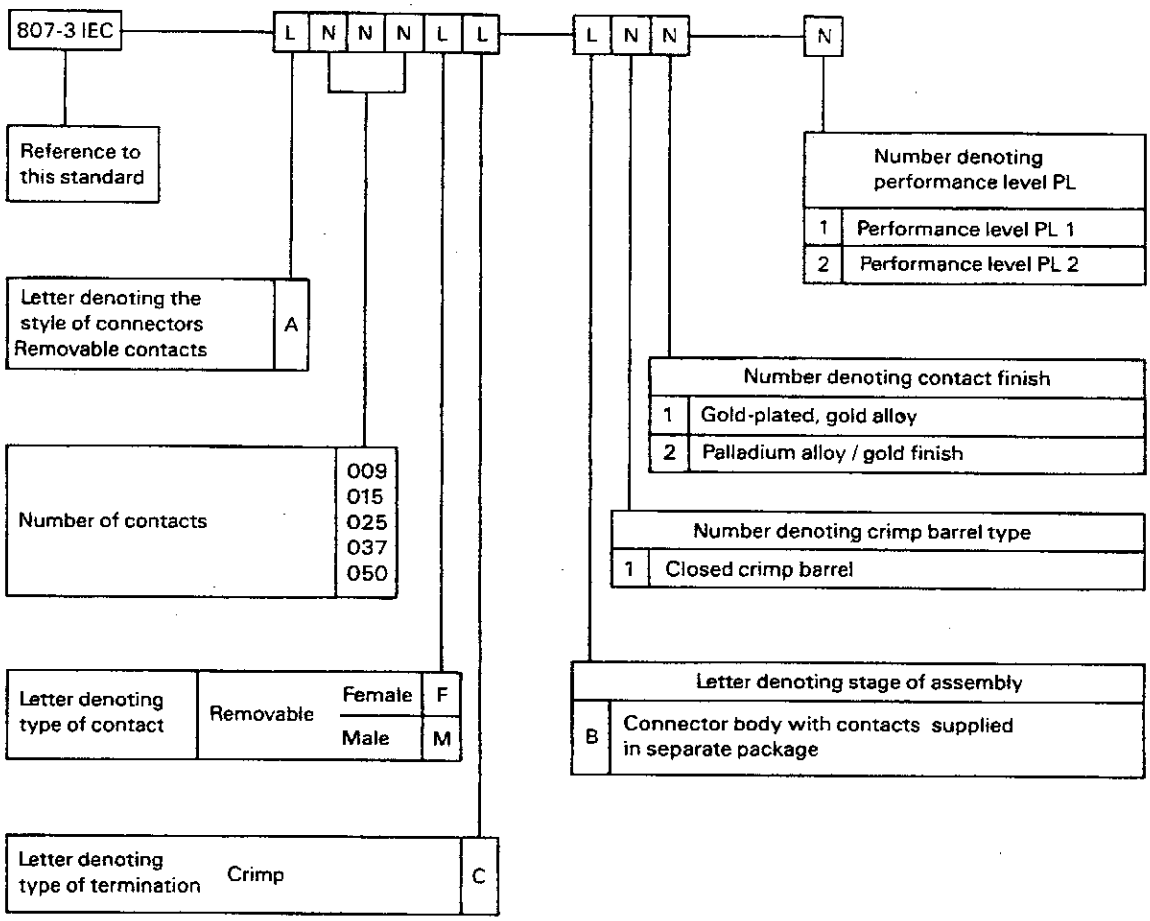
512-8 (1984): Part 8: Connector tests (mechanical) and mechanical tests on contacts and terminations.

807-1 (1985): Rectangular connectors for frequencies below 3 MHz, Part 1: General requirements and guide for the preparation of detail specifications.

807-2 (1985): Part 2: Detail specification for a range of connectors with round contacts. Fixed solder contact types.

2. IEC type designation

Connectors according to this standard shall be designated by the following system:

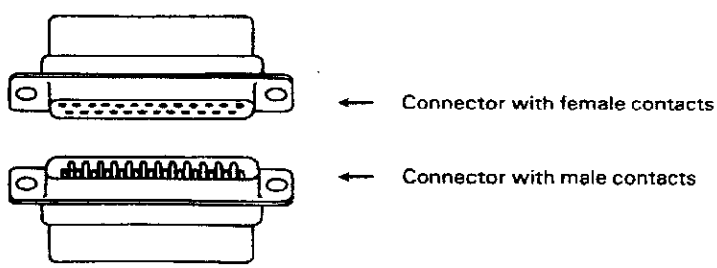


Note. – "L" stands for letter.
"N" stands for number.

Example: 807-3 IEC-A25FC-B112 denotes a female connector body supplied with 25 crimp removable female contacts. The contacts are gold-plated and have closed crimp barrels. The connector body and contacts will perform to PL2.

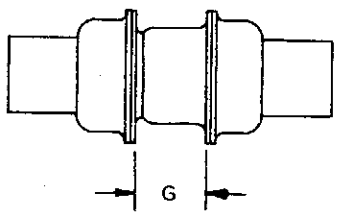
3. Common features and isometric view

3.1 *Isometric view*



3.2 *Mating information*

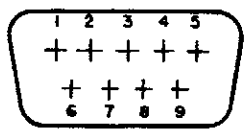
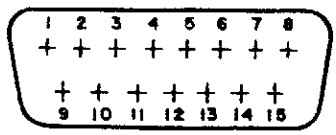
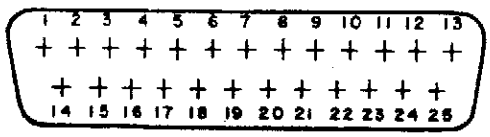
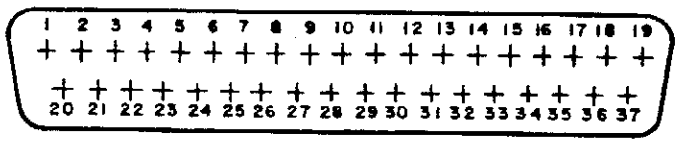
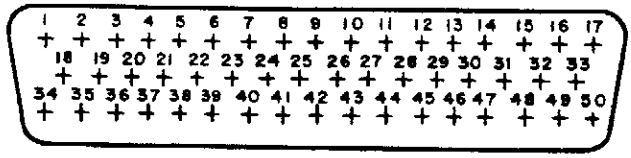
The specified contact resistance shall be ensured within the limits of the dimensions specified.



Shell size	Number of contacts	G	
		mm	in
1	9	6.35 7.11	0.250 0.280
2	15	6.35 7.11	0.250 0.280
3	25	6.12 6.88	0.241 0.271
4	37	6.12 6.88	0.241 0.271
5	50	6.12 6.88	0.241 0.271

3.3 *Survey of variants of style A (removable contact connector)*

Contact arrangements, face view of connector with male contacts or rear view of connector with female contacts.

Shell size	Number of contacts	Connector with male contacts
1	9	
2	15	
3	25	
4	37	
5	50	

4. Dimensions

4.1 *General*

Dimensions in inches are original. Drawings are shown in the third 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.

