

INTERNATIONAL STANDARD

IEC
60603-7-7

First edition
2002-04

Connectors for electronic equipment –

Part 7-7:

**Detail specification for 8-way, shielded,
free and fixed connectors, for data
transmission with frequencies up to 600 MHz
(category 7, shielded)**

(<https://standards.iteh.ai>)

Document Preview

<https://standards.iteh.ai/standards/iec/60603-7-7:2002>

<https://standards.iteh.ai/standards/iec/60603-7-7:2002>



Reference number
IEC 60603-7-7:2002(E)

Publication numbering

As from 1 January 1997 all IEC publications are issued with a designation in the 60000 series. For example, IEC 34-1 is now referred to as IEC 60034-1.

Consolidated editions

The IEC is now publishing consolidated versions of its publications. For example, edition numbers 1.0, 1.1 and 1.2 refer, respectively, to the base publication, the base publication incorporating amendment 1 and the base publication incorporating amendments 1 and 2.

Further information on IEC publications

The technical content of IEC publications is kept under constant review by the IEC, thus ensuring that the content reflects current technology. Information relating to this publication, including its validity, is available in the IEC Catalogue of publications (see below) in addition to new editions, amendments and corrigenda. Information on the subjects under consideration and work in progress undertaken by the technical committee which has prepared this publication, as well as the list of publications issued, is also available from the following:

- **IEC Web Site** (www.iec.ch)

- **Catalogue of IEC publications**

The on-line catalogue on the IEC web site (www.iec.ch/catlg-e.htm) enables you to search by a variety of criteria including text searches, technical committees and date of publication. On-line information is also available on recently issued publications, withdrawn and replaced publications, as well as corrigenda.

- **IEC Just Published**

This summary of recently issued publications (www.iec.ch/JP.htm) is also available by email. Please contact the Customer Service Centre (see below) for further information.

- **Customer Service Centre**

If you have any questions regarding this publication or need further assistance, please contact the Customer Service Centre:

Email: custserv@iec.ch
Tel: +41 22 919 02 11
Fax: +41 22 919 03 00

CONTENTS

FOREWORD.....	7
1 General	9
1.1 Scope.....	9
1.2 Normative references	9
2 IEC type designation	11
2.1 Terminology.....	12
2.2 Marking	12
2.3 Main functions	12
2.4 Interchangeability	12
3 Common features and isometric view	14
3.1 Isometric view	14
3.2 Mating information	15
4 Dimensions.....	22
4.1 General	22
4.2 Type C free connectors – switch actuator dimensions	22
4.3 Terminations – fixed and free connectors.....	23
5 Gauges.....	23
5.1 Fixed connectors	23
5.2 Free connectors	27
5.3 Switch actuator gauges.....	29
6 Characteristics.....	29
6.1 General	29
6.2 Classification into climatic categories	29
6.3 Creepage and clearance distance	30
6.4 Electrical characteristics	30
6.5 Transmission characteristics, category 7.....	32
6.6 Mechanical characteristics	33
7 Tests and test schedule	34
7.1 General	34
7.2 Test procedures and measuring methods.....	34
7.3 Preconditioning.....	34
7.4 Wiring and mounting of specimens	34
7.5 Test schedules	36
Annex A (normative) Gauging requirements.....	43
A.1 Fixed connectors.....	43
A.2 Free connectors	43
Annex B (normative) Locking device mechanical operation – Test procedure and requirements.....	44
B.1 Object.....	44
B.2 Preparation of the specimens	44
B.3 Test method.....	44
B.4 Final measurements.....	44

Annex C (normative) High frequency (category 7) transmission interoperability testing	45
C.1 Object.....	45
C.2 Test equipment.....	45
C.3 Free connector precision test fixture construction.....	45
C.4 Fixed connector precision test fixture construction.....	46
C.5 Alternate fixed or free connector test fixture	46
C.6 Test fixture requirements	46
C.7 Test procedure.....	46
Annex D (normative) General requirements for the measurement set-up.....	47
D.1 Test instrumentation	47
D.2 Coaxial cables and test leads for network analysers	47
D.3 Measurement precautions	47
D.4 Balun requirements.....	48
D.5 Reference components for calibration	49
D.6 Termination loads for termination of conductor pairs.....	49
D.7 Termination of screens.....	50
D.8 Test specimen and reference planes.....	50
Annex E (normative) Insertion loss	52
E.1 Object.....	52
E.2 Test method.....	52
E.3 Test set up.....	52
E.4 Procedure.....	52
E.5 Test report.....	53
E.6 Accuracy.....	53
Annex F (normative) Return loss	54
F.1 Object.....	54
F.2 Test method.....	54
F.3 Test set-up	54
F.4 Procedure.....	54
F.5 Test report.....	54
F.6 Accuracy.....	54
Annex G (normative) Near end cross talk	56
G.1 Object.....	56
G.2 Test method.....	56
G.3 Test set-up	56
G.4 Procedure.....	57
G.5 Test report.....	58
G.6 Accuracy.....	58
Annex H (normative) Far end cross talk.....	59
H.1 Object.....	59
H.2 Test method.....	59

