

# Rules for the preparation of detail specifications for —

**Circular electrical connectors of  
assessed quality for d.c. and low  
frequency applications. Full, basic and  
full plus airframe assessment levels**

# Foreword

This revised British Standard prescribes the rules for the preparation of detail specifications for circular electrical connectors for d.c. and low frequency applications. It is supplementary to BS 9520 “*Specification for electrical connectors of assessed quality for d.c. and low frequency application: generic data, methods of test and capability approval procedures*”. Examples of detail specifications, in the BS 9522 range are BS 9522 N0001, N0003 and F0039.

This revision updates the rules document in the light of changes in test requirements for connectors for electronic equipment and supersedes BS 9522:1984, which is withdrawn.

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, pages 1 to 50 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 |
|----------|------|----------|
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## 1 Scope

This British Standard prescribes those special rules which in conjunction with the general rules contained in section 2 of BS 9520:1983 are required for the preparation of detail specifications for circular electrical connectors of assessed quality for frequencies below 3 MHz at the full, basic and full plus airframe assessment levels.

## 2 General

### 2.1 Contacts

Connectors designed to intermate, but which differ in having removable or non-removable contacts with solder, crimp, wire wrap, push-on etc., terminations, may be included in one detail specification. The types of contact shall be indicated in the title of the connector specification, and for removable contacts the direction of release and removal from the connector, e.g. front release, rear removable, shall be stated.

Removable contacts shall be defined in connector detail specifications by means of outline drawings and shall be identified either:

- a) by reference to the contact detail specification to which the contacts are qualified in the series BS 9521: *"Specification for removable contacts of assessed quality for electrical connectors as defined by BS 9520: generic data, methods of test and rules for the preparation of detail specifications"*  
e.g. BS 9521 F0001; or
- b) by means of digits indicating contact size, wire accommodation and contact style, preceded by the connector pattern number e.g. BS 9522 F0001/20-20M; or
- c) where a) or b) cannot be applied, by an accessory number.

### 2.2 Assessment level

The detail specification shall show the relevant assessment level, basic, full etc. (see 2.1.4 of BS 9520). Each detail specification shall refer to only one assessment level.

The performance of connectors is normally only assessed with mated pairs from the same manufacturer and in such cases the detail specification shall include a statement to this effect. In other cases, where manufacturers wish to claim functional compatibility and their connectors have been tested to demonstrate such compatibility, this fact and the tests employed shall be stated on the facing sheet of the detail specification.

In cases where a manufacturer produces only one half of a mated connector, such connectors may be tested with an approved mating part to demonstrate functional compatibility. In such cases, the detail specification shall include a statement to this effect.

In cases where two or more manufacturers wish to include a claim of functional compatibility of differing connector styles, and their connectors are tested to demonstrate such compatibility, the detail specification shall identify the appropriate agreed tests and include a statement to this effect.

See also 2.1.4 of BS 9520.

### 2.3 Title

Connectors to detail specifications in this series have the following title:

"Multi-contact, circular electrical connectors".

Typical supplementary information in the title is as follows:

"Bayonet coupling with front release, rear removable crimp contacts".

See the example detail specifications quoted in the foreword for the method of presentation of information required to be shown on the front page.

(See also BS 9000-2 and PD 9004, Circular letters Nos. 15 and 16.)

### 2.4 Pattern number

The pattern number of a connector or range of connectors shall consist of the relevant detail specification number without the letters BS e.g. Pattern 9522 N----.

2.5 Description of the connector and intended application

The description of the connector shall make reference to the method of coupling, polarization (and orientation where applicable), contact type (crimp, solder, etc., removable, non-removable), material or finish.

For connectors having removable contacts the manner of insertion, release and removal of the contacts shall be stated. Where compliance with the detail specification is dependent on a full complement of contacts being fitted and/or by the use of dummy contacts or unwired contacts with filler plugs, this shall be stated.

The description of intended application shall make reference to major performance characteristics of the connector, such as un-sealed or sealed e.g. barrier or barrier and panel sealed, environment resistant, shielded etc., and attention may also be drawn to particular uses, e.g. general purpose application.