4.2 *Connecteurs avec contacts mâles*

4.2.1 *Dimensions extérieures*

4.2 *Connectors with male contacts*

4.2.1 *Outline dimensions*

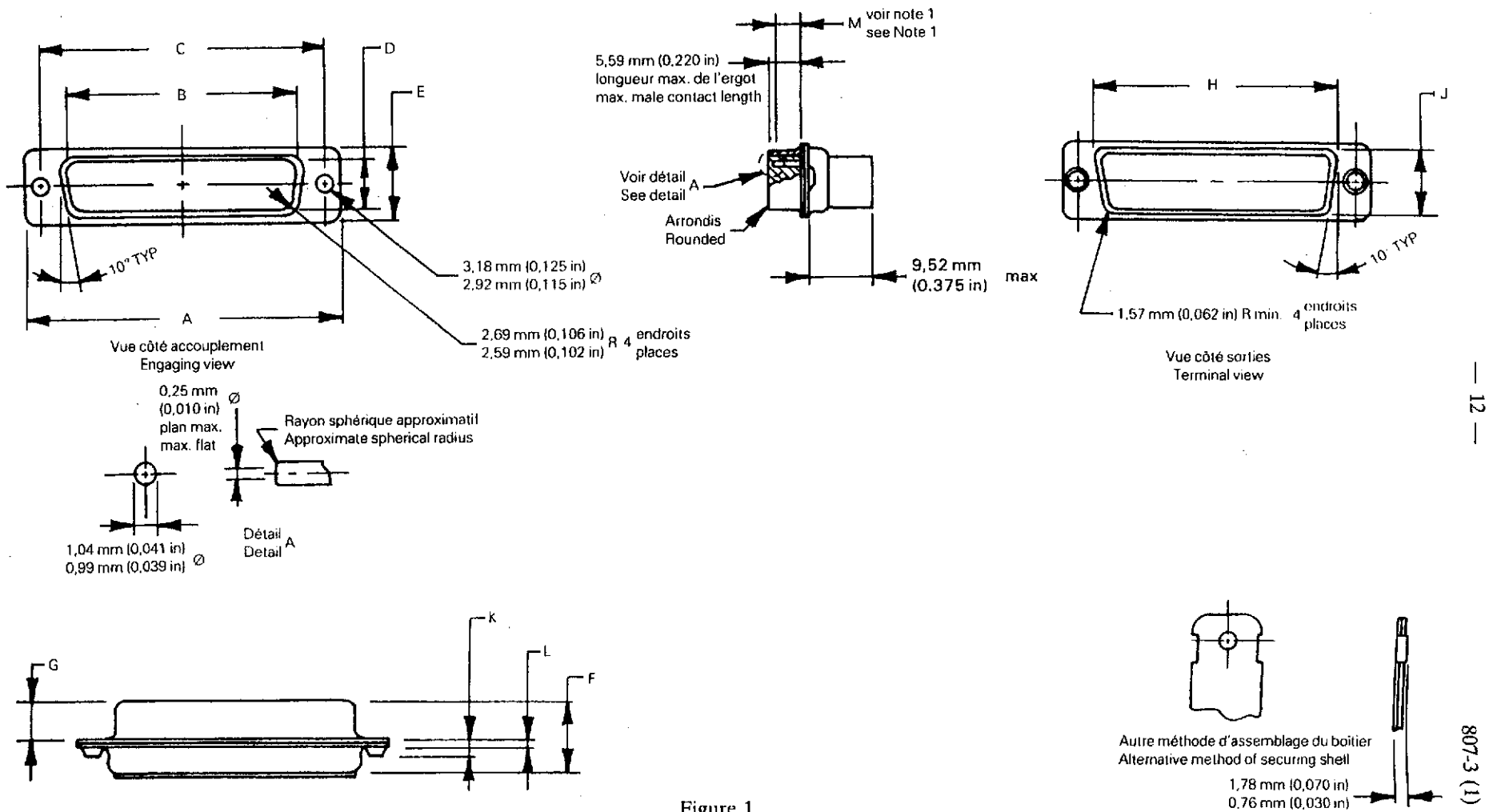


Figure 1

Note 1. – Le contact mâle doit avoir une section circulaire avec une tolérance de 0,051 mm (0.002 in) sur toute la longueur de la dimension M vérifiée à l'aide d'un comparateur.

Note 1. – The male contact shall have a circular cross-section concentric within 0.051 mm (0.002 in) Total Indicator Reading, the full length of the M dimension.

TABLEAU I

Dimensions extérieures des connecteurs avec contacts mâles

TABLE I

Outline dimensions of connectors with male contacts

Taille de boîtier Shell size	Nombre de contacts Number of contacts	A		B		C		D		E		F	
		mm	in	mm	in	mm	in	mm	in	mm	in	mm	in
1	9	31,19 30,43	1.228 1.198	17,04 16,79	0.671 0.661	25,12 24,87	0.989 0.979	8,48 8,23	0.334 0.324	12,93 12,17	0.509 0.479	10,97 10,46	0.432 0.412
2	15	39,52 38,76	1.556 1.526	25,37 25,12	0.999 0.989	33,45 33,20	1.317 1.307	8,48 8,23	0.334 0.324	12,93 12,17	0.509 0.479	10,97 10,46	0.432 0.412
3	25	53,42 52,65	2.103 2.073	39,09 38,84	1.539 1.529	47,17 46,91	1.857 1.847	8,48 8,23	0.334 0.324	12,93 12,17	0.509 0.479	11,07 10,57	0.435 0.416
4	37	69,70 68,94	2.744 2.714	55,55 55,30	2.187 2.177	63,63 63,37	2.505 2.495	8,48 8,23	0.334 0.324	12,93 12,17	0.509 0.479	11,07 10,57	0.436 0.416
5	50	67,31 66,55	2.650 2.620	52,93 52,68	2.084 2.074	61,24 60,99	2.411 2.401	11,33 11,07	0.446 0.436	15,75 14,99	0.620 0.590	11,07 10,57	0.436 0.416

Taille de boîtier Shell size	Nombre de contacts Number of contacts	G		H		J		K		L		M	
		mm	in	mm	in	mm	in	mm	in	mm	in	mm	in
1	9	6,05 5,82	0.238 0.229	19,53 19,02	0.769 0.749	10,97 10,46	0.432 0.412	1,78 max.	0.070 max.	1,02 0,51	0.040 0.020	4,04 min.	0.159 min.
2	15	6,05 5,82	0.238 0.229	27,76 27,25	1.093 1.073	10,97 10,46	0.432 0.412	1,78 max.	0.070 max.	1,02 0,51	0.040 0.020	4,04 min.	0.159 min.
3	25	5,99 5,69	0.236 0.224	41,53 41,02	1.635 1.615	10,97 10,46	0.432 0.412	1,78 max.	0.070 max.	1,24 0,74	0.049 0.029	3,81 min.	0.150 min.
4	37	5,99 5,69	0.236 0.224	57,96 57,45	2.282 2.262	10,97 10,46	0.432 0.412	1,78 max.	0.070 max.	1,24 0,74	0.049 0.029	3,81 min.	0.150 min.
5	50	5,99 5,69	0.236 0.224	55.58 55,07	2.188 2.168	13,82 13,31	0.544 0.524	1,78 max.	0.070 max.	1,24 0,74	0.049 0.029	3,81 min.	0.150 min.

4.2.2 *Dimensions of contact arrangements*

Markings shown are for the engaging face of male contact inserts and the rear face of female contact inserts. Marking of the engaging face of female contact inserts and rear face of male contact inserts is opposite. Markings on both the front face and the rear face of the contact inserts shall be fully numbered and shall correspond.