H.3	Test set-up	59
H.4	Procedure	60
H.5	Test report	61
H.6	Accuracy	61
Annex I (normative) Longitudinal conversion loss		62
I.1	Object	62
I.2	Test method	62
I.3	Test set-up	62
I.4	Procedure	63
I.5	Test report	63
I.6	Accuracy	63
Annex J (normative) Transfer impedance		64
J.1	Object	64
J.2	Test method	64
J.3	Definitions	64
J.4	Test set-up	65
J.5	Procedure	68
J.6	Test report	69
J.7	Accuracy	69
Annex K (normative) Coupling attenuation		70
K.1	Object	70
K.2	Test method	70
K.3	Test equipment and set-up	70
K.4	Procedure	71
K.5	Test report	71
Annex L (normative) Termination of balun		73
L.1	Termination of balun with low return loss for common mode	73
Annex M (normative) Gauge dimensions supplement for switch actuator for use with standard IEC 60603-7 series connectors		74
M.1	Fixed connectors	74
M.2	Free connectors	77
Annex N (normative) Switch function		79
N.1	Basic switch function	79
N.2	Alternate switch function	80
Figure 1 – Examples fixed and free connectors, free connector shown with both switch positions		14
Figure 2 – Physical interface, contacts interface, see table 1		15
Figure 3 – Physical interface, switch actuator, see table 1		16
Figure 4 – Physical interface, fixed connector contacts, front view, see table 2		18

Figure 5 – Physical interface, fixed connector contacts, side view, see table 2	18
Figure 6 – Physical interface, free connector contacts, see table 3.....	20
Figure 7 – Free connector, switch actuator dimensions, see table 4	22
Figure 8 – Fixed connector GO gauge, see table 5	24
Figure 9 – Fixed connector NO-GO gauges, see table 5	25
Figure 10 – Free connector NO-GO gauges, see table 6.....	27
Figure 11 – Free connector GO gauges, see table 7	28
Figure 12 – Connector derating curve.....	31
Figure 13 – Arrangement for contact resistance measurement.....	35
Figure 14 – Arrangement for dynamic stress tests	36
Figure C.1 – Free connector precision test fixture	45
Figure C.2 – Fixed connector precision test fixture	46
Figure D.1 – 180° hybrid used as a balun	48
Figure D.2 – Calibration of reference loads.....	49
Figure D.3 – Resistor load.....	50
Figure D.4 – Definition of reference planes.....	51
Figure E.1 – Calibration.....	52
Figure E.2 – Measuring set-up.....	53
Figure G.1 – NEXT measurement for differential mode only terminations	56
Figure G.2 – NEXT measurement differential and common mode terminations.....	57
Figure H.1 – FEXT measurement for differential mode only terminations.....	59
Figure H.2 – FEXT measurement for differential and common mode terminations	60
Figure I.1 – LCL measurement.....	62
Figure J.1 – Preparation of test specimen.....	65
Figure J.2 – Triaxial test set-up.....	66
Figure J.3 – Impedance matching for $R_1 < 50 \Omega$	67
Figure J.4 – Impedance matching for $R_1 > 50 \Omega$	68
Figure L.1 – Balanced attenuator for balun centre tap grounded.....	73
Figure L.2 – Balanced attenuator for balun centre tap open	73
Figure M.1 – Fixed connector switch GO gauge, see table M.1	74
Figure M.2 – Fixed connector switch NO-GO gauges, see table M.1	75
Figure M.3 – Free connector switch NO-GO gauges, see table M.2.....	77
Figure M.4 – Free connector switch GO gauges, see table M.2.....	78
Figure N.1 – Basic switch function.....	79
Figure N.2 – Alternate switch function	80
Table 1 – Physical interface contacts interface and switch actuator dimensions	17
Table 2 – Physical interface, fixed connector contacts dimensions.....	19
Table 3 – Physical interface, free connector contact dimensions	21
Table 4 – Free connector, switch actuator dimensions	22
Table 5 – Fixed connector gauge dimensions	26
Table 6 – Free connector NO-GO gauges dimensions	28
Table 7 – Free connector GO gauges dimensions.....	29
Table 8 – Climatic categories – selected values.....	30
Table 9 – Minimum distances	30
Table 10 – Test group P.....	37