2.6 Making of the component and package

The detail specification shall state that the marking shall be in accordance with 1.1.6 of BS 9520. The individual reference number required by 1.1.6 c) of BS 9520 consists of abbreviations to identify individual connectors accessories and tools. It is not intended that this reference number shall describe every feature of the connector. An explanation of the reference shall be included in each detail specification similar to the following:

2.6.1 Connector reference numbers:

C XXXX    XX    XXX    X X X    X

Style number \_\_\_\_\_

Housing (shell) size/contact arrangement \_\_\_\_\_

Contact style \_\_\_\_\_

Termination style \_\_\_\_\_

Polarization \_\_\_\_\_

Variant \_\_\_\_\_

|                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Style number                             | A letter C denoting Circular, followed by four digits. A typical description of a style is C 1234: Connector, fixed single hole mounting (crimp contacts). (The detail specification shall designate style and shall relate this number to a control drawing in the CC or FC series, e.g. CC/C.1234).                                                                                                                                                                                              |
| Housing (shell) size/contact arrangement | <p>A pair of digits denoting a particular housing (shell) followed by three digits denoting a particular contact arrangement for that particular housing (shell) size.</p> <p>These arrangements shall be shown in the outline drawing section of the detail specification.</p> <p>In order to facilitate automatic recognition, it is necessary to standardize the number of digits used within the reference number e.g. 8–33 and 10–6 will be expressed as C 1234 08 033 and C 1234 10 006.</p> |
| Contact style (letter)                   | <p>M = Male contact</p> <p>F = Female contact</p> <p>H = Hermaphroditic contact</p>                                                                                                                                                                                                                                                                                                                                                                                                                |
| Termination style                        | <p>C = Crimp</p> <p>S = Solder</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |

|                                                  |                                                                                                                                                                             |
|--------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                  | W = Wire wrap                                                                                                                                                               |
|                                                  | P = Push on                                                                                                                                                                 |
| Polarization                                     | Letter or digit denoting a particular arrangement of keys and keyways on housings (shells) and bodies or orientation of insert in housings, e.g. N,A,B,C,D, or 0,1,2, ..... |
| Variant                                          | A letter or digit to denote variation from basic specification, e.g. housing (shell) finish, contact finish etc. Detail specification shall designate variants.             |
|                                                  | Where no variation exists 0 shall be used.                                                                                                                                  |
| Example of reference number: C 1234 20 41 MS NO. |                                                                                                                                                                             |

### 2.6.2 Accessory add tool reference numbers

|                                         |                    |           |          |
|-----------------------------------------|--------------------|-----------|----------|
|                                         | <u>A(orT) XXXX</u> | <u>XX</u> | <u>X</u> |
| Style number                            | _____              |           |          |
| Housing (shell) size<br>or contact size | _____              |           |          |
| Variant                                 | _____              |           |          |

|                                                |                                                                                                                                                                                                                                                                                                                                       |
|------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Style number:                                  | A letter A denoting accessory or letter T denoting tool, followed by four digits. A typical description of a style is A2468 Grommet Nut assembly or T3579 Contact Insertion tool. (The detail specification shall designate styles and shall relate this number to a control drawing in the CC or FC series, e.g. CC/A2468 CC/T2018.) |
| Housing (shell) size:                          | Two digits (quoted for accessories).                                                                                                                                                                                                                                                                                                  |
| Contact size:                                  | Two digits (quoted for filler plugs or tools.)                                                                                                                                                                                                                                                                                        |
| Variant:                                       | Quoted for accessories. Digit as for connector in 2.6.1.                                                                                                                                                                                                                                                                              |
| Example accessory tool<br>reference numbers:   | A 2468 18 0<br>T 3579 20                                                                                                                                                                                                                                                                                                              |
| Example removable contact<br>reference numbers | BS 9521 F0001 20 20 M<br>[see 2.1 a)]<br>BS 9522 N0001 20 20 M<br>[see 2.1 b)]<br>A2466 [see 2.1 c)]                                                                                                                                                                                                                                  |

**2.6.3 Connector supplied complete with accessory.** Where a connector is supplied complete with an accessory, the accessory reference number is added to that of the connector, e.g. C1234 20 41 MNO A 2468.

**2.6.4 Packaging.** Packaging shall include upon request the manufacturer's assembly instructions, including wire preparation crimping and contact insertion details.

### 2.7 Ordering information

For ordering information see 2.4 of BS 9520.

### 2.8 Drawings

The detail specification shall contain drawings, in appendices as required by 2.1.5 and Appendix A of BS 9520.

## 2.9 Ratings (including conditions of use)

The following ratings shall be stated (in accordance with 1.1.12 of BS 9520) and the applicability requirements of Table 1 and Table 2 of this specification.

**2.9.1 *Electrical*.** A recommended maximum working current per individual contact sizes (in isolation) at a specified ambient temperature.

Maximum current per contact (for each contact size) through all contacts simultaneously at a specified ambient temperature.

Working and proof voltages shall be given for stated air pressure(s).

### 2.9.2 *Environmental*

Climatic classification

Low air pressure severity

Vibration severity

Bump severity

Shock severity

Acceleration severity<sup>1)</sup>

### 2.9.3 *Endurance*

Mechanical operation

Electrical load and temperature: long term (at stated current and temperature)

Electrical load and temperature: short term (no electrical load and at upper temperature severity).