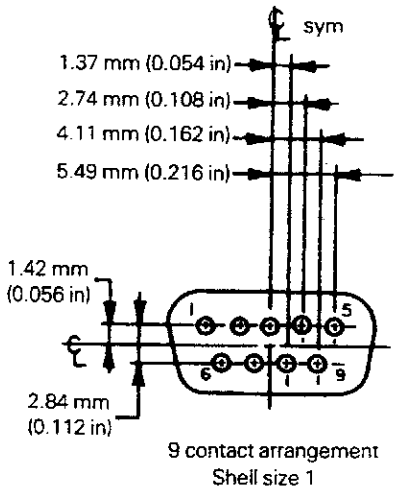


Figure 1a

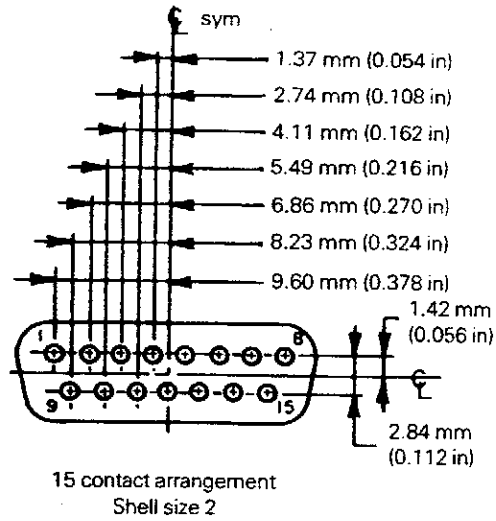


Figure 1b

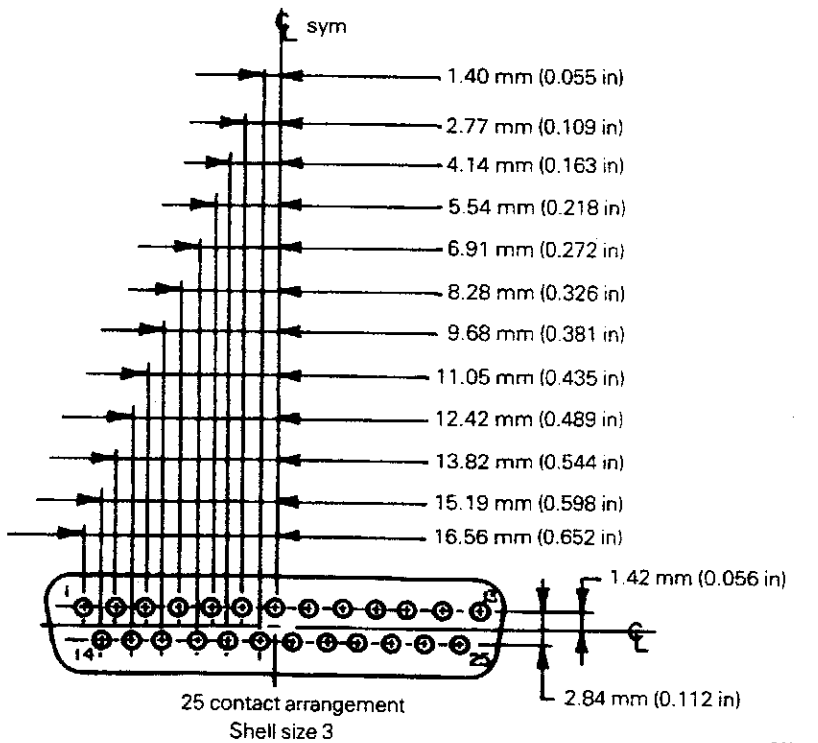


Figure 1c

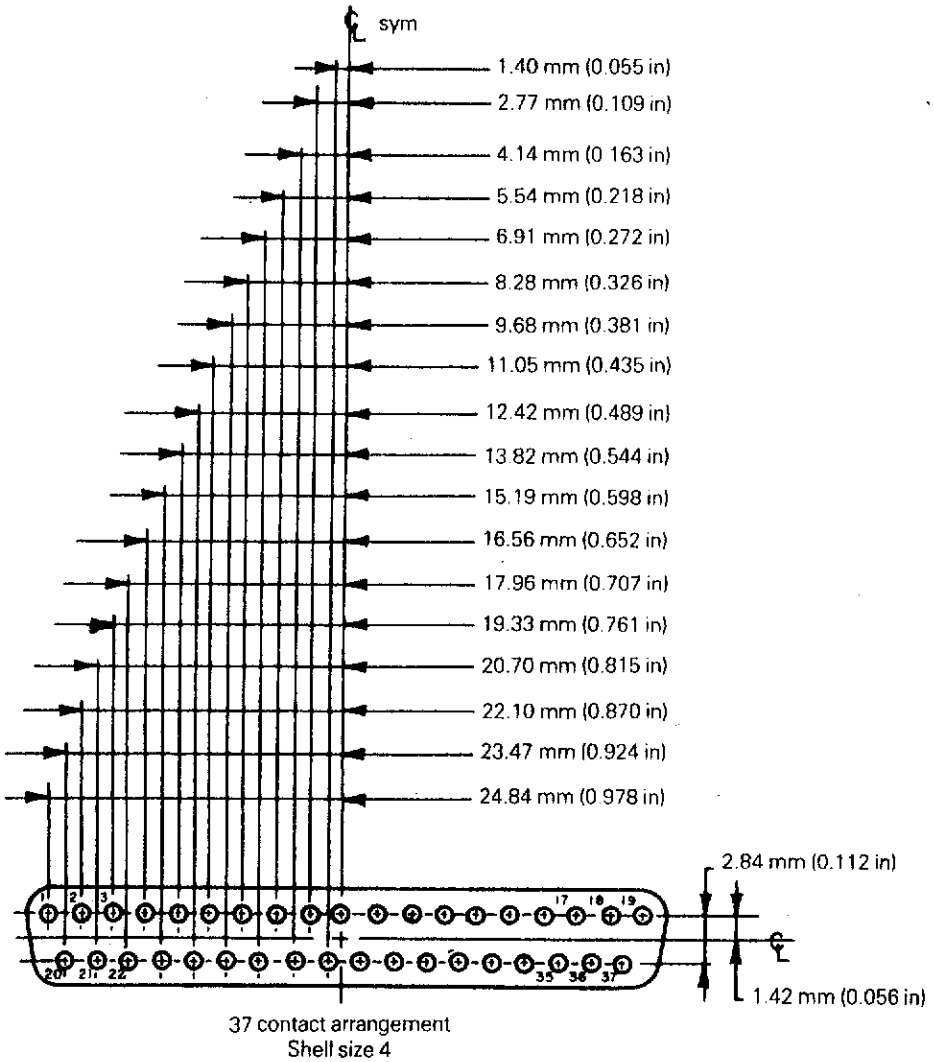


Figure 1d

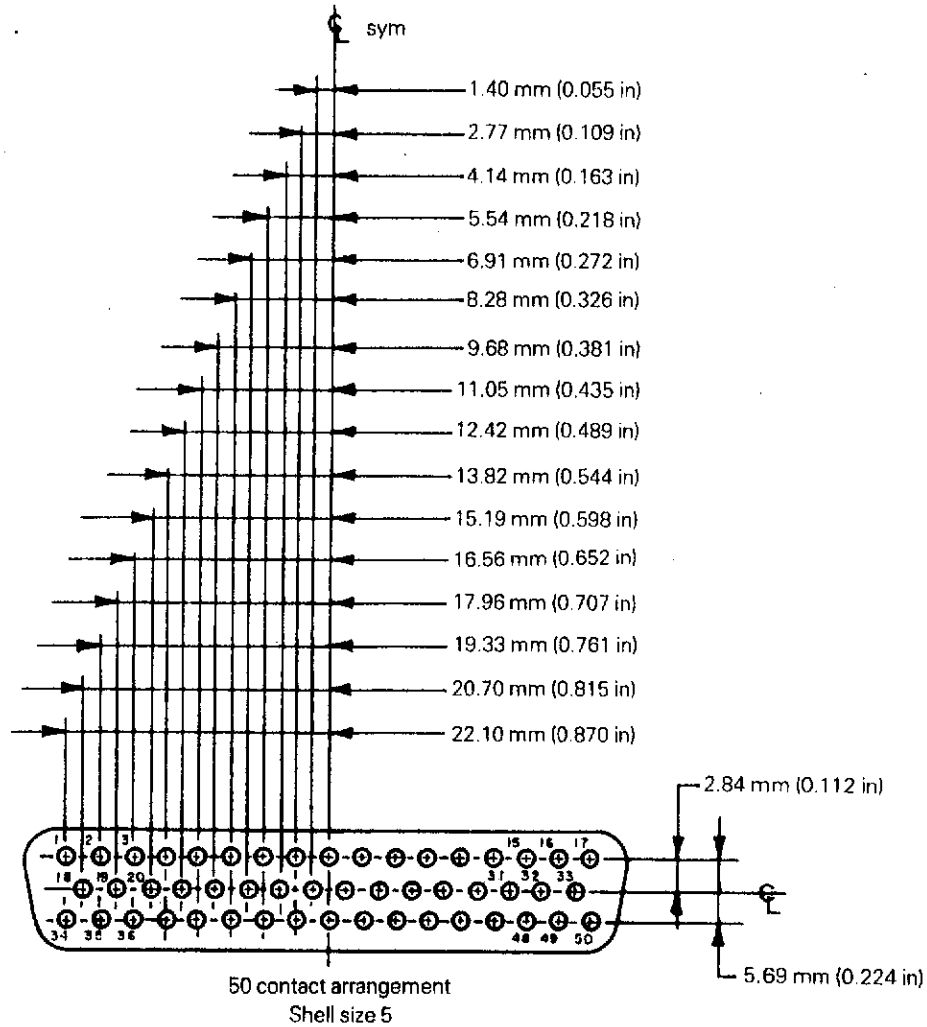
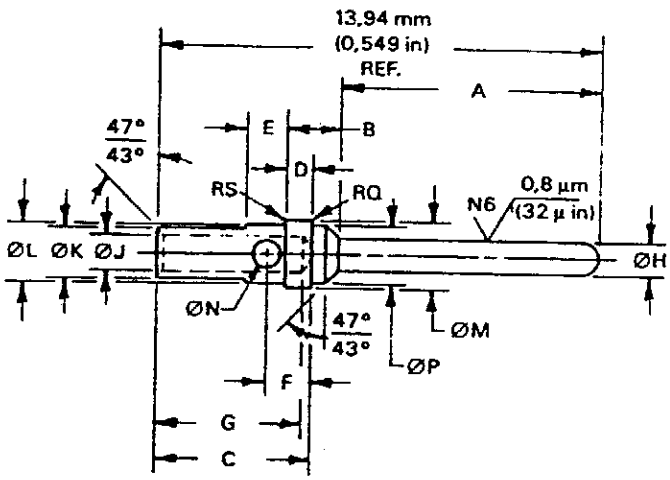


Figure 1e

4.2.3 *Dimensions of the male contact*

4.2.3.1 *Closed crimp barrel, type A, crimp wire size maximum 0.6 mm² (20 AWG), minimum 0.22 mm² (24 AWG)*

Performance levels 1 and 2.



	mm		in	
	MAX.	MIN.	MAX.	MIN.
A	8.25	8.15	0.325	0.321
B	1.75	1.65	0.069	0.065
C	4.93	4.80	0.194	0.189
D	0.84	0.74	0.033	0.029
E	1.24	1.02	0.049	0.040
F	1.40	1.24	0.055	0.049
G	4.70	3.81	0.185	0.150
ØH	1.04	0.99	0.041	0.039
ØJ	1.17	1.09	0.046	0.043
ØK	1.73	1.65	0.068	0.065
ØL	1.80	1.73	0.071	0.068
ØM	2.16	2.08	0.085	0.082
ØN	0.84	0.64	0.033	0.025
ØP	1.85	1.78	0.073	0.070
RQ	0.18	–	0.007	–
RS	0.08	–	0.003	–

Figure 1f

Note. – The male contact shall have a circular cross-section concentric within 0.10 mm (0.004 in) Total Indicator Reading on all diameters.

