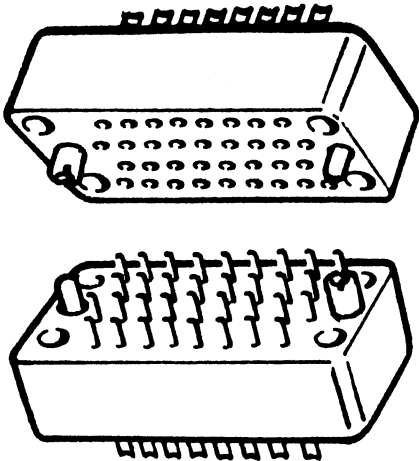


BRITISH STANDARDS INSTITUTION 2 PARK STREET LONDON W1A 2BS	BS 9524 N0002 ISSUE 1 OCTOBER 1981
Specification available from: BRITISH STANDARDS INSTITUTION 101 PENTONVILLE ROAD LONDON N1 9ND TELEPHONE 01-837 8801 : TELEX 23218	44 pages
ELECTRONIC COMPONENTS OF ASSESSED QUALITY DETAIL SPECIFICATION IN ACCORDANCE 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 non-removable solder contacts
	ENVIRONMENTAL CATEGORY 55/125/56
	FULL ASSESSMENT

This specification shall be read in conjunction with BS 9520.

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

[Clause 1

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 N0002.

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
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. or a.c. applications. Intended primarily for inter-chassis connections, with or without hoods and/or shrouds. Not intended to be used as free cable couplers.

Contacts are size 16 or size 20, non-removable, with solder terminations and hard acid gold alloy finish.

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

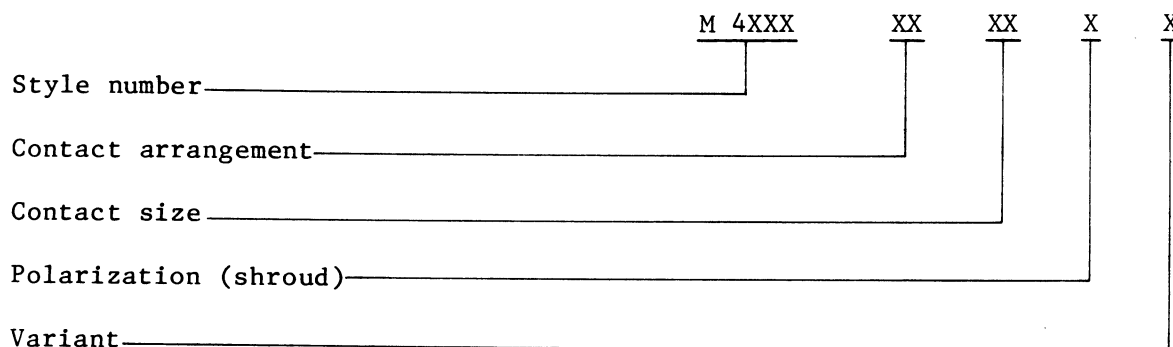
End guides and fixed jackscrews are stainless steel on the standard connector. Turnable jackscrews, hoods and shrouds are available in alternative materials/finishes (see A.3).

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: 1974.

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



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

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

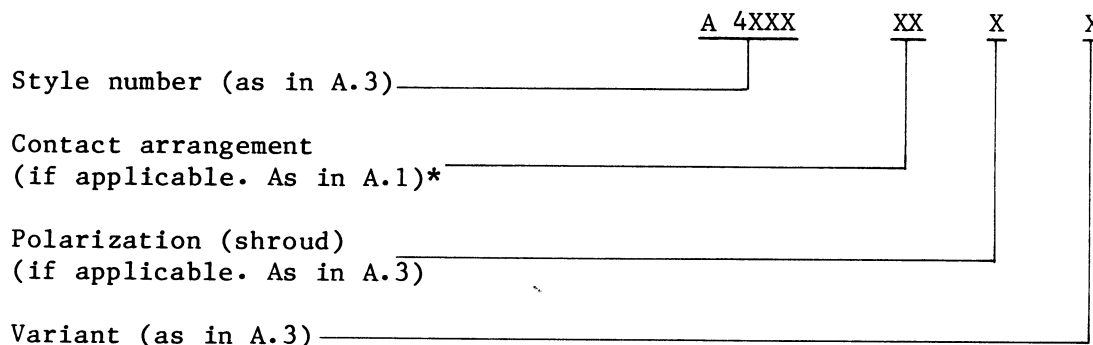
Contact size: 16 or 20.

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 4147 50 20 0 0.

Marking of accessories (A) shall be as follows.



Standard accessories have variant designation '0'.

Example reference number: A 4139 50 B 0.

* Where, however, an accessory is common to all contact arrangements 07 to 50, use the code 750. (See also A.3.)

5. ORDERING INFORMATION

The following information is to 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 specification.
- (c) Details of marking which may be required in addition to that specified in clause 4 of this detail specification.

6. OUTLINE DRAWINGS

See appendix A as follows.