Table 11 – Test group AP	38
Table 12 – Test group BP	39
Table 13 – Test group CP	40
Table 14 – Test group DP	40
Table 15 – Test group EP	41
Table 16 – Test group FP	42
Table D.1 – Test balun performance characteristics	48
Table F.1 – Uncertainty band of return loss measurement at frequencies below 100 MHz	55
Table M.1 – Fixed connector switch gauge dimensions	76
Table M.2 – Free connector switch gauge dimensions	78

Withheld

iTech Standards
(<https://standards.iteh.ai>)
Document Preview

<https://standards.iteh.ai/standards/iec/60603-7-7-2002>

<https://standards.iteh.ai/standards/iec/60603-7-7-2002>

INTERNATIONAL ELECTROTECHNICAL COMMISSION

CONNECTORS FOR ELECTRONIC EQUIPMENT –**Part 7-7: Detail specification for 8-way, shielded,
free and fixed connectors, for data transmission with frequencies
up to 600 MHz (category 7, shielded)**

FOREWORD

- 1) The IEC (International Electrotechnical Commission) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of the IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, the IEC publishes International Standards. Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. The IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
- 2) The formal decisions or agreements of the IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested National Committees.
- 3) The documents produced have the form of recommendations for international use and are published in the form of standards, technical specifications, technical reports or guides and they are accepted by the National Committees in that sense.
- 4) In order to promote international unification, IEC National Committees undertake to apply IEC International Standards transparently to the maximum extent possible in their national and regional standards. Any divergence between the IEC Standard and the corresponding national or regional standard shall be clearly indicated in the latter.
- 5) The IEC provides no marking procedure to indicate its approval and cannot be rendered responsible for any equipment declared to be in conformity with one of its standards.

The International Electrotechnical Commission (IEC) draws attention to the fact that it is claimed that compliance with this International Standard may involve the use of patent(s).

The IEC takes no position concerning the evidence, validity and scope of this patent right.

The holder of this patent right has assured the IEC that he is willing to negotiate licences under reasonable and non-discriminatory terms and conditions with applicants throughout the world. In this respect, the statement of the holder of this patent right is registered with the IEC. Information may be obtained from:

Nexans
16, rue de Monceau
75008 Paris
France

Attention is drawn to the possibility that some of the elements of this International Standard may be the subject of patent rights other than those identified above. IEC shall not be held responsible for identifying any or all such patent rights.

International Standard IEC 60603-7-7 has been prepared by subcommittee 48B: Connectors, of IEC technical committee 48: Electromechanical components and mechanical structures for electronic equipment.

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

FDIS	Report on voting
48B/1166, 1166A/FDIS	48B/1214/RVD

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

This publication has been drafted in accordance with the ISO/IEC Directives, Part 3.

Annexes A, B, C, D, E, F, G, H, I, J, K, L, M and N form an integral part of this standard.

The committee has decided that the contents of this publication will remain unchanged until 2002. At this date, the publication will be

- reconfirmed;
- withdrawn;
- replaced by a revised edition, or
- amended.

Withdawn

iTeh Standards
(<https://standards.iteh.ai>)
Document Preview

[IEC 60603-7-7:2002](https://standards.iteh.ai/standards/iec/60603-7-7-2002)

<https://standards.iteh.ai/standards/iec/60603-7-7-2002>

CONNECTORS FOR ELECTRONIC EQUIPMENT –

Part 7-7: Detail specification for 8-way, shielded, free and fixed connectors, for data transmission with frequencies up to 600 MHz (category 7, shielded)

1 General

1.1 Scope

This part of IEC 60603 covers 8 way connectors, up to 4 pairs, to be used up to 600 MHz, when used with an appropriate cable. These cables are specified in the IEC 61156 series and used in cabling systems specified in ISO/IEC 11801¹.

The connectors are backward compatible with the already defined IEC 60603-7-X connectors.²

The connectors are interoperable with the already defined IEC 60603-7-X connectors.³

1.2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 60068-1, *Environmental testing – Part 1: General and guidance*

IEC 60068-2-14, *Basic environmental testing procedures – Part 2: Tests – Test N: Change of temperature*

IEC 60068-2-38, *Basic environmental testing procedures – Part 2: Tests – Test Z/AD: Composite temperature/humidity cyclic test*

IEC 60169-16, *Radio-frequency connectors – Part 16: R.F. coaxial connectors with inner diameter of outer conductor 7 mm (0,276 in) with screw coupling – Characteristic impedance 50 ohms (75 ohms) (Type N)*

IEC 60352-2:1990, *Solderless connections – Part 2: Solderless crimped connections – General requirements, test methods and practical guidance*

IEC 60352-3:1993, *Solderless connections – Part 3: Solderless accessible insulation displacement connections – General requirements, test methods and practical guidance*

IEC 60352-4:1994, *Solderless connections – Part 4: Solderless non-accessible insulation displacement connections – General requirements, test methods and practical guidance*

IEC 60352-5:2001, *Solderless connections – Part 5: Press-in connections – General requirements, test methods and practical guidance*

¹ ISO/IEC 11801 contains various 'category' designations corresponding to various frequency ranges.