4.3 *Connecteurs avec contacts femelles*

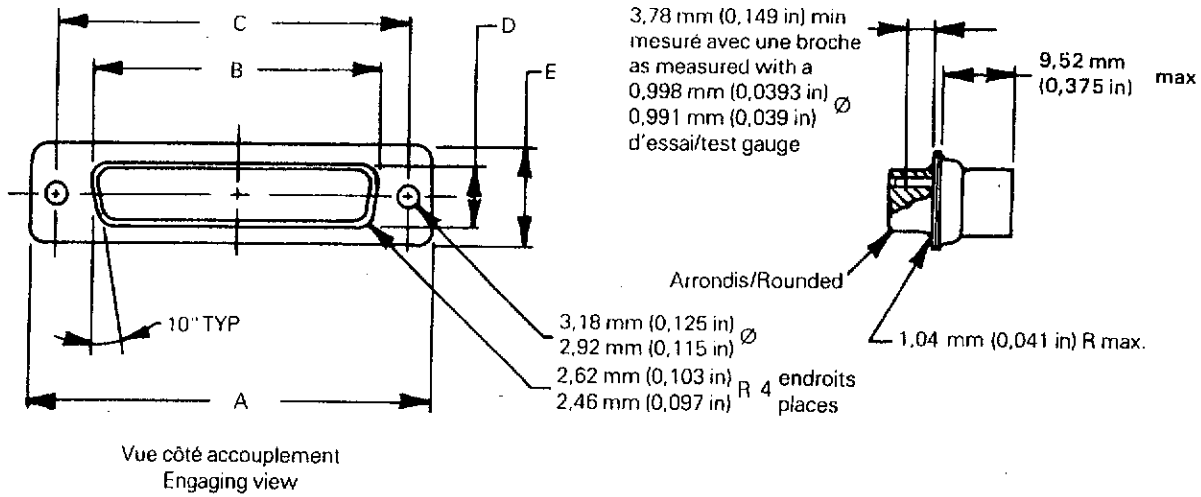
4.3.1 *Dimensions extérieures*

Pour les dimensions des arrangements, voir paragraphe 4.2.2.

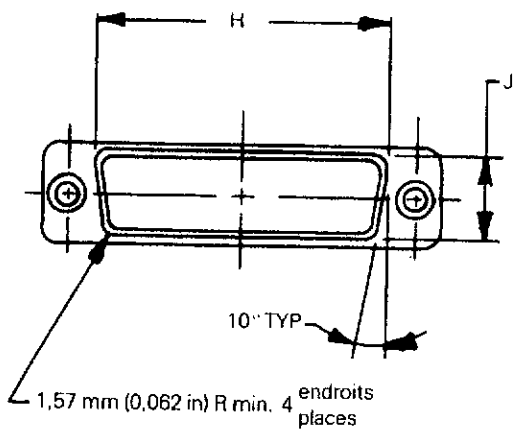
4.3 *Connectors with female contacts*

4.3.1 *Outline dimensions*

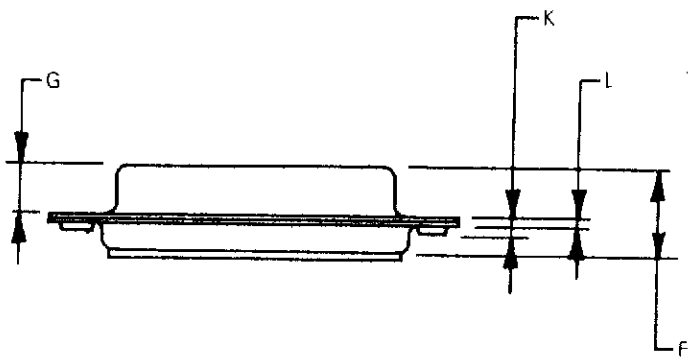
For dimensions of insert arrangements, see Sub-clause 4.2.2.



Vue côté accouplement
Engaging view



Vue côté sorties
Terminal view



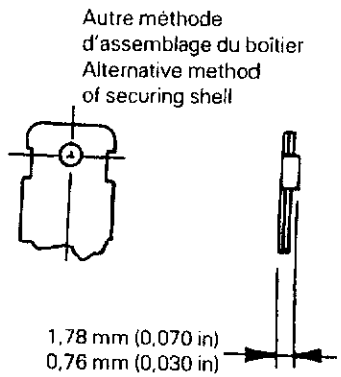


Figure 2

TABLEAU II

Dimensions extérieures des connecteurs avec contacts femelles

TABLE II

Outline dimensions of connectors with female contacts

Taille de boîtier Shell size	Nombre de contacts Number of contacts	A		B		C		D		E		F	
		mm	in	mm	in	mm	in	mm	in	mm	in	mm	in
1	9	31,19 30,43	1.228 1.198	16,46 16,21	0.648 0.638	25,12 24,87	0.989 0.979	8,03 7,77	0.316 0.306	12,93 12,17	0.509 0.479	11,15 10,64	0.439 0.419
2	15	39,52 38,76	1.556 1.526	24,79 24,54	0.976 0.966	33,45 33,20	1.317 1.307	8,03 7,77	0.316 0.306	12,93 12,17	0.509 0.479	11,15 10,64	0.439 0.419
3	25	53,42 52,65	2.103 2.073	38,51 38,25	1.516 1.506	47,17 46,91	1.857 1.847	8,03 7,77	0.316 0.306	12,93 12,17	0.509 0.479	11,15 10,64	0.439 0.419
4	37	69,70 68,94	2.744 2.714	54,97 54,71	2.164 2.154	63,63 63,37	2.505 2.495	8,03 7,77	0.316 0.306	12,93 12,17	0.509 0.479	11,15 10,64	0.439 0.419
5	50	67,31 66,55	2.650 2.620	52,55 52,30	2.069 2.059	61,24 60,99	2.411 2.401	10,87 10,62	0.428 0.418	15,75 14,99	0.620 0.590	11,15 10,64	0.439 0.419

Taille de boîtier Shell size	Nombre de contacts Number of contacts	G		H		J		K		L	
		mm	in	mm	in	mm	in	mm	in	mm	in
1	9	6,30 6,05	0.248 0.238	19,53 19,02	0.769 0.749	10,97 10,46	0.432 0.412	1,78 max.	0.070 max.	1,02 0,51	0.040 0.020
2	15	6,30 6,05	0.248 0.238	27,76 27,25	1.093 1.073	10,97 10,46	0.432 0.412	1,78 max.	0.070 max.	1,02 0,51	0.040 0.020
3	25	6,30 6,05	0.248 0.238	41,53 41,02	1.635 1.615	10,97 10,46	0.432 0.412	1,78 max.	0.070 max.	1,02 0,51	0.040 0.020
4	37	6,30 6,05	0.248 0.238	57,96 57,45	2.282 2.262	10,97 10,46	0.432 0.412	1,78 max.	0.070 max.	1,02 0,51	0.040 0.020
5	50	6,30 6,05	0.248 0.238	55,58 55,07	2.188 2.168	13,82 13,31	0.544 0.524	1,78 max.	0.070 max.	1,02 0,51	0.040 0.020

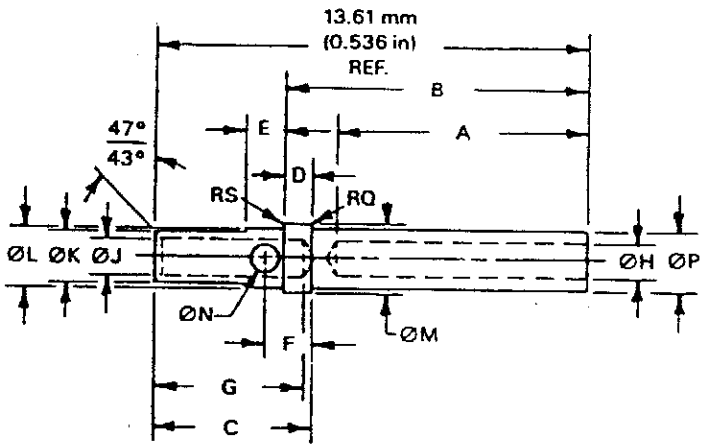
4.3.2 *Dimensions of insert arrangements*

See Sub-clause 4.2.2.