## 2.10 Characteristics

The following characteristics shall be stated (in accordance with 1.1.12 of BS 9520), and the conditions under which they apply. Initial and final values shall both be stated where differences after conditioning are permitted.

### 2.10.1 *Electrical*

Maximum contact resistance

Minimum insulation resistance

Maximum housing (shell) electrical continuity resistance

### 2.10.2 *Mechanical*

Engaging and separating force, connector

Insert retention in housing (shell): test load<sup>1)</sup>

Contact retention (in insert): test load<sup>1)</sup>

Contact holding force

Pressure sealing (air leakage)<sup>1)</sup>

Pressure sealing (air leakage)<sup>1)</sup>

Wire/cable accommodation

**2.10.3 *Resistance to fluids*.** The detail specification shall state the fluids to which resistance is claimed. See Tables 1 and 2 of BS 2011-2.1R for basic and full assessment. For airframe connectors see BS G 202.

## 2.11 Certified test records (for full assessment level only)

See Appendix C of BS 9000 for an example layout.

## 2.12 Additional information

Additional drawings, notes etc., needed for the clarification of the detail specification may be given. This information is not required to be verified by the inspection requirements.

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<sup>1)</sup> Where applicable.

### 3 Quality assessment procedure

#### 3.1 Selection of specimens

The specimens for each subgroup should contain representative styles and the smallest, medium and largest size for which approval is sought. The overall sample shall include the greatest contact density for each voltage and current rating for which approval is sought in these sizes. For group D the detail specification shall include a table which indicates the combinations of connectors and accessories to be used in each set and which set is to be tested in which subgroup(s).

##### 3.1.1 Full assessment level

a) For subgroup D0, one specimen of each piece-part of the connector range submitted for approval. For subgroup D1, three specimens of connector for each reference number. However, this may be modified provided a sampling plan, agreed with the National Supervising Inspectorate (NSI), is appended to the detail specification. The layout of this should preferably be similar to that in Appendix C of the example detail specification (BS 9522 N0001 or N0003).

b) The minimum sample for subgroup D2 to D9<sup>2)</sup> inclusive is 60 specimen mated pairs complete with appropriate accessories. The minimum number of specimens for each of the subgroups D2, D3, D4, D5 and D6 is 15 pairs except in the case of Table 4 where subgroup D3 samples shall be used for subgroup D4.

For Table 1, subgroup D3 samples may be used for subgroup D4. For subgroup D6(ii) it is three samples for each contact size and these may be taken from the subgroup D3 test samples.

For subgroup D7 and D9<sup>2)</sup> it is five mated pairs; for subgroup D8(i) it is three mated pairs and these can be taken from the subgroup D2 test samples.

For subgroup D8(ii) it is two mated pairs and these shall be selected from the larger sizes of subgroup D2 test samples. Alternatively, separate samples may be used for subgroup D8(ii) tests.

##### 3.1.2 Basic assessment level

a) For subgroup D0, one specimen of each piece-part required for the connector range submitted for approval. For subgroup D1, three specimens of connector for each reference number. However, this may be modified provided that a sampling plan, agreed with the NSI, is appended to the detail specification. The layout of this should preferably be similar to that in Appendix C of the example detail specification (BS 9522 N0001 or N0003).

b) The minimum sample for subgroup D2 to D6 inclusive is 30 specimen mated pairs complete with appropriate accessories. The minimum number of specimens for each of subgroups D2, D3 and D6 is 15 mated pairs. Subgroup D2 samples may be used for subgroup D6.

#### 3.2 Information to be given in the detail specification

The following information shall be included in the detail specification, in a clause entitled "Quality assessment procedure", or elsewhere at the discretion of the specification writer.

##### 3.2.1 Acceptance criteria for group D

|                                     |                                       |
|-------------------------------------|---------------------------------------|
| Subgroups D0, D1, D4(ii), D8 and D9 | No failure allowed.                   |
| Remaining subgroups                 | One failure allowed in each subgroup. |

**3.2.2 Qualification approval.** Group C tests need not be carried out if similar tests, at the same or increased severity, are carried out in group D.

**3.2.3 Quality conformance inspection.** When group D tests are due, similar tests in group C need not be performed.

##### 3.2.4 Alternative method of maintaining qualification approval

a) **Full assessment level.** Subject to the approval of the National Supervising Inspectorate (NSI) the group C-D sequential test procedure given in Appendix A may be used.

Detail specifications invoking the procedures of Appendix A shall not make reference to group C tests.

<sup>2)</sup> For D9, one specimen pair is required for each fluid specified. If more than five fluids are specified, the extra specimens may be taken from those used for subgroup D5.

- b) **Basic assessment level.** Subgroup to the approval of the NSI, a group D sequential test procedure which has been approved by that authority may be used.