² Backward compatibility definition and requirements are given in 2.4.2.

³ Interoperability definition and requirements are given in 2.4.3.

IEC 60352-6:1994, *Solderless connections – Part 6: Insulation piercing connections – General requirements, test methods and practical guidance*

IEC 60512 (all parts), *Connectors for electronic equipment – Tests and measurements*

IEC 60512-1-100, *Connectors for electronic equipment – Tests and measurements – Part 1-100: General – Applicable publications*

IEC 60603-7, *Connectors for frequencies below 3 MHz for use with printed boards – Part 7: Detail specification for connectors, 8-way, including fixed and free connectors with common mating features, with assessed quality*

IEC 60603-7-1, *Connectors for electronic equipment – Part 7-1: Detail specification for 8-way, shielded free and fixed connectors with common mating features, with assessed quality*

IEC 60807-1, *Rectangular connectors for frequencies below 3 MHz – Part 1: Generic specification – General requirements and guide for the preparation of detail specifications for connectors with assessed quality*

IEC 61076-1:1995, *Connectors with assessed quality for use in d.c., low frequency analogue and in digital high speed data applications – Part 1: Generic specification*

IEC/PAS 61076-3-110:2002, *Connectors for electronic equipment – Part 3-110: Detail specification for 8 way connectors for frequencies up to 600 MHz*

IEC 61156 (all parts), *Multicore and symmetrical pair/quad cables for digital communications*

IEC 61196 (all parts), *Radio-frequency cables*

ISO/IEC 11801, *Information technology – Generic cabling for customer premises*

<https://www.iso.org/standard/55063.html> ISO 1302, *Technical drawings – Method of indicating surface texture*

ITU-T G.117, *Transmission aspects of unbalance about earth*

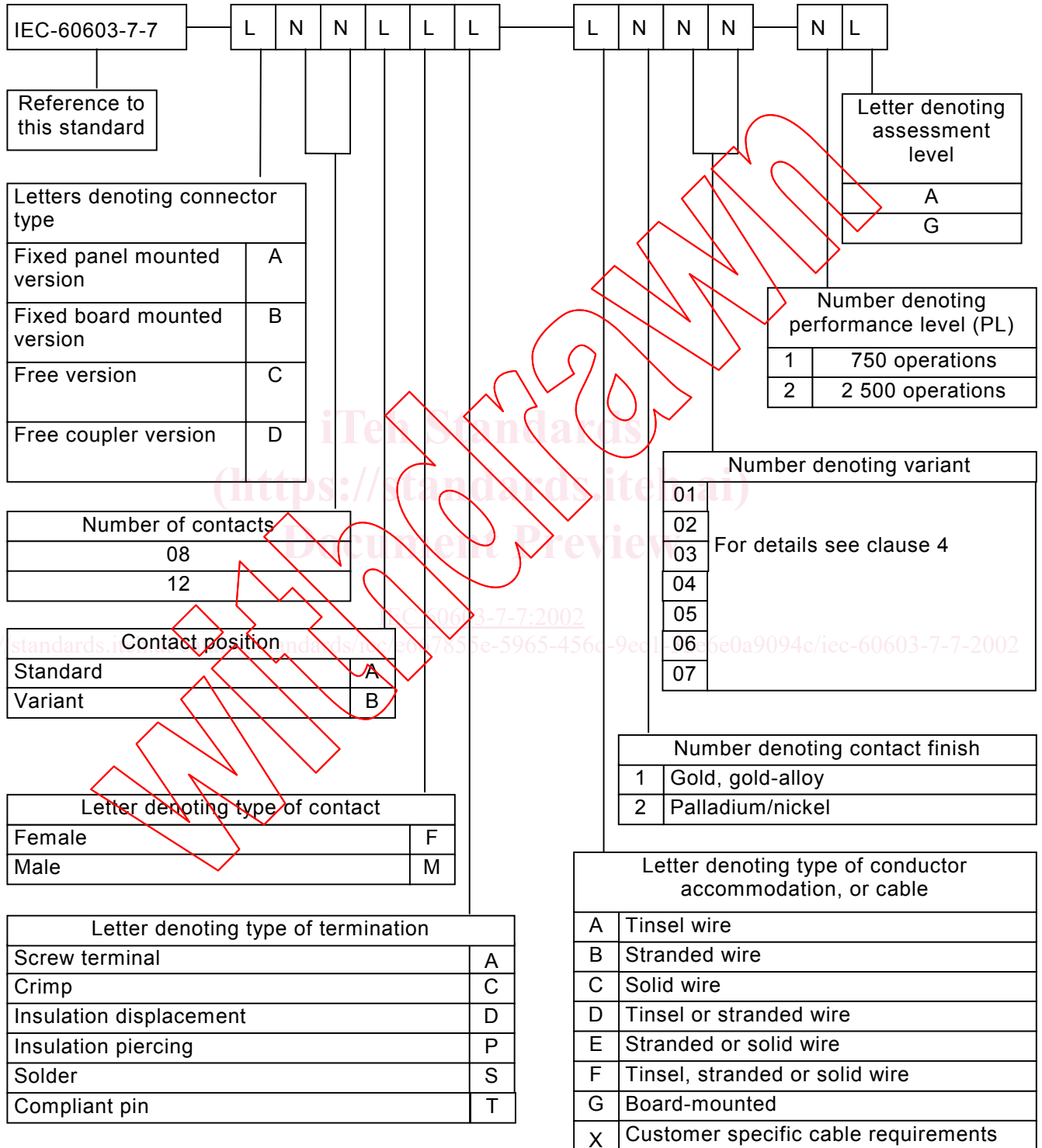
ITU-T K.20, *Resistibility of telecommunication equipment installed in a telecommunications centre to overvoltages and overcurrents*

