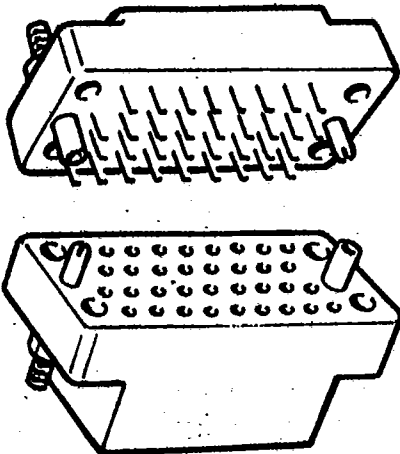


BRITISH STANDARDS INSTITUTION 2 PARK STREET LONDON W1A 2BS	BS 9524 N0001 ISSUE 1 OCTOBER 1981
Specification available from: BRITISH STANDARDS INSTITUTION 101 PENTONVILLE ROAD LONDON N1 9ND TELEPHONE 01-837 8801 : TELEX 23218	48 pages
ELECTRONIC COMPONENTS OF ASSESSED QUALITY DETAIL SPECIFICATION IN ACCORDANCE WITH BS 9520	MANUFACTURER'S TYPE NUMBER See PD 9002
TYPICAL CONNECTORS  For marking information see clause 4 For outline drawings see A.2	For ordering information see clause 5
	MULTI-CONTACT RECTANGULAR ELECTRICAL CONNECTORS WITH MOULDED BODIES Unsealed with end guides or jackscrew couplings and front release rear removable crimp contacts
	ENVIRONMENTAL CATEGORY 55/125/56
	FULL ASSESSMENT

This specification shall be read in conjunction with BS 9520.

1. PATTERN NUMBER

The specification number without the letters BS is used as the pattern number.
 This range of connectors is known as Pattern 9524 N0001.

Refer to Qualified Products List PD 9002 for details of manufacturers approved to this specification

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2. RELATED DOCUMENTS

- BS 6001 Sampling procedures and tables for inspection by attributes
- BS 9000 General requirements for electronic components of assessed quality
- BS 9520 Electrical connectors of assessed quality for frequencies below 3 MHz: generic data and methods of test
- BS 9521 Generic specification for contacts of assessed quality for d.c. and low frequency applications
- PD 9002 BS 9000 component selection guide

3. DESCRIPTION OF CONNECTOR AND INTENDED APPLICATION

Multi-contact unsealed rectangular connectors with moulded bodies, and end guides or jackscrew couplings, for d.c. and a.c. applications. Intended for inter-chassis connections, with or without hoods and/or shrouds.

Contacts are front release rear removable with crimp terminations and gold plated finish.

Polarization is effected by guides or jackscrews, and additional polarization can be provided by the optional use of keyed shrouds (see A.1 for additional polarization availability).

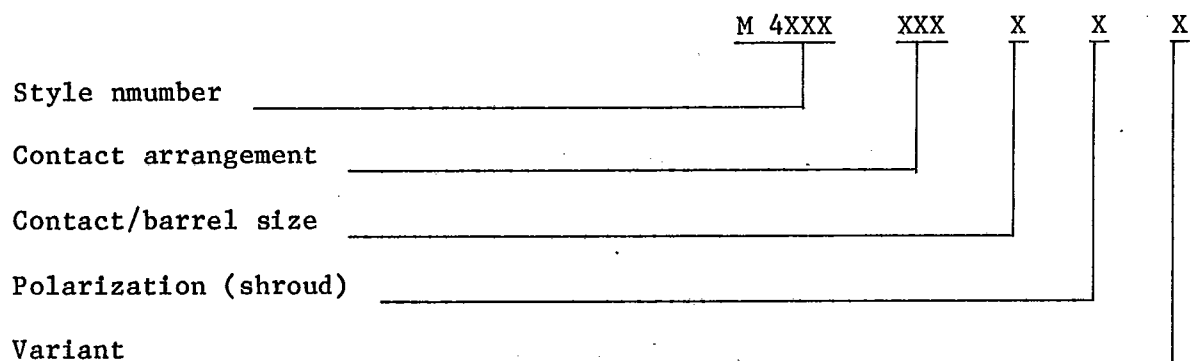
Guides and fixed jackscrews are stainless steel. Turntable jackscrews, hoods and shrouds are available in alternative materials/finishes (see A.3).