## 4 Inspection requirements

The mandatory tests in each group for the full and basic assessment levels are given with the relevant inspection levels and acceptance quality levels (AQLs) in Table 1 and Table 2. The mandatory tests for airframe assessment levels are given in Table 4. A detail specification shall contain, as a minimum, these tests, inspection levels and acceptance quality levels. The tests in any subgroup shall be performed in the order given in the inspection requirements. Table 3 lists the comparative requirements of Table 1 and Table 2.

**Table 1 — Mandatory inspection requirements for full assessment level**

Samples subjected to tests in subgroups marked “(D)” shall not be accepted for release under BS 9000 (see 20.2 of BS 9000-1).

The wires or cables to be used in the test shall be prepared in accordance with the relevant detail specification. Extruded PTFE covered wires and cables are preferred. (To ensure that the wiring operation has been carried out satisfactorily, it is advisable to apply insulation and contact resistance tests.)

| Inspection requirements                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | BS 9520 reference and conditions of test                                                                                             |                                                                                                                                           |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------|
| GROUP A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | To be applied on a sampling basis lot-by-lot, except subgroup A0. Subgroups A2 and A3 are not applicable. Subgroup A4 as applicable. |                                                                                                                                           |
| <u>Subgroup A0</u>                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | <u>100 % inspection.</u> Unless required for tests, contacts need not be fitted.                                                     |                                                                                                                                           |
| Voltage proof <sup>a</sup>                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | <b>1.2.4.5</b>                                                                                                                       | Method A or B shall be prescribed. Duration = 5 s. This requirement may be demonstrated immediately prior to final assembly.              |
| Coupling pin strength <sup>b</sup>                                                                                                                                                                                                                                                                                                                                                                                                                                                           | <b>1.2.5.15</b>                                                                                                                      | Force and rate to be specified in the detail specification. This requirement may be demonstrated immediately prior to the final assembly. |
| Visual examination                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | <b>1.2.2(a)</b>                                                                                                                      |                                                                                                                                           |
| Pressure sealing <sup>c</sup><br>(air leakage)                                                                                                                                                                                                                                                                                                                                                                                                                                               | <b>1.2.6.19.1</b>                                                                                                                    | Duration = 5 s min.                                                                                                                       |
| Pressure sealing <sup>d</sup><br>(gas leakage)                                                                                                                                                                                                                                                                                                                                                                                                                                               | <b>1.2.6.19.2</b>                                                                                                                    | Duration = 5 s min.                                                                                                                       |
| <u>Subgroup A1</u>                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | <u>Inspection level S-3, AQL 1.5 %.</u> Contacts need not be fitted.                                                                 |                                                                                                                                           |
| Visual examination                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | <b>1.2.2(b)</b>                                                                                                                      |                                                                                                                                           |
| <u>Subgroup A4</u>                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | <u>Inspection level S-3, AQL 1.5 %</u>                                                                                               |                                                                                                                                           |
| Voltage proof <sup>e</sup>                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | <b>1.2.4.5</b>                                                                                                                       | Method A or B shall be prescribed. Duration = 5 s.                                                                                        |
| <sup>a</sup> Mandatory only for sealed, hermetically sealed, and environment resistant connectors, except where dielectric assembly is necessary after release.<br><sup>b</sup> Applicable to 5 % of the production lot.<br><sup>c</sup> Applicable only to sealed connectors (excluding hermetically sealed connectors).<br><sup>d</sup> Applicable only to hermetically sealed connectors.<br><sup>e</sup> Applicable only to connectors not subject to voltage proof test in subgroup A0. |                                                                                                                                      |                                                                                                                                           |

**Table 1 — Mandatory inspection requirements for full assessment level**

|                                                             |                                                                                                                                                             |                                                                                       |
|-------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| Inspection requirements                                     | BS 9520 reference and conditions of test                                                                                                                    |                                                                                       |
| <u>Subgroup A5</u>                                          |                                                                                                                                                             |                                                                                       |
| CTR information                                             | 1.1.11                                                                                                                                                      | The results 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 contacts fitted and wired as required for tests. |                                                                                       |
| <u>Subgroup B1</u>                                          |                                                                                                                                                             |                                                                                       |
|                                                             | <u>Inspection level S-4, AQL 1 %</u>                                                                                                                        |                                                                                       |
| Gauging procedure                                           | 1.2.3.3.2                                                                                                                                                   |                                                                                       |
| Insulation resistance                                       | 1.2.4.4                                                                                                                                                     | Method A or B shall be prescribed.                                                    |
| Engaging and separating force, connector                    | 1.2.5.3                                                                                                                                                     |                                                                                       |
| Contact holding force                                       | 1.2.5.9                                                                                                                                                     | With three sizings using gauges prescribed in the detail specification.               |
| <u>Subgroup B2</u>                                          |                                                                                                                                                             |                                                                                       |
|                                                             | <u>Inspection level S-4, AQL 4 %</u> . Specimens from subgroup B1 may be used.                                                                              |                                                                                       |
| Solderability <sup>a</sup>                                  | 1.2.6.7.1                                                                                                                                                   | The method shall be prescribed.                                                       |
| Contact resistance                                          | 1.2.4.2(a)                                                                                                                                                  |                                                                                       |
| Housing (shell) electrical continuity <sup>b</sup>          | 1.2.4.3                                                                                                                                                     |                                                                                       |
| Contact retention (in insert)                               | 1.2.5.4                                                                                                                                                     | Forces to be specified in the detail specification.                                   |
| Insert retention in housing (shell), axial                  | 1.2.5.5                                                                                                                                                     |                                                                                       |
| Insert retention in housing (shell), torsional <sup>c</sup> | 1.2.5.6                                                                                                                                                     |                                                                                       |
| Grounding contact spring holding force <sup>d</sup>         | 1.2.5.16                                                                                                                                                    |                                                                                       |