- A.1 Contact arrangements
- A.2 Outline dimensions, panel cut-outs, and mass
- A.3 Accessories, outline dimensions, and mass
- A.4 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

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

- contact size 16: 10 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.

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

7.1.2 Voltage

	Sea level 1013 mbar†	9144 m (30 000 ft) 446 mbar	22 000 m (72 000 ft) 44 mbar
Working voltage* (nominal) d.c. or a.c. peak	750	500	175
Voltage proof d.c. or a.c. peak	2500	1000	525

7.2 Environmental

Environmental classification	55/125/56
Low air pressure severity	44 mbar
Vibration severity	5 Hz to 500 Hz 0.75 mm (10g _n) Duration 150 h
Shock severity	390 m/s ² (40g _n) Duration 6 ms
Acceleration severity	N/A
Bump severity	390 m/s ² (40g _n) 4000 ± 10 bumps

7.3 Endurance

Mechanical	5000 operations ‡
High temperature - long term (current as in 6.1.1(b))	1000 h at 85 °C
High temperature - short term (no electrical load)	250 h at 125 °C

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

† 1 mbar = 100 N/m² = 0.1 kPa.

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

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 m Ω
Maximum contact resistance (after conditioning)	10 m Ω
Minimum insulation resistance (initially)	5000 M Ω , method A or B
Minimum insulation resistance (hot and after conditioning)	100 M Ω , method A or B

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)
14	46.70	3.89	(10.50)	(0.88)
18	60.10	5.00	(13.50)	(1.13)
26	86.70	7.23	(19.50)	(1.63)
34	113.00	9.45	(25.50)	(2.13)
50	167.00	13.90	(37.50)	(3.13)

Contact retention
(in insert moulding) 44 N (9.89 lbf)

Contact holding force

Contact size	N min.	(lbf) min.
16	0.56	(0.13)
20	0.21	(0.05)

Individual conductor accommodation

Contact size	Max. diameter	
	mm	(in)
16	1.50	(0.059)
20	1.00	(0.039)

8.4 Fluid resistance

The connectors shall be resistant to the following fluids listed in 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.

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>	
Visual examination	1.2.2(1)	As in 1.2.2(1)

Inspection	BS 9520: 1981 reference and conditions of test	Requirements as in BS 9520: 1981
<u>Subgroup A1</u>	<u>Inspection level S-3, AQL 1.5 %</u>	
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	
<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)
Insulation resistance	1.2.4.3 Method A or B (500 ± 50 V)	5000 M Ω 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

Inspection	BS 9520: 1981 reference and conditions of test	Requirements as in BS 9520: 1981
<u>Subgroup B2 (D)</u>	<u>Inspection level S-4, AQL 4 %</u>	
Soldering	Specimens from subgroup B1 may be used 1.2.6.6 Method 2 Recovery period 1 h Application time 10 s Bit size 3 mm	Satisfactory tinning. No loosening of part or other damage such as would impair performance
Contact resistance	1.2.4.1(1)	5 mΩ max.
Contact retention (in insert moulding)	1.2.5.3 Force as specified in 8.3 of this specification	As in 1.2.5.3 0.3 mm max. axial displacement
<u>Subgroup B8</u>		
CTR information	1.1.11 Results from the tests in subgroups B1 and B2 shall be reported as attributes information	
GROUP C	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	
<u>Subgroup C1</u>	<u>Inspection level S-3, AQL 4 %</u>	
Dimensions, outline	1.2.3.1	As specified in A.2 and A.3 of this specification

Inspection	BS 9520: 1981 reference and conditions of test	Requirements as in BS 9520: 1981
<u>Subgroup C3 (D)</u>	<u>Inspection level S-3, AQL 4 %</u> Specimens from subgroup C1 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. 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 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)b 10 mΩ max. By hand As in 1.2.6.14(2)h
<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 max. 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 measurements shall be made:	

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

Inspection	BS 9520: 1981 reference and conditions of test	Requirements as in BS 9520: 1981
<u>Subgroup C5 (D)</u> (cont'd) Insulation resistance	1.2.4.3 Method B (500 + 50 V) 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 1.2.4.4
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)
<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 tests 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	

Inspection	BS 9520: 1981 reference and conditions of test	Requirements as in BS 9520: 1981
<u>Subgroup D0</u>	Sample size: one set of piece parts for the connector range submitted for approval. 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
Mass*	1.2.5.1	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

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

† Metal housings (shells).

Inspection	BS 9520: 1981 reference and conditions of test	Requirements as in BS 9520: 1981
<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.4.3 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
Robustness of terminations	1.2.6.5(1) Not applicable (2) Applied force of 9 N (2.02 lbf) (3) Not applicable	As in 1.2.6.5(2)
<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 ± 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 1.2.6.2.1
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.

* Where cable clamps and covers are provided.

Inspection	BS 9520: 1981 reference and conditions of test	Requirements as in BS 9520: 1981
<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 ± 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 M Ω min. As in 1.2.6.11a.(ii) 10 m Ω max. By hand As in 1.2.6.11a.(vii)
<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 m Ω max.