It is recommended that jackscrews are used on connectors having 26 or more contacts. Female shrouds when used have to be fitted to the male moulding.

4. MARKING OF THE CONNECTOR AND PACKAGE

The marking shall be in accordance with 1.1.6 of BS 9520: 1981.

The individual reference number required by 1.1.6(3) consists of abbreviations to identify individual connectors as follows.



[Clause 4 (cont'd)]

Style number: M 4XXX as shown in A.2.

Contact arrangement: three digits as shown on the appropriate outline drawing in A.1.

Contact/barrel size: denoted by a single letter as shown below.

Letter	Contact size				Conductor accommodation		Dielectric accommodation
	Mating end		Barrel		CMA*		o.d. mm (max.)
	size	colour	size	colour	max.	min.	
A	16	Blue	16	Blue	2650	1178	2.46
B	16	Blue	20	Red	1178	434	1.60
C	20	Red	20	Red	1178	434	1.60
D	20	Red	24	Yellow	434	109	1.30
0	No contacts fitted				N/A		N/A

Polarization (shroud): denoted by a single letter as shown in A.1. '0' denotes not applicable.

Variant: a digit denoting any variation from the basic specification. '0' denotes standard connector.

Example reference number: M 4104 026 A00.

Marking of accessories (A) and tools (T) shall be as follows.

	A (or T) 4XXX	XXX	X	XX
Style number (as in A.3)				
Contact arrangement (if applicable. As in A.1) [†]				
Polarization (shroud) (if applicable. As in A.3)				
Variant (as in A.3)				

Standard accessories have variant designation '0'.

* CMA denotes circular mil area.

[†] Where, however, an accessory is common to all contact arrangements 007 to 075 use the code 770. (See also A.3.)

[Clause 5

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Example reference number: A 4137 104 B 00.

The packaging shall include the manufacturer's assembly instructions, including the wire preparation, crimping and contact insertion, if requested.

5. ORDERING INFORMATION

The following information shall be given when ordering parts complying with the requirements of this specification.

- (a) The number of this detail specification.
- (b) The individual (type) reference number as described in clause 3 of this detail specification.
- (c) Details of marking that may be required in addition to that specified in clause 4 of this detail specification.
- (d) Requirements for the provision of assembly instructions.

6. OUTLINE DRAWINGS

See appendix A as follows.

- A.1 Contact arrangements with polarization details and typical assemblies
- A.2 Outline dimensions, mass and panel cut-outs
- A.3 Accessories, outline dimensions, and mass
- A.4 Assembly tools
- A.5 Gauges

NOTE. Outline drawings include a cross-reference to the relevant National Supervising Inspectorate control drawings.

7. RATINGS

7.1 Electrical

7.1.1 Current

- (a) Maximum current per individual contact (in isolation)* at an ambient temperature of 85 °C:

contact size 16: 13 A
contact size 20: 7.5 A

* That is when only one contact per connector is electrically loaded.

(b) Maximum current per contact through all contacts simultaneously at an ambient temperature of 85 °C:

contact size 16: 9 A

contact size 20: 5 A

The performance of any connectors listed in this specification shall at all times exceed the maximum continuous bunched rating of the appropriate size wire or cable of equivalent temperature rating, and this bunched rating shall be the determining factor.

7.1.2 Voltage

	Sea level 1013 mbar	8500 m (27 800 ft) 300 mbar
Working voltage (nominal) d.c. or a.c. peak	700	250
Voltage proof d.c. or a.c. peak	2100	500

Establishment of electrical safety factors, when the connector is used at other than the working voltage (nominal), is the responsibility of the user.

7.2 Environmental

Environmental classification	55/125/56
Low air pressure severity	300 mbar*
Vibration severity	10 Hz to 500 Hz 0.75 mm/10g _n Duration 6 h
Shock severity	490 m/s ² (50g _n) for 11 ms
Acceleration severity	N/A
Bump severity	390 m/s ² (40g _n) 4000 $\pm$ 10 bumps

* 1 mbar = 100 N/m² = 0.1 kPa.