<sup>a</sup> Applicable only to connectors having contacts with solder or wire-wrap terminations. A contact which has been soldered is regarded as (D).  
<sup>b</sup> Not applicable to connectors with a non-conductive finish.  
<sup>c</sup> Applicable only to connectors having removable contacts.  
<sup>d</sup> Where applicable.

Table 1 — Mandatory inspection requirements for full assessment level

| Inspection requirements                                                                                                  | BS 9520 reference and conditions of test                                                                                                                                                                            |                                                                                                                                                                                                                                                                                                             |
|--------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <u>Subgroup B8</u>                                                                                                       |                                                                                                                                                                                                                     |                                                                                                                                                                                                                                                                                                             |
| CTR information                                                                                                          | 1.1.11                                                                                                                                                                                                              | Results from the tests in subgroup B1 shall be reported as attributes information. Results from the following tests (as applicable) in subgroup B2: Solderability, contact resistance, housing (shell) electrical continuity and contact retention (in insert) shall be reported as attributes information. |
| GROUP C<br>[see 3.2.4(a)]                                                                                                | To be applied on a sampling basis at three or six-month 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> . Contacts need not be fitted.                                                                                                                                                 |                                                                                                                                                                                                                                                                                                             |
| Dimensions, outline                                                                                                      | 1.2.3.1                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                             |
| <u>Subgroup C3 (D)</u>                                                                                                   | <u>Inspection level S-3, AQL 4 %</u> . Specimens from subgroup C1 with contacts fitted may be used.                                                                                                                 |                                                                                                                                                                                                                                                                                                             |
| Contact resistant                                                                                                        | 1.2.4.2(a)                                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                             |
| Rapid change of temperature, short term                                                                                  | 1.2.6.8                                                                                                                                                                                                             | Upper and lower temperature severities.                                                                                                                                                                                                                                                                     |
| Damp heat, steady state                                                                                                  | 1.2.6.15                                                                                                                                                                                                            | Duration = 10/21 days. As applicable.                                                                                                                                                                                                                                                                       |
| <u>Final measurements</u>                                                                                                | 1.2.6.15.3                                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                             |
| Solderability <sup>a</sup>                                                                                               | 1.2.6.7.1                                                                                                                                                                                                           | The method shall be prescribed.                                                                                                                                                                                                                                                                             |
| <u>Subgroup C5 (D)</u>                                                                                                   | <u>Inspection level S-3, AQL 4 %</u>                                                                                                                                                                                |                                                                                                                                                                                                                                                                                                             |
| Mechanical operation <sup>b</sup>                                                                                        | 1.2.7.1                                                                                                                                                                                                             | 50 operations (at a rate not exceeding 15 operations per min).                                                                                                                                                                                                                                              |
| Electrical load and temperature, short term                                                                              | 1.2.7.2                                                                                                                                                                                                             | Duration = 250 h, at upper category temperature. No electrical load. During the conditioning, the following measurements shall be made.                                                                                                                                                                     |
| <sup>a</sup> Applicable only to connectors having contacts with solder or wire-wrap terminations.                        |                                                                                                                                                                                                                     |                                                                                                                                                                                                                                                                                                             |
| <sup>b</sup> Screw coupling/locking devices shall be operated evenly and progressively during engagement and separation. |                                                                                                                                                                                                                     |                                                                                                                                                                                                                                                                                                             |