ITU-T O.9, *Measuring arrangements to assess the degree of unbalance about earth*

CENELEC PREN 50289-1-6, *Communication Cables – Specifications for Test Methods – Part 1-6: Electrical Test Methods – Electromagnetic Performance*

2 IEC type designation

Connectors, connector bodies and connectors with pre-inserted contacts according to this standard shall be designated by the following system (see IEC 60603-7-1).



NOTE "L" stands for letter
 "N" stands for number

Example:

IEC 60603-7-7 C08AFD-C101-2G: Free shielded connector, IDC-contact, having 8 female contacts in standard contact positions, gold plated to be used with solid wires, meeting performance level 2, assessment level G.

2.1 Terminology

The terminology used in and applicable to this specification is stated in 2.1 of IEC 61076-1. Some applicable terms are also covered in IEC 60512-1.

2.2 Marking

Each connector and/or its associated package shall be marked in accordance with the requirements specified in 2.6 of IEC 61076-1.

2.3 Main functions

These connectors are compatible with IEC 60603-7 series connectors insofar as described in 2.4.

The two most widely separated pairs of contacts of the 4 original pairs of contacts, normally used in IEC 60603-7 series connectors at and below 250 MHz, are used herein for applications above 250 MHz.

Two additional pairs of contacts located opposite the 4 original pairs of contacts are included to provide a total of 4 pairs for applications above 250 MHz. The remaining two of the 4 original pairs of contacts are available for use in applications at and below 250 MHz.

A switch is employed within the connectors to engage transmission paths between 4 pairs of terminations and the respective pairs of contacts operating above 250 MHz or below.

The fixed connector switch is actuated by a protrusion added onto the end of a standard shaped IEC 60603-7 series free connector (type C) (plug).

The free connector switch is actuated by two protrusions added onto each side of a standard shaped IEC 60603-7 series free connector (type C) (plug) (see figure 1).

A total of 12 contacts (6 pairs) and 8 terminations (4 pairs) are described herein for the connectors. At any one time, a maximum of 8 contacts (4 pairs) are engaged by the switch for transmission by connecting 8 contacts to the 8 terminations. The remaining 4 contacts (2 pairs) shall be disengaged or connected to a common termination (shield if present).

The wiring convention and the circuit arrangement of the basic switch is detailed in annex N.

2.4 Interchangeability

These connectors are intermateable, interoperable and backward compatible with all IEC 60603-7 series connectors.

In this standard, 'lower level IEC 60603-7 series connector' refers to a connector conforming to an IEC 60603-7 series specification for a lower application transmission frequency range than 600 MHz, such as 100 MHz or 250 MHz.

The original 4 pairs of contacts and the shield contacts specified for lower level IEC 60603-7 series connectors are given for reference and their specifications given in this standard conform to the specifications for IEC 60603-7 series connectors.