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7.3 Endurance

Mechanical 500 operations*

High temperature - 1000 h at 85 °C
long term (current as in 6.1.1(b))

High temperature - 250 h at 125 °C
short term (no electrical load)

8. CHARACTERISTICS

8.1 Connector range (see A.1.1 and A.2.1 to A.2.8 inclusive)

8.2 Electrical

Maximum contact resistance (initially) 5 mΩ

Maximum contact resistance (after 10 mΩ
conditioning)

Minimum insulation resistance 5000 MΩ method A and B
(initially)

Minimum insulation resistance 100 MΩ method A and B
(hot and after conditioning)

8.3 Mechanical

Engaging and separating force, connector

Number of contacts	N		(lbf)	
	max.	min.	max.	min.
7	23.40	1.96	(5.25)	(0.44)
9	30.00	2.49	(6.75)	(0.56)
14	46.70	3.89	(10.50)	(0.88)
18	60.10	5.00	(13.50)	(1.13)
20	66.70	5.56	(15.00)	(1.25)
26	86.70	7.23	(19.50)	(1.63)
34	113.00	9.45	(25.50)	(2.13)
42	139.00	11.70	(31.50)	(2.63)
50	167.00	13.90	(37.50)	(3.13)
75	250.00	20.90	(56.30)	(4.69)
104	347.00	28.90	(78.00)	(6.50)

* Initial 10 % of operations using coupling/locking devices if incorporated.

Contact retention (in insert moulding)

Contact size	N min.	(lbf) min.
20	44.50	(10.00)
16	89.00	(20.00)

Contact holding force

Contact size	N min.	(lbf) min.
20	0.21	(0.05)
16	0.57	(0.13)

8.4 Fluid resistance

The connectors shall be resistant to the following fluids selected from appendix E of BS 9520: 1981.

Isopropanol, trichlorotrifluoroethane, trichloroethane, and trichloroethylene.

9. CERTIFIED TEST RECORDS (CTRs)

Certified test records shall be prepared in accordance with 1.1.11 of BS 9520: 1981.

10. QUALITY ASSESSMENT PROCEDURE

Group C tests need not be carried out for Qualification Approval or when subsequent group D tests are performed.

11. INSPECTION REQUIREMENTS

Samples subjected to tests marked '(D)' shall not be accepted for release under BS 9000 (see 2.6.5 of BS 9000: Part 1).

Unless otherwise specified, tests shall be performed at an ambient temperature of between 15 °C and 35 °C.

Fitting (and wiring) of contacts shall be in accordance with the manufacturer's instructions. PTFE extruded insulation equipment wire complying with the requirements of BS G 210 shall be used.

NOTE. To ensure that the wiring operation has been carried out satisfactorily it is advisable to apply insulation resistance and contact resistance tests.

[Group A

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Inspection	BS 9520: 1981 reference and conditions of test	Requirements as in BS 9520: 1981
GROUP A	To be applied on a sampling basis lot-by-lot except subgroup A0 Subgroups A2 and A3 are not applicable	
<u>Subgroup A0</u>	<u>100 % inspection</u> Contacts need not be fitted	
Visual examination	1.2.2(1)	As in 1.2.2(1)
<u>Subgroup A1</u>	<u>Inspection level S-3, AQL 1.5 %</u> Contacts need not be fitted	
Visual examination	1.2.2(2)	As in 1.2.2(2)
<u>Subgroup A4</u>	<u>Inspection level S-3, AQL 1.5 %</u>	
Voltage proof	1.2.4.4 Method A or B. Voltage as in 7.1.2 of this specification	As in 1.2.4.4
<u>Subgroup A5</u>		
CTR information	1.1.11 The result from the test in subgroup A1 shall be reported as attributes information	
GROUP B	To be applied on a sampling basis lot-by-lot Subgroups B3 to B7 are not applicable Connectors shall have all contacts fitted and only wired as required for tests	
<u>Subgroup B1</u>	<u>Inspection level S-4, AQL 1 %</u>	
Gauging procedure	1.2.3.3(2)	As in 1.2.3.3(2)

[Subgroup B2]