4.3.3 *Dimensions of the female contact*

4.3.3.1 *Closed crimp barrel, Type A, crimp wire size, maximum 0.6 mm² (20 AWG), minimum 0.22 mm² (24 AWG)*

Performance levels 1 and 2.



	mm		in	
	MAX.	MIN.	MAX.	MIN.
A	7.87	7.37	0.310	0.290
B	9.63	9.47	0.379	0.373
C	4.93	4.80	0.194	0.189
D	0.84	0.74	0.033	0.029
E	1.24	1.02	0.049	0.040
F	1.40	1.24	0.055	0.049
G	4.70	3.81	0.185	0.150
ØH	–	1.054	–	0.0415
ØJ	1.17	1.09	0.046	0.043
ØK	1.73	1.65	0.068	0.065
ØL	1.80	1.73	0.071	0.068
ØM	2.16	2.08	0.085	0.082
ØN	0.84	0.64	0.033	0.025
ØP	1.85	1.75	0.073	0.069
RQ	0.18	–	0.007	–
RS	0.08	–	0.003	–

Figure 2a

Note. – The female contact shall have a circular cross-section concentric within 0.10 mm (0.004 in) Total Indicator Reading on all diameters.

4.4 *Mating information*

The mating information forms part of the common features, see Sub-clause 3.2.

4.5 *Accessories*

Not applicable.

4.6 *Mounting information for fixed connectors (connectors with male or female contacts)*

Panel cutout dimensions.

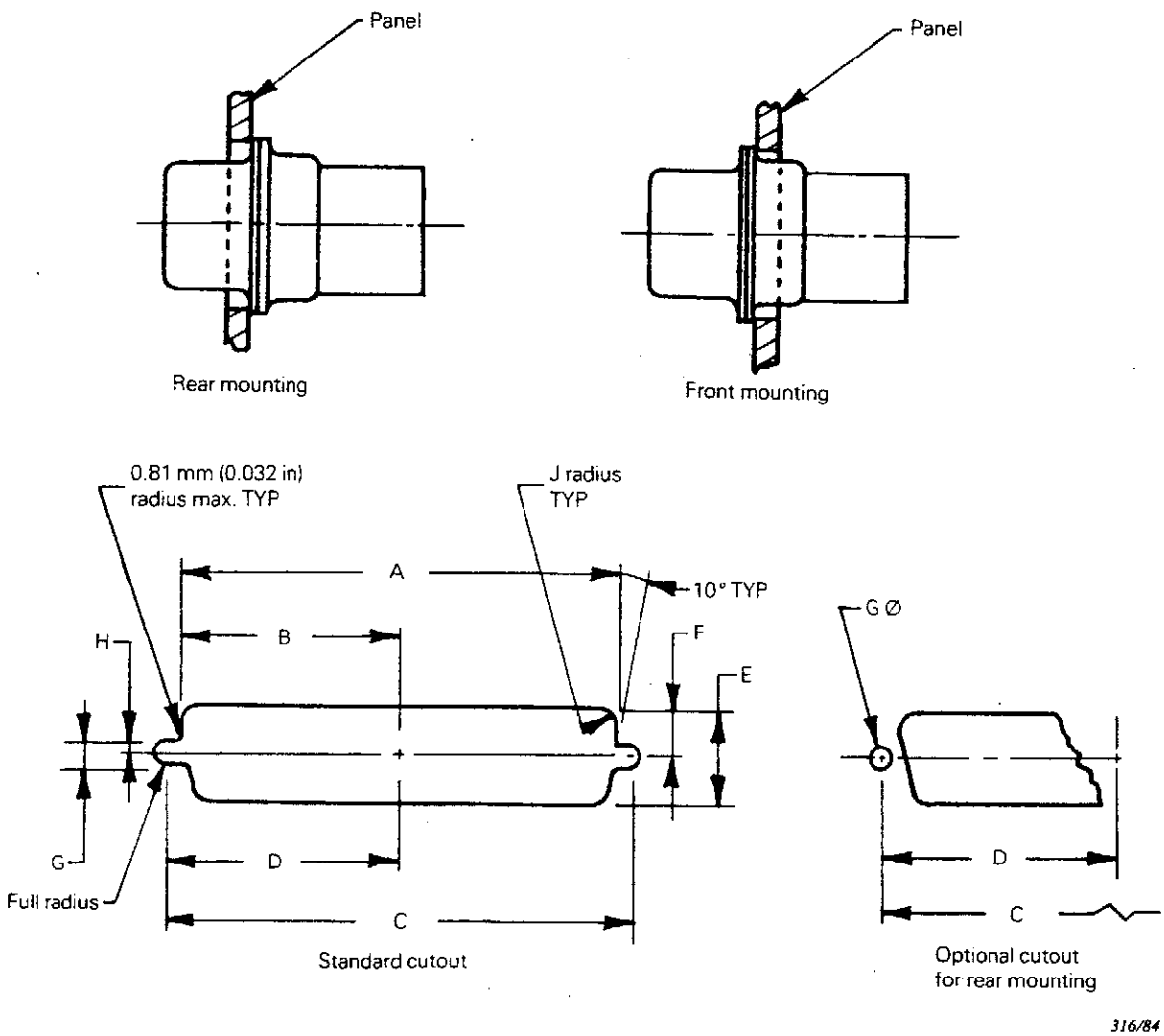


Figure 3

4.7 *Mounting information for free connectors*

Not applicable.

4.8 *Mounting information for connectors with accessories*

Not applicable.

TABLE III

Panel cutout dimensions

Shell size	Number of contacts	Mounting method	A		B		C		D	
			mm ±0.13	in ±0.005	mm ±0.13	in ±0.005	mm ±0.13	in ±0.005	mm ±0.13	in ±0.005
1	9	Front Rear	22.2 20.5	0.874 0.806	11.1 10.2	0.437 0.403	25.0 25.0	0.984 0.984	12.5 12.5	0.492 0.492
2	15	Front Rear	30.5 28.8	1.202 1.134	15.3 14.4	0.601 0.567	33.3 33.3	1.312 1.312	16.7 16.7	0.656 0.656
3	25	Front Rear	44.3 42.5	1.743 1.674	22.2 21.3	0.872 0.837	47.0 47.0	1.852 1.852	23.5 23.5	0.926 0.926
4	37	Front Rear	60.7 59.1	2.391 2.326	30.4 29.5	1.196 1.163	63.5 63.5	2.500 2.500	31.8 31.8	1.250 1.250
5	50	Front Rear	58.3 56.3	2.297 2.218	29.2 28.2	1.149 1.109	61.1 61.1	2.406 2.406	30.6 30.6	1.203 1.203

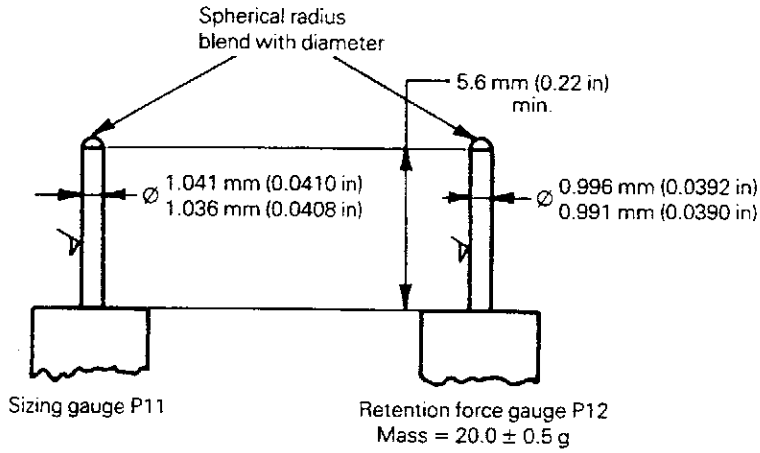
Shell size	Number of contacts	Mounting method	E		F		G		H		J	
			mm ±0.13	in ±0.005	mm ±0.13	in ±0.005	mm ±0.05	in ±0.002	mm ±0.05	in ±0.002	mm ±0.13	in ±0.005
1	9	Front Rear	13.0 11.4	0.513 0.449	6.5 5.7	0.257 0.225	3.1 3.1	0.120 0.120	1.5 1.5	0.060 0.060	2.1 3.4	0.083 0.132
2	15	Front Rear	13.0 11.4	0.513 0.449	6.5 5.7	0.257 0.225	3.1 3.1	0.120 0.120	1.5 1.5	0.060 0.060	2.1 3.4	0.083 0.132
3	25	Front Rear	13.0 11.4	0.513 0.449	6.5 5.7	0.257 0.225	3.1 3.1	0.120 0.120	1.5 1.5	0.060 0.060	2.1 3.4	0.083 0.132
4	37	Front Rear	13.0 11.4	0.513 0.449	6.5 5.7	0.257 0.225	3.1 3.1	0.120 0.120	1.5 1.5	0.060 0.060	2.1 3.4	0.083 0.132
5	50	Front Rear	15.8 14.1	0.623 0.555	7.9 7.1	0.312 0.278	3.1 3.1	0.120 0.120	1.5 1.5	0.060 0.060	2.1 3.4	0.083 0.132

5. Gauges

5.1 *Sizing gauges and retention force gauges*

Material: tool steel, hardened

$\sqrt{}$ = surface roughness according to ISO Standard 468*:
Ra = 0.15 µm to 0.25 µm (6 µin to 10 µin)



5.2 *Test panel*

For voltage proof, insulation resistance, vibration, shock and static load tests.

