

INTERNATIONAL STANDARD

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**Radio frequency and coaxial cable assemblies –
Part 4-3: Detail specification for semi-rigid cable assemblies – Frequency
range up to 6 000 MHz, type 50-12 low loss semi-rigid coaxial cable**

**Cordons coaxiaux et cordons pour fréquences radioélectriques –
Partie 4-3: Spécification particulière pour les cordons semi rigides –
Plage de fréquences jusqu'à 6 000 MHz, câble coaxial semi-rigide à faibles
pertes de type 50-12**



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INTERNATIONAL ELECTROTECHNICAL COMMISSION

RADIO FREQUENCY AND COAXIAL CABLE ASSEMBLIES –**Part 4-3: Detail specification for semi-rigid cable assemblies – Frequency range up to 6 000 MHz, type 50-12 low loss semi-rigid coaxial cable**

FOREWORD

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IEC 60966-4-3 has been prepared by IEC technical committee 46: Cables, wires, waveguides, RF connectors, RF and microwave passive components and accessories. It is an International Standard.

The text of this International Standard is based on the following documents:

Draft	Report on voting
46/883/FDIS	46/894/RVD

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

The language used for the development of this International Standard is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/standardsdev/publications.

A list of all parts in the IEC 60966 series, published under the general title *Radio frequency and coaxial cable assemblies*, can be found on the IEC website.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under webstore.iec.ch in the data related to the specific document. At this date, the document will be

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RADIO FREQUENCY AND COAXIAL CABLE ASSEMBLIES –

Part 4-3: Detail specification for semi-rigid cable assemblies – Frequency range up to 6 000 MHz, type 50-12 low loss semi-rigid coaxial cable

1 Scope

This part of IEC 60966 is a detail specification that relates to semi-rigid cable assemblies composed of type 50-12 low loss semi-rigid coaxial cables and connectors such as type 7-16 (IEC 61169-4), type 4.1-9.5 (IEC 61169-11), type N (IEC 61169-16), type S7-16 (IEC 61169-53) or type 4.3-10 (IEC 61169-54).

This detail specification applies to the cable assemblies (jumper cables) for mobile communication, particularly for the cable assemblies used between the main feeder and antennas or between the main feeder and equipment system or between remote radio heads and antennas. The operating frequency is up to 6 000 MHz.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 60068-2-11, *Environmental testing – Part 2-11: Tests Test Ka: Salt mist*

<https://standards.iteh.ai/catalog/standards/sist/0cdd4335-4a51-4cd6-8fc8-2269d14ab6cf/iec-60529>, *Degrees of protection provided by enclosures (IP Code)*

IEC 60966-1:2019, *Radio frequency and coaxial cable assemblies – Part 1: Generic specification – General requirements and test methods*

IEC 60966-4, *Radio frequency and coaxial cable assemblies – Part 4: Sectional specification for semi-rigid coaxial cable assemblies*

IEC 60966-4-1, *Radio frequency and coaxial cable assemblies – Part 4-1: Blank detail specification for semi-rigid coaxial cable assemblies*

IEC 61169-4, *Radio-frequency connectors – Part 4: RF coaxial connectors with inner diameter of outer conductor 16 mm (0,63 in) with screw lock – Characteristic impedance 50 Ω (type 7-16)*

IEC 61169-11, *Radio-frequency connectors – Part 11: Sectional specification for RF coaxial connectors with inner diameter of outer conductor 9,5 mm with threaded coupling – Characteristics impedance 50 Ω (Type 4,1-9,5)*

IEC 61169-16, *Radio-frequency connectors – Part 16: Sectional specification – RF coaxial connectors with inner diameter of outer conductor 7 mm (0,276 in) with screw coupling – Characteristics impedance 50 Ω (75 Ω) (type N)*

IEC 61169-53, *Radio-frequency connectors – Part 53: Sectional specification for RF coaxial connectors with inner diameter of outer conductor 16 mm with screw lock – Characteristic impedance 50 Ω (Type S7-16)*