Inspection	BS 9520: 1981 reference and conditions of test		Requirements as in BS 9520: 1981
<u>Subgroup B1 (cont'd)</u>			
Insulation resistance	1.2.4.3	Method A or B (500 + 50 V)	5000 MΩ min.
Engaging and separating force, connector	1.2.5.2	Forces as specified in 8.3 of this specification	As in 1.2.5.2
Contact holding force	1.2.5.8	With 3 sizings and using gauges as prescribed in A.5 of this specification	As in 1.2.5.8
<u>Subgroup B2 (D)</u>			
	<u>Inspection level S-4, AQL 4 %</u>		
	Specimens from subgroup B1 may be used		
Contact resistance	1.2.4.1(1)		5 mΩ max.
Insert moulding ageing	1.2.5.10	Contact retention forces as specified in 8.3 of this specification	As in 1.2.5.3. Maximum axial displacement under load 0.3 mm
		Nine insertions and withdrawals using the recommended tools in A.4 of this specification	
		Contant retention forces as specified in 8.3 of this specification	As in 1.2.5.3. Maximum axial displacement under load 0.3 mm
<u>Subgroup B8</u>			
CTR information	1.1.11	Results from the tests in subgroups B1 and B2 shall be reported as attributes information	
<u>GROUP C</u>			
	To be applied on a sampling basis at three-monthly intervals		
	Subgroups C2 and C4 are not applicable		
	The issue number of the manufacturing drawing shall be checked against that on the approval certificate		

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Inspection	BS 9520: 1981 reference and conditions of test	Requirements as in BS 9520: 1981
<u>Subgroup C1</u>	<u>Inspection level S-3, AQL 4 %</u> Contacts need not be fitted	
Dimensions, outline	1.2.3.1	As specified in A.2 and A.3 of this specification
<u>Subgroup C3 (D)</u>	<u>Inspection level S-3, AQL 4 %</u> Specimens from subgroup C1 with contacts fitted may be used	
Contact resistance	1.2.4.1(1)	5 mΩ max.
Rapid change of temperature	1.2.6.7 -55 °C to 125 °C	
Damp heat, steady state	1.2.6.14 21 days. Working voltage as specified in 7.1.2 of this specification. Polar- izing voltage 60 V d.c. (1)	As in 1.2.6.14(1)
	After 1½ h to 2 h recovery	
<u>Final measurements</u>	1.2.6.14(2)a Method A or B (500 ± 50 V) (2)b (2)c Not applicable (2)d As in 1.2.4.1(1) (2)e (2)f Not applicable (2)g Not applicable (2)h Method A or B Voltage as in 7.1.2 of this specification	100 MΩ min. As in 1.2.6.14(2) 10 mΩ max. By hand As in 1.2.6.14(2)

[Subgroup C5 (D)]

Inspection	BS 9520: 1981 reference and conditions of test		Requirements as in BS 9520: 1981
<u>Subgroup C5 (D)</u>	<u>Inspection level S-3, AQL 4 %</u>		
Mechanical endurance*	1.2.7.1	50 operations at 15 operations per minute maximum. Initial 10 % of operations to use coupling/locking devices, if incorporated	
High temperature endurance	1.2.7.2	250 h duration at 125 °C. No electrical load During the conditioning the following measure- ments shall be made:	
Insulation resistance	1.2.4.3	Method B Mated at 125 °C Measured 8 times at intervals of not less than 24 h	100 MΩ min.
<u>Final measurements</u>	After 1½ h to 2 h recovery. Specimens shall remain mated unless otherwise stated		
Contact resistance	1.2.4.1(1)		10 mΩ max.
Voltage proof	1.2.4.4	Method A or B Voltage as in 7.1.2 of this specification	As in 1.2.4
Engaging and separating force, connector	1.2.5.2	Forces as specified in 8.3 of this specification	As in 1.2.5.2
Visual examination	1.2.2(3) 1.2.2(4)		As in 1.2.2(3) As in 1.2.2(4)

* Screw coupling/locking devices shall be operated evenly and progressively during engagement and separation.

[Subgroup C6

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Inspection	BS 9520: 1981 reference and conditions of test	Requirements as in BS 9520: 1981
<u>Subgroup C6</u>		
CTR information	1.1.11 The results from the final measurements in subgroups C3 and C5 shall be reported as attributes information The final contact resistance and insulation resistance results of the test in subgroups C3 and C5 and the minimum insulation resistance at upper category temperature in C5 shall be reported as measurements information	
GROUP D	To be applied at three-yearly intervals. For sampling plan see appendix B of this specification Wire or cable of maximum insulation diameter shall be used for the test specimens. See 8.3 of this specification The issue number of the manufacturing drawing shall be checked and recorded	
<u>Subgroup D0</u>	Sample size: one set of piece parts for the connector range submitted for approval testing. Common piece parts need not be duplicated. No failure allowed	
Dimensions, detail and materials	1.2.3.2	As in 1.2.3.2
<u>Subgroup D1</u>	For samples see appendix B of this specification. No failure allowed	
Dimensions, outline	1.2.3.1	As in A.2 and A.3 of this specification