Panel thickness: 2.5 mm (0.1 in).

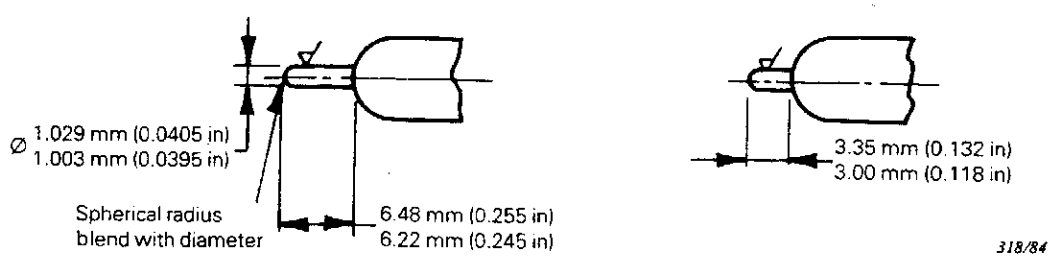
For dimensions see Sub-clause 4.6.

Cutout: standard cutout for front mounting.
Outline dimensions: C + 40 mm (1.57 in). E + 40 mm (1.57 in).

5.3 *Test probe for probe damage*

Material: tool steel, hardened.

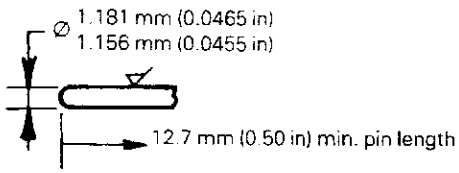
$\sqrt{}$ = surface roughness according to ISO Standard 468*:
Ra = 0.8 µm (32 µin).
Bending moment = 0.0565 Nm.



*Surface roughness – Parameters, their values and general rules for specifying requirements.

5.4 *Test pin for restricted entry*

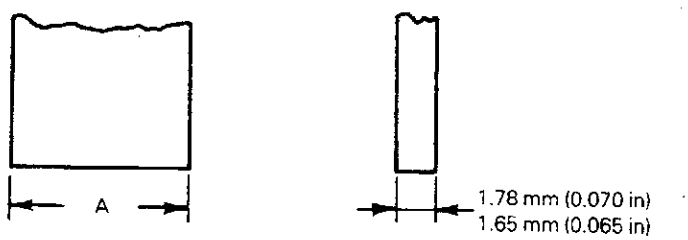
Applied force = 22 N (5 lbf).



319/84

5.5 *Test prod for static load*

Material: tool steel, hardened



320/84

Shell size	A	
	mm	in
1	11.30 11.56	0.445 0.455
2	11.30 11.56	0.445 0.455
3	34.16 34.42	1.345 1.355
4	34.16 34.42	1.345 1.355
5	34.16 34.42	1.345 1.355

6. **Characteristics**

6.1 *Climatic category*

TABLE IV

Performance level	Category	Temperature range	Damp heat, steady state
PL1	55/125/21	−55 °C to +125 °C	21 days
PL2	55/100/10	−55 °C to +100 °C	10 days

6.2 *Electrical*

6.2.1 *Clearance and creepage distances*

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

Therefore the clearance and creepage distances are given as operating characteristics.

In practice, reductions in clearance or creepage distances may occur due to the wiring used and shall duly be taken into account.

The minimum clearance and creepage distance between adjacent contacts is 1.0 mm (0.039 in).

The minimum clearance and creepage distance between contacts and shell or chassis is 1.0 mm (0.039 in).

6.2.2 *Proof voltage*

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

Contact/contact: 1000 V r.m.s.
Contact/test panel: 1000 V r.m.s.

The values are the same for performance levels PL1 and PL2.

6.2.3 *Current-carrying capacity*

Conditions: IEC Publication 512-3, Test 5b.

Performance level PL1

Rated current when all contacts are loaded. Terminations are wired with 0.6 mm^2 (20 AWG) wire.

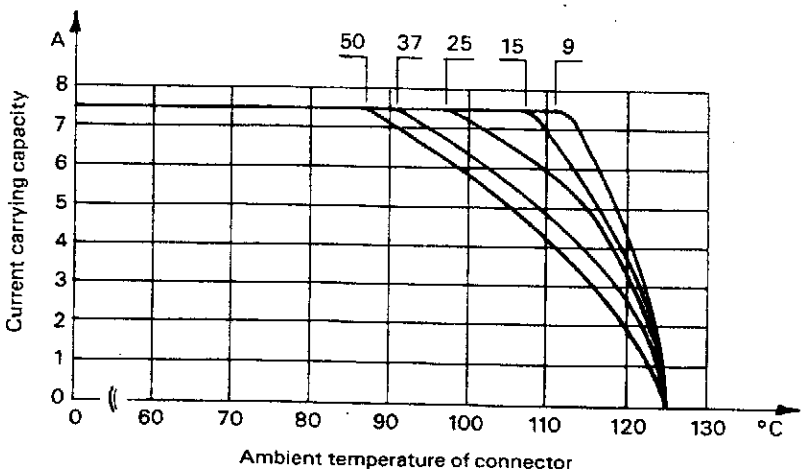


Figure 4a

Performance level PL2

Rated current when all contacts are loaded. Terminations are wired with 0.6 mm² (20 AWG) wire.

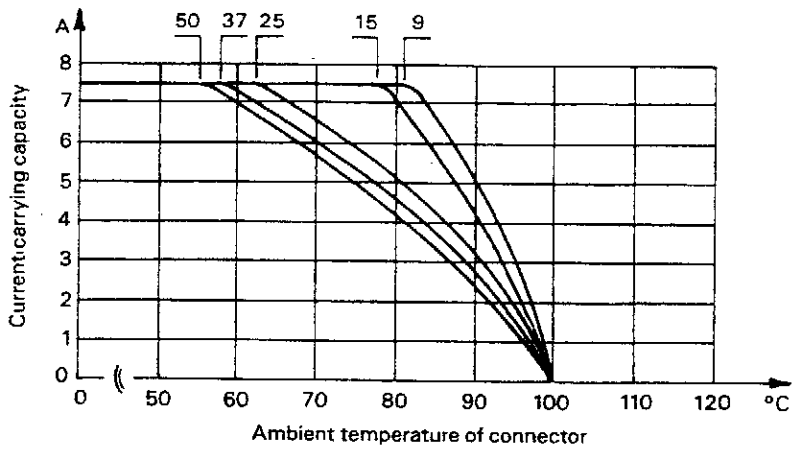
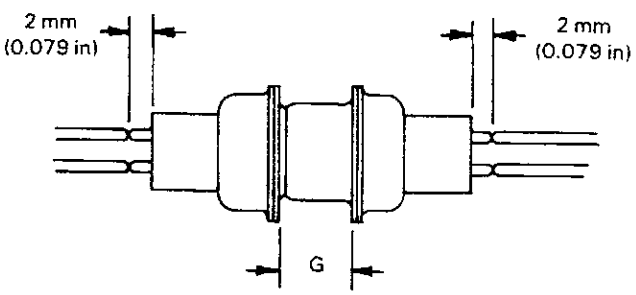


Figure 4b

6.2.4 *Initial contact resistance*

Conditions: IEC Publication 512-2, Test 2b.
Standard atmospheric conditions.
Mated connectors.
Connection points.



Shell size	Number of contacts	G	
		mm	in
1	9	6.35 7.11	0.250 0.280
2	15	6.35 7.11	0.250 0.280
3	25	6.12 6.88	0.241 0.271
4	37	6.12 6.88	0.241 0.271
5	50	6.12 6.88	0.241 0.271

Performance level PL1: 5 mΩ max.