IEC 61169-54, *Radio-frequency connectors – Part 54: Sectional specification for coaxial connectors with 10 mm inner diameter of outer conductor, nominal characteristic impedance 50 Ω , Series 4.3-10*

IEC 61196-11, *Coaxial communication cables – Part 11: Sectional specification for semi-rigid cables with polyethylene (PE) dielectric*

3 Terms and definitions

No terms and definitions are listed in this document.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

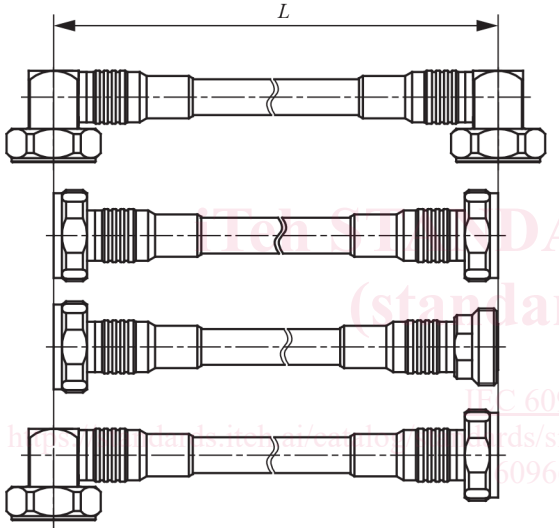
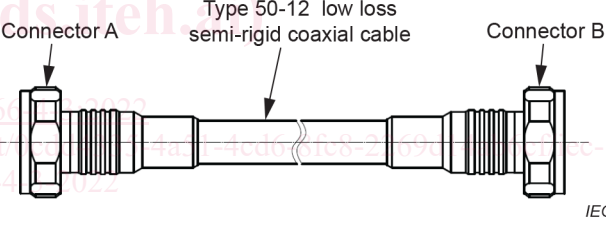
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4 Detail specification

[1] Prepared by: IEC TC 46			[2] Document No.: IEC 60966-4-3 Issue: First issue Date:	
[3] Available from: IEC			[4] Generic specification: IEC 60966-1 Sectional specification: IEC 60966-4 Blank detail specification: IEC 60966-4-1	
[5] Additional references:				
Outline for semi-rigid coaxial cable assemblies NOTE Example diagram, see Figure 1 and Figure 2, manufacturer to insert actual diagram.				
				
Figure 1 – Length definition of cable assemblies			Figure 2 – Semi-rigid cable assemblies with type 50-12 low loss semi-rigid coaxial cable	
[6] Maximum diameter of type 50-12 low loss semi-rigid coaxial cable < 16,4 mm				
[7] Characteristic impedance: 50 Ω		[8] Frequency: up to 6 000 MHz		
[9] Typical weight: Cable: 200 g/m Connector: Type 7-16: 125 g Type 4.1-9.5: 90 g Type N: 80 g Type S 7-16: 100 g Type 4.3-10: 115 g		[10] Minimum inside radius: For static bending: 70 mm For dynamic bending: 125 mm		
[11] Climatic category: 40/70/21		[12] Applicable test group: Ba, Eh, Eb, Ez, Ep, Ee, Et, Mn, Vv, Vc, Vt, Vf		

[13]	
Connector reference number	IEC 61169-4 (type 7-16), IEC 61169-11 (type 4.1-9.5) IEC 61169-16 (type N) IEC 61169-53 (type S7-16) IEC 61169-54 (type 4.3-10)
Type (series), style, sex of the connector	Type 7-16, straight or right angled, male or female Type 4.1-9.5, straight or right angled, male or female Type N, straight or right angled, male or female Type S7-16, straight or right angled, male or female Type 4.3-10, straight or right angled, male or female
Reference no, type of the cable	IEC 61196-11, 50-12 (1/2")
Marking method	