[Subgroup D2 (D)]

Inspection	BS 9520: 1981 reference and conditions of test	Requirements as in BS 9520: 1981
<u>Subgroup D1 (cont'd)</u>		
Mass*	1.2.5.1 (Including contacts)	As in A.2 and A.3 of this specification
Gauging procedure	1.2.3.3(1) See also appendix C of this specification for the selection of samples of types within the range for submission to National Supervising Inspectorate for compatibility control	As in 1.2.3.3(1)
	1.2.3.3(3)	As in 1.2.3.3(3)
Compass safe distance*	1.2.5.11 Sample size: one mated pair of each of the largest and smallest specimens. Measured with and without accessories†	As in 1.2.5.11
<u>Subgroup D2 (D)</u>	For samples see appendix B of this specification. One failure allowed	
Test prod damage	1.2.5.9 Use tool and test prods specified in A.5.3 of this specification	As in 1.2.5.9
Impact	1.2.5.6 Five impacts Drop height 1 m (1) (2) Contour of shroud may be restored prior to test	Any damage shall be restricted to shrouds/cable outlets By hand

* This test shall be carried out for initial Qualification Approval only.

† Metal housings (shells).

[Subgroup D3 (D)]

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Inspection	BS 9520: 1981 reference and conditions of test	Requirements as in BS 9520: 1981
<u>Subgroup D3 (D)</u>	For samples see appendix B of this specification. One failure allowed	
Bump	1.2.6.1 390 m/s ² (40g _n) 4000 $\pm$ 10 bumps	As in 1.2.6.1
Vibration, general	1.2.6.2.1 Procedure A 10 Hz to 500 Hz 0.75 mm/10g _n Duration 6 h	As in 1.2.6.2
Shock	1.2.6.3 490 m/s ² (50g _n) Duration 11 ms	As in 1.2.6.3
<u>Final measurements</u>		
Visual examination	1.2.2(4)	As in 1.2.2(4)
Contact resistance	1.2.4.1(1)	10 mΩ max.
<u>Subgroup D4 (D)</u>	For samples see appendix B of this specification	
<u>Subgroup D4(i)</u>	One failure allowed	
Rapid change of temperature	1.2.6.7 -55 °C to 125 °C	
Climatic sequence	1.2.6.11 Severity 55/125/56 (1) -25 °C (2) Not applicable (3) Method A or B Voltage as in 7.1.2 of this specification After 1½ h to 2 h recovery	By hand As in 1.2.4.4
<u>Final measurements</u>	1.2.6.11a.(i) Method A or B (500 $\pm$ 50 V) a.(ii) a.(iii) Not applicable a.(iv) As in 1.2.4.1(1) a.(v) a.(vi) Not applicable a.(vii) Method A or B Voltage as in 7.1.2 of this specification	100 MΩ min. As in 1.2.6.11a.(ii) 10 mΩ max. By hand As in 1.2.6.11a.(vii)

[Subgroup D5(D)]

Inspection	BS 9520: 1981 reference and conditions of test	Requirements as in BS 9520: 1981
<u>Subgroup D4 (D)</u> (cont'd)		
<u>Subgroup D4(ii)</u>	Sample size: one fixed and one free mating connector of the largest body size for which approval is sought. No failure allowed	
Flammability	1.2.6.8 Direct flame against (a) mating face and (b) unprotected rear (accessories removed) of each connector	As in 1.2.6.8
<u>Subgroup D5 (D)</u>	For samples see appendix B of this specification. One failure allowed	
Contact resistance	1.2.4.1(1)	5 mΩ max.
Damp, heat, steady state	1.2.6.14 Severity 56 days Voltage as in 7.1.2 of this specification Polarizing voltage 60 V d.c.	
	(1) After 1½ h to 2 h recovery	As in 1.2.6.14(1)
<u>Final measurements</u>	1.2.6.14(2)a Method A or B (500 ± 50 V) (2)b (2)c Not applicable (2)d Prior to separation As in 1.2.4.1(1) (2)e (2)f Not applicable (2)g Not applicable (2)h Method A or B Voltage as specified in 7.1.2 of this specification	100 MΩ min. As in 1.2.6.14(2)b 10 mΩ max. By hand As in 1.2.6.14(2)h

[Subgroup D6 (D)]