Performance level PL2: 10 mΩ max.

6.2.5 *Initial insulation resistance*

Conditions: IEC Publication 512-2, Test 3a, Method A.
Standard atmospheric conditions.
Test voltage 500 ± 50 V d.c.
Mated connectors.

Performance level PL1: 5 GΩ minimum.

Performance level PL2: 5 GΩ minimum.

6.3 *Mechanical*

6.3.1 *Insertion and withdrawal forces*

Conditions: IEC Publication 512-7, Test 13b.

TABLE V

Performance levels PL1 and PL2

Shell size	Number of contacts	Insertion and withdrawal forces		
		Withdrawal min. N	Withdrawal max. N	Insertion max. N
1	9	3.3	20	30
2	15	4.5	33	50
3	25	7.8	56	83
4	37	11.0	82	123
5	50	14.5	111	167

6.3.2 *Vibration*

Conditions: IEC Publication 512-4, Test 6d.

TABLE VI

Performance level	Severities
PL1	10 Hz to 2000 Hz, 1.5 mm or 20 g, 3 × 2 h
PL2	10 Hz to 500 Hz, 0.35 mm or 5 g, 3 × 2 h

6.3.3 *Mechanical operation*

Conditions: IEC Publication 512-5, Test 9a.
Speed: 10 mm/s maximum.
Rest: 10 s minimum (unmated).

Performance level PL1: 500 operations.

Performance level PL2: 250 operations.

6.3.4 *Contact retention in insert*

Conditions: IEC Publication 512-8, Test 15a.

Performance level PL1: 40 N.

Performance level PL2: 27 N.

Displacement 0.3 mm (0.012 in).

6.3.5 *Insert retention in housing (axial)*

Conditions: IEC Publication 512-8, Test 15b.

TABLE VII

Performance levels PL1 and PL2

Shell size	Number of contacts	N	lbf
1	9	53	12
2	15	80	18
3	25	124	28
4	37	180	40
5	50	233	52

6.3.6 *Contact bending strength*

Conditions: IEC Publication 512-8, Test 16c.

Force applied = 0.06 N·m (0.53 lbf-in).

Maximum rate of application of force: not to exceed 25.4 mm (1 in) per minute.

Maximum time of force application: not to exceed 1 min.

Maximum allowable permanent set: 0.127 mm (0.005 in).

6.3.7 *Durability of contact retention system*

Conditions: IEC Publication 512-5, Test 9d.

Number of contact extraction and insertion cycles:

PL 1, 10 cycles
PL 2, 3 cycles

The contacts shall be inserted into and extracted from the connector with tools that conform to the connector manufacturer's recommendations.

7. **Test schedule**

7.1 *Test schedule for closed crimp barrel contacts*

7.1.1 Prepare 20 contact specimens with 0.6 mm^2 stranded (19×0.2 mm) silverplated wire (20 AWG) having suitable insulation. The wire shall be 150 ±5 mm (5.9 ±0.2 in) long.

Prepare 20 contact specimens with 0.22 mm² stranded (7 × 0.2 mm) silverplated wire (24 AWG) having suitable insulation. The wire shall be 150 ± 5 mm (5.9 ± 0.2 in) long.

The contact specimens should be prepared with crimping tools recommended by the connector manufacturer.

7.1.2 All specimens shall be subjected to the following tests in sequence:

Test phase	IEC test			Measurement to be performed		Requirements	
	Title	Publication 352-2 No.	Severity or conditions of test	Title	Publication 512 No.	Performance level	
						PL1	PL2
P1	General examination		0.6 mm² (20 AWG) 0.22 mm² (24 AWG)	Visual examination	-2 Test 1a	There shall be no defects that would impair normal operation	
P2	Tensile strength	Subclause 12.2.1	0.6 mm² (20 AWG)	Tensile strength (crimped connection)	-8 Test 16d	89 N (20 lbf)	89 N (20 lbf)
			0.22 mm² (24 AWG)			33 N (7.4 lbf)	33 N (7.4 lbf)

7.2 *General*

This test schedule shows all tests and the order in which they shall be carried out as well as the requirements to be met.

An "X" in the column "Requirements" of the following tables indicates that the test or conditioning shall be applied.

Unless otherwise specified, mated sets of connectors shall be tested. Care shall be taken to keep a particular combination of connectors together during the complete test sequence, i.e. when unmating is necessary for a certain test, the same connectors as before shall be mated for the subsequent tests.

In the following, a mated set of connectors is called a "specimen".

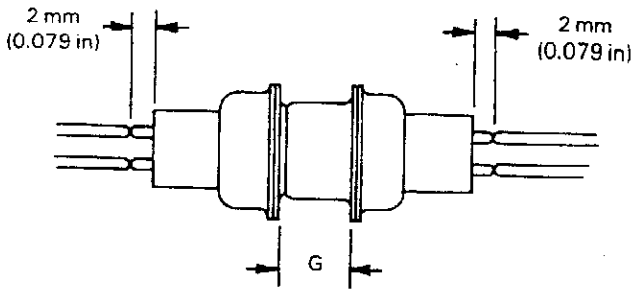
For a complete test sequence, the number of specimens according to Table VIII is necessary.

TABLE VIII

Number of specimens

Test group	Performance level	
	PL1	PL2
P	24	24
AP	4	4
BP	4	4
CP	4	4
DP	4	4
EP	4	4
IP	4	4

For the measurements of contact resistance, the points of connection shall be as follows:



Shell size	Number of contacts	G	
		mm	in
1	9	6.35 7.11	0.250 0.280
2	15	6.35 7.11	0.250 0.280
3	25	6.12 6.88	0.241 0.271
4	37	6.12 6.88	0.241 0.271
5	50	6.12 6.88	0.241 0.271

Note. – When the connectors are required to be wired for tests, the contacts shall be crimped to 0.6 mm² stranded (19 × 0.2 mm) silverplated wire (20 AWG) having suitable insulation.

The additional conductor resistance of the wire used shall be measured and taken into consideration.

The measurements of contact resistance shall be carried out on the number of contacts specified. Any subsequent measurement of contact resistance shall be made on the same contacts.

7.3 All specimens shall be subjected to the following tests in sequence.

Group P

Test phase	IEC test			Measurement to be performed		Requirements	
	Title	Publication 512 No.	Severity or conditions of test	Title	Publication 512 No.	Performance level	
						PL1	PL2
P1	General examination		Unmated connectors	Visual examination	-2 Test 1a	There shall be no defects that would impair normal operation.	
				Examination of dimensions and mass	-2 Test 1b	The dimensions shall comply with those specified in Sub-clauses 4.2, 4.3, 3.2, and 6.2.1	
P2	Polarizing method	-7 Test 13e	Engaging forces according to the max. insertion forces in Sub-clause 6.3.1			It shall be possible to correctly align and mate the appropriate mating connectors. It shall not be possible to mate the connectors in any manner other than the correct one	
P3			Connection points as in Sub-clause 7.2 6 contacts/specimen	Contact resistance at 7.5 A	-2 Test 2b	5 mΩ max.	10 mΩ max.
P4			Test voltage 500 ± 50 V d.c. Method A	Insulation resistance	-2 Test 3a	5 GΩ min.	5 GΩ min.
P5			Method A	Voltage proof	-2 Test 4a	1000 V r.m.s.	1000 V r.m.s.

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

Group AP

Test phase	IEC test			Measurement to be performed		Requirements	
	Title	Publication 512 No.	Severity or conditions of test	Title	Publication 512 No.	Performance level	
						PL1	PL2
AP1	Gauge retention force	-8 Test 16e	Female contacts only 6 contacts/specimen Sizing tool P11 Gauge P12			X Retains gauge	X
AP2	Insertion and withdrawal forces	-7 Test 13b				X See Sub-clause 6.3.1	X
AP3						Not applicable	Not applicable
AP 3.1						Not applicable	Not applicable
AP 3.2						Not applicable	Not applicable
AP 3.3				Contact retention in insert	-8 Test 15a	X Forces as in Sub-clause 6.3.4	X
AP4			Method A	Voltage proof	-2 Test 4a	X 1000 V r.m.s.	X
AP5						Not applicable	Not applicable
AP6	Vibration	-4 Test 6d	Wires clamped 203 mm (8 in) min. behind fixed connector to non-vibrating point or wires clamped 87 mm to 114 mm (3.5 in to 4.5 in) behind free connector to vibrating point	Contact disturbance	-2 Test 2e	Monitor all contacts in series 100 mA minimum for a discontinuity of 1 µs	
			10 Hz to 2000 Hz 1.5 mm (0.06 in) d.a. (displacement amplitude) 196 m/s² (20 *g*) 20 min/sweep 12 sweeps/axes 3 axes (12 h total)			X	
			10 Hz to 500 Hz 0.35 mm (0.014 in) d.a. 49 m/s² (5 *g*) 20 min/sweep 3 axes (12 h total)				X