**Table 1 — Mandatory inspection requirements for full assessment level**

| Inspection requirements                            | BS 9520 reference and conditions of test |                                                                                                                                                                                                              |
|----------------------------------------------------|------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <u>Subgroup C5 (D)</u> (cont'd)                    |                                          |                                                                                                                                                                                                              |
| Insulation resistance <sup>a</sup>                 | <b>1.2.4.4</b>                           | Method B. Mated and at upper temperature severity.<br>Measured eight times at the intervals of not less than 24 h.<br><br>After 1½ h to 2 h recovery. Specimens shall remain mated, unless otherwise stated. |
| <u>Final measurements</u>                          |                                          |                                                                                                                                                                                                              |
| Voltage proof                                      | <b>1.2.4.5</b>                           | Method B.                                                                                                                                                                                                    |
| Housing (shell) electrical continuity <sup>b</sup> | <b>1.2.4.3</b>                           |                                                                                                                                                                                                              |
| Contact resistance                                 | <b>1.2.4.2(a)</b>                        |                                                                                                                                                                                                              |
| Engaging and separating force, connector           | <b>1.2.5.3</b>                           |                                                                                                                                                                                                              |
| Visual examination                                 | <b>1.2.2(c)</b><br><b>1.2.2(d)</b>       |                                                                                                                                                                                                              |
| Pressure sealing <sup>c</sup> (air leakage)        | <b>1.2.6.19.1(b)</b>                     | Specimens unmated.                                                                                                                                                                                           |
| Pressure sealing <sup>d</sup> (gas leakage)        | <b>1.2.6.19.2</b>                        | Specimens unmated.                                                                                                                                                                                           |
| Pressure sealing <sup>ce</sup> (air leakage)       | <b>1.2.6.19.1(b)</b>                     | At the upper temperature severity. Specimens unmated.                                                                                                                                                        |
| Pressure sealing <sup>de</sup> (gas leakage)       | <b>1.2.6.19.2</b>                        | At the upper temperature severity. Specimens unmated.                                                                                                                                                        |

<sup>a</sup> Method B has many parallel paths. The value of I/R is therefore lowered by the number of paths. The value of I/R is determined by the number of parallel paths defined by method B.

<sup>b</sup> Not applicable to connectors with a non-conductive finish.

<sup>c</sup> Applicable only to sealed connectors (excluding hermetically sealed connectors).

<sup>d</sup> Applicable only to hermetically sealed connectors.

<sup>e</sup> This measurement may be applied immediately following **1.2.7.2** (Electrical load and temperature test).

Table 1 — Mandatory inspection requirements for full assessment level

|                                                                                        |                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                                              |
|----------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Inspection requirements                                                                | BS 9520 reference and conditions of test                                                                                                                                                                                                                                    |                                                                                                                                                                                                                                                                                                                                                                              |
| <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.<br><br>The final contact resistance and insulation resistance results of the tests in subgroup C3 and the final contact resistance and minimum insulation resistance at upper category temperature in subgroup C5 shall be reported as measurements information. |
| GROUP D<br>[see 3.2.4(a)]                                                              | To be applied at three-year intervals. Wire or cable of maximum insulation diameter shall be used for approximately half the test specimens and minimum insulation diameter for the remainder. The issue number of the manufacturing drawing shall be checked and recorded. |                                                                                                                                                                                                                                                                                                                                                                              |
| <u>subgroup D0</u>                                                                     |                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                                              |
| For sample size see clause 3 of this standard.                                         |                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                                              |
| Dimensions, details and materials                                                      | 1.2.3.2                                                                                                                                                                                                                                                                     | Identical piece-parts used in different style number connectors need not be re-checked. When available an inspection record made at the time of the production of the parts and certified by the manufacturer and NSI shall discharge this requirement within a period of 2 years.                                                                                           |
| <u>Subgroup D1</u>                                                                     |                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                                              |
| For sample size see clause 3 of this standard.                                         |                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                                              |
| Dimensions, outline                                                                    | 1.2.3.1                                                                                                                                                                                                                                                                     |                                                                                                                                                                                                                                                                                                                                                                              |
| Mass <sup>a</sup>                                                                      | 1.2.5.2                                                                                                                                                                                                                                                                     | Including contacts.                                                                                                                                                                                                                                                                                                                                                          |
| Gauging procedure                                                                      | 1.2.3.3.1<br>1.2.3.3.3 <sup>b</sup><br>1.2.3.3.4 <sup>b</sup>                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                                                                                                              |
| Compass safe distance <sup>ab</sup>                                                    | 1.2.5.12                                                                                                                                                                                                                                                                    | For this test only, the sample size is one mated pair of each of the largest and smallest connectors (including accessories if applicable).                                                                                                                                                                                                                                  |
| <sup>a</sup> These tests shall be carried out for initial qualification approval only. |                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                                              |
| <sup>b</sup> If declared applicable.                                                   |                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                                              |