Group AP *(continued)*

Test phase	IEC test			Measurement to be performed		Requirements	
	Title	Publication 512 No.	Severity or conditions of test	Title	Publication 512 No.	Performance level	
						PL1	PL2
AP7	Shock	-4 Test 6c	490 m/s² (50 g) peak saw-tooth 11 milliseconds duration. 1 shock each direction, 3 axes (6 shocks total). Clamping of wires as for vibration test	Contact disturbance	-2 Test 2e	Monitor all contacts in series 100 mA min. for discontinuity of 1 µs	Monitor all contacts in series 100 mA min. for discontinuity of 1 µs
AP8						Not applicable	Not applicable
AP9	Rapid change of temperature	-6 Test 11d	Unmated connector non-operated, 30 min. exposure, 5 cycles Recovery time 2 h			X −55 °C to +125 °C	X −55 °C to +100 °C
AP 10			Test voltage 500 ± 50 V d.c. Method A	Insulation resistance	-2 Test 3a	5 GΩ min.	5 GΩ min.
AP 11			Method A	Voltage proof	-2 Test 4a	X 1000 V r.m.s.	X
AP 12			Unmated connectors	Visual examination	-2 Test 1a	No damage due to conditioning	
AP 13	Climatic sequence	-6 Test 11a	Unmated, non-operated				
AP 13.1	Dry heat	-6 Test 11i	Duration 12 h			125 °C	100 °C
			Test voltage 500 ± 50 V d.c. Method A	Insulation resistance at high temperature	-2 Test 3a	100 MΩ min.	100 MΩ min.
AP 13.2	Damp heat, cyclic, first cycle	-6 Test 11m	Upper temperature 55 °C 1 cycle, variant 2 Recovery time: 2 h Room ambient temperature			X	X
AP 13.3	Cold	-6 Test 11j	Recovery time: 2 h			−55 °C	−55 °C
AP 13.4						Not applicable	Not applicable

Group AP *(continued)*

Test phase	IEC test			Measurement to be performed		Requirements	
	Title	Publication 512 No.	Severity or conditions of test	Title	Publication 512 No.	Performance level	
						PL1	PL2
AP7 13.5	Damp heat, cyclic, remaining cycles	-6 Test 11m	Upper temperature 55°C, 5 cycles as in AP13.2			X	X
AP 14			Test voltage 500 ± 50 V d.c. Method A	Insulation resistance	-2 Test 3a	100 MΩ min.	100 MΩ min.
AP 15			Connection points as in Sub-clause 7.2 6 contacts/specimen	Contact resistance at 7.5 A	-2 Test 2b	10 mΩ max.	15 mΩ max.
AP 16			Method A	Voltage proof	-2 Test 4a	600 V r.m.s.	600 V r.m.s.
AP 17				Insertion and withdrawal forces	-7 Test 13b	X See Sub-clause 6.3.1	X
AP 18			Unmated connectors	Visual examination	-2 Test 1a	No damage due to conditioning	

Group BP

Test phase	IEC test			Measurement to be performed		Requirements	
	Title	Publication 512 No.	Severity or conditions of test	Title	Publication 512 No.	Performance level	
						PL1	PL2
BP1			Female contacts only 6 contacts/specimen Sizing tool P11 Gauge P12	Gauge retention force	-8 Test 16e	X Retains gauge	X
BP2	Mechanical operation (half of the specified number of operations)	-5 Test 9a	Speed 10 mm/s (0.4 in/s) max. Rest 30 s min. (when unmated) 250 operations			X	
			125 operations				X
BP 3.1	Salt mist	-6 Test 11f	Mated, non operating 48 h, wash in running tap water and dry for 2 h maximum at 38 °C			X	Not applicable
BP4			Connection points as in Sub-clause 7.2 6 contacts/specimen	Contact resistance at 7.5 A	-2 Test 2b	10 mΩ max.	15 mΩ max.
BP5	Mechanical operation (remaining number of operations)	-5 Test 9a	Speed 10 mm/s (0.4 in/s) max. Rest 30 s min. (when unmated) 250 operations			X	
			125 operations				X
BP6			Test voltage 500 ± 50 V d.c. Method A	Insulation resistance	-2 Test 3a	5 GΩ min.	5 GΩ min.
BP7			Female contacts only 6 contacts/specimen Gauge P12	Gauge retention force	-8 Test 16e	X Retains gauge	X
BP8						Not applicable	Not applicable
BP9						Not applicable	Not applicable
BP 10	Insert retention in housing (axial)	-8 Test 15b	Unmated connectors mounted on test panel. Test prod as in Sub-clause 5.5. Force applied to the mating side and centred in the contact area Pressure 414 kPa (60 lbf/in²) or force as in Sub-clause 6.3.5	Visual examination	-2 Test 1a	There shall be no damage that would impair normal operation	
BP 11			Unmated connectors	Visual examination	-2 Test 1a	No damage due to conditioning	

Group CP

Test phase	IEC test			Measurement to be performed		Requirements	
	Title	Publication 512 No.	Severity or conditions of test	Title	Publication 512 No.	Performance level	
						PL1	PL2
CP1	Damp heat, steady state	-6 Test 11c	Unmated, non-operational 21 days			X	Not applicable
			10 days			Not applicable	X
			Recovery time: 2 h			X	X
CP2			Test voltage 500 ± 50 V d.c. Method A	Insulation resistance	-2 Test 3a	1 GΩ min.	
CP3			Connection points as in Sub-clause 7.2 6 contacts/specimen	Contact resistance at 7.5 A	-2 Test 2b	10 mΩ max.	15 mΩ max.
CP4			Method A	Voltage proof	-2 Test 4a	X	X
						1000 V r.m.s.	
CP5			Unmated connectors	Visual examination	-2 Test 1a	No damage due to conditioning	

Group DP

Test phase	IEC test			Measurement to be performed		Requirements	
	Title	Publication 512 No.	Severity or conditions of test	Title	Publication 512 No.	Performance level	
						PL1	PL2
DP1	Mechanical operation	-5 Test 9a	Speed 10 mm/s (0.4 in/s) max. Rest 30 s min. (when unmated)				
			500 operations			X	
			250 operations				X
DP2	Electrical load and temperature	-5 Test 9b	85 °C, 500 hours			X	
			70 °C, 500 hours				X
DP3			Connection points as in Sub-clause 7.2 6 contacts/specimen	Contact resistance at 7.5 A	-2 Test 2b	10 mΩ max.	15 mΩ max.
DP4			Method A	Voltage proof	-2 Test 4a	X	X
						1000 V r.m.s.	
DP5			Unmated connectors	Visual examination	-2 Test 1a	No damage due to conditioning	
DP6				Partial discharge		Not applicable	Not applicable
DP7						Not applicable	Not applicable
DP8						Not applicable	Not applicable

Group EP

Test phase	IEC test			Measurement to be performed		Requirements	
	Title	Publication 512 No.	Severity or conditions of test	Title	Publication 512 No.	Performance level	
						PL1	PL2
EP1	Robustness of terminations					Not applicable	Not applicable
EP2	Contact retention in insert	-8 Test 15a	6 contacts/specimen Axial force from mating face			40 N	27 N
						Displacement 0.3 mm (0.012 in) max.	
EP3	Probe damage	-8 Test 16a	Female contacts only 6 contacts/specimen Test probe as in Sub-clause 5.3	Gauge retention force	-8 Test 16e	Retains gauge P12	Not applicable
EP4	Restricted entry	-8 Test 16b	Female contacts only 6 contacts/specimen Test pin as in Sub-clause 5.4			Test gauge shall not enter the contact	Not applicable
EP5	Contact bending strength	-8 Test 16c	Male contacts only 6 contacts/specimen Test as per Sub-clause 6.3.6			X	X
EP6				Visual examination	-2 Test 1a	Not applicable	Not applicable
EP7	Flammability	-9 Test 20a	Under consideration			X	X
EP8				Visual examination	-2 Test 1a	Insulator material self-extinguishing	

Group IP

Test phase	IEC test			Measurement to be performed		Requirements	
	Title	Publication 512 No.	Severity or conditions of test	Title	Publication 512 No.	Performance level	
						PL1	PL2
IP1	Durability of contact retention system	-5 Test 9d	Extract and insert contacts as per clause 6.3.6			10 cycles	3 cycles
IP2	Contact retention in insert	-8 Test 15a	Apply test to specimens previously tested as per test phase IP1			40 N	27 N

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