**Table 1 — Mandatory inspection requirements for full assessment level**

|                                                                                                                                                                           |                                                 |                                                                                    |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------|------------------------------------------------------------------------------------|
| Inspection requirements                                                                                                                                                   | BS 9520 reference and conditions of test        |                                                                                    |
| <u>Subgroup D2 (D)</u>                                                                                                                                                    | For sample sizes see clause 3 of this standard. |                                                                                    |
| Insert ageing <sup>a</sup>                                                                                                                                                | 1.2.5.11                                        | Nine insertions and withdrawals using tools specified in the detail specification. |
| Contact dislodgement by cable nutation <sup>b</sup>                                                                                                                       | 1.2.5.17                                        |                                                                                    |
| Probe damage <sup>c</sup>                                                                                                                                                 | 1.2.5.10                                        | Tool and test probes to be prescribed in the detail specification.                 |
| Cable clamping <sup>de</sup>                                                                                                                                              | 1.2.5.8                                         | As applicable.                                                                     |
| Mechanical impact <sup>de</sup>                                                                                                                                           | 1.2.5.7                                         | Five impacts.                                                                      |
| Resistance to soldering heat <sup>fe</sup>                                                                                                                                | 1.2.6.7.2                                       | The method shall be prescribed.                                                    |
| Contact retention (in insert) <sup>g</sup>                                                                                                                                | 1.2.5.4                                         | Forces to be specified in the detail specification.                                |
| Robustness of terminations <sup>h</sup>                                                                                                                                   | 1.2.6.6                                         | The detail specification shall prescribe those tests which are applicable.         |
| Locking wire pull out                                                                                                                                                     | 1.2.5.33                                        | May be carried out on piece-parts prior to assembly.                               |
| <u>Subgroup D3 (D)</u>                                                                                                                                                    | For sample size see clause 3 of this standard.  |                                                                                    |
| Bump                                                                                                                                                                      | 1.2.6.2                                         |                                                                                    |
| Vibration, general                                                                                                                                                        | 1.2.6.3.1                                       |                                                                                    |
| Shock                                                                                                                                                                     | 1.2.6.4                                         |                                                                                    |
| Acceleration, steady state <sup>c</sup>                                                                                                                                   | 1.2.6.5                                         |                                                                                    |
| Final measurements                                                                                                                                                        |                                                 |                                                                                    |
| <sup>a</sup> Applicable only to connectors having removable contacts.                                                                                                     |                                                 |                                                                                    |
| <sup>b</sup> Applicable only to connectors having rear release/removable contacts.                                                                                        |                                                 |                                                                                    |
| <sup>c</sup> If declared applicable.                                                                                                                                      |                                                 |                                                                                    |
| <sup>d</sup> Where cable clamps are provided and/or where used in a free connector application.                                                                           |                                                 |                                                                                    |
| <sup>e</sup> These tests shall be carried out for initial qualification approval only.                                                                                    |                                                 |                                                                                    |
| <sup>f</sup> Applicable only to connectors having contacts with solder or wire-wrap terminations. This test shall be carried out for initial qualification approval only. |                                                 |                                                                                    |
| <sup>g</sup> Applicable only to connectors having non-removable contacts.                                                                                                 |                                                 |                                                                                    |
| <sup>h</sup> Not applicable to connectors having contacts with crimped terminations.                                                                                      |                                                 |                                                                                    |

Table 1 — Mandatory inspection requirements for full assessment level

|                                                                                                                                                                                                                       |                                                       |                                                                                                                           |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------|
| Inspection requirements                                                                                                                                                                                               | BS 9520 reference and conditions of test              |                                                                                                                           |
| <u>Subgroup D3 (D)</u> (Cont'd)                                                                                                                                                                                       |                                                       |                                                                                                                           |
| Visual examination                                                                                                                                                                                                    | <b>1.2.2(d)</b>                                       |                                                                                                                           |
| Pressure sealing <sup>a</sup><br>(air leakage)                                                                                                                                                                        | <b>1.2.6.19.1(b)</b>                                  |                                                                                                                           |
| Pressure sealing <sup>b</sup><br>(gas leakage)                                                                                                                                                                        | <b>1.2.6.19.2</b>                                     |                                                                                                                           |
| <u>Subgroup D4 (D)</u>                                                                                                                                                                                                | For sample size see clause <b>3</b> of this standard. |                                                                                                                           |
| <u>Subgroup D4 (i)</u>                                                                                                                                                                                                |                                                       |                                                                                                                           |
| Rapid change of temperature                                                                                                                                                                                           | <b>1.2.6.8</b>                                        | Upper and lower temperature severities.                                                                                   |
| Climatic sequence, general                                                                                                                                                                                            | <b>1.2.6.12</b>                                       | After 1½ h to 2 h recovery specimens shall remain mated unless otherwise stated.                                          |
| Final measurements <sup>c</sup>                                                                                                                                                                                       | <b>1.2.6.12</b>                                       | As applicable. To be prescribed in the detail specification.                                                              |
| <u>Subgroup D4 (ii)</u>                                                                                                                                                                                               | Sample size: one unmated pair                         |                                                                                                                           |
| Flammability <sup>d</sup>                                                                                                                                                                                             | <b>1.2.6.9</b>                                        |                                                                                                                           |
| <u>Subgroup D5 (D)</u>                                                                                                                                                                                                | For sample size see clause <b>3</b> of this standard. |                                                                                                                           |
| Immersion (at low air pressure) <sup>e</sup>                                                                                                                                                                          | <b>1.2.6.13</b>                                       | Insulation resistance limit.                                                                                              |
| Sealing, immersion <sup>f</sup>                                                                                                                                                                                       | <b>1.2.6.14</b>                                       |                                                                                                                           |
| Damp heat, steady state                                                                                                                                                                                               | <b>1.2.6.15</b>                                       | Duration: 21/56 days (as applicable).<br>After 1½ h to 2 h recovery specimens shall remain mated unless otherwise stated. |
| Final measurements                                                                                                                                                                                                    | <b>1.2.6.15.3</b>                                     |                                                                                                                           |
| <sup>a</sup> Applicable only to sealed connectors (excluding hermetically sealed connectors).                                                                                                                         |                                                       |                                                                                                                           |
| <sup>b</sup> Applicable only to hermetically sealed connectors.                                                                                                                                                       |                                                       |                                                                                                                           |
| <sup>c</sup> For sealed (excluding hermetically sealed) connectors final measurements shall include sealing at low temperature category if not carried out during the climatic sequence test <b>1.2.6.12</b> .        |                                                       |                                                                                                                           |
| <sup>d</sup> This test shall be carried out for initial qualification approval only.                                                                                                                                  |                                                       |                                                                                                                           |
| <sup>e</sup> Applicable only to environmental resistant, sealed and hermetically sealed connectors. This test may be made after damp heat, steady state <b>1.2.6.15</b> if so prescribed in the detail specification. |                                                       |                                                                                                                           |
| <sup>f</sup> Applicable only if test immersion (at low air pressure) <b>1.2.6.13</b> is not carried out.                                                                                                              |                                                       |                                                                                                                           |

**Table 1 — Mandatory inspection requirements for full assessment level**

| Inspection requirements                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | BS 9520 reference and conditions of test       |                                                                                                                                                                                  |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Subgroup D6 (D)</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | For sample size see clause 3 of this standard. |                                                                                                                                                                                  |
| Mechanical operation <sup>a</sup>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | <b>1.2.7.1</b>                                 | 300 operations minimum (at not exceeding 15 operations per min)                                                                                                                  |
| Electrical load and temperature, long term                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | <b>1.2.7.2</b>                                 | Duration = 1 000 h at temperature and current prescribed in detail specification.<br><br>The temperature of the specimen shall be maintained and the following measurement made: |
| Insulation resistance <sup>b</sup>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | <b>1.2.4.4</b>                                 | Method B. Mated and at upper temperature severity.                                                                                                                               |
| Mechanical load and temperature                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | <b>1.2.7.3</b>                                 | After 1½ h to 2 h recovery. Specimens shall remain mated unless otherwise stated.                                                                                                |
| <b>Final measurements</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                |                                                                                                                                                                                  |
| Voltage proof                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | <b>1.2.4.5</b>                                 |                                                                                                                                                                                  |
| Housing (shell) <sup>c</sup> electrical continuity                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | <b>1.2.4.3</b>                                 |                                                                                                                                                                                  |
| Contact resistance                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | <b>1.2.4.2(a)</b>                              |                                                                                                                                                                                  |
| Engaging and separating force, connector                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | <b>1.2.5.3</b>                                 |                                                                                                                                                                                  |
| Grounding contact spring holding force <sup>d</sup>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | <b>1.2.5.16</b>                                |                                                                                                                                                                                  |
| Visual examination <sup>e</sup>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | <b>1.2.2(c)</b><br><b>1.2.2(d)</b>             |                                                                                                                                                                                  |
| Pressure sealing (air leakage)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | <b>1.2.6.19.1(b)</b>                           | Specimens unmated.                                                                                                                                                               |
| <sup>a</sup> Where practicable screw coupling/locking devices need only be used for the initial 10 % of operations. They shall be operated evenly and progressively during engagement and separation.<br><sup>b</sup> Method B has many parallel paths. The value of I/R is therefore lowered by the number of paths. The value of I/R is determined by the number of parallel paths defined by method B.<br><sup>c</sup> Not applicable to connectors with non-conductive finishes.<br><sup>d</sup> Where applicable.<br><sup>e</sup> Applicable only to sealed connectors (excluding hermetically sealed connectors). |                                                |                                                                                                                                                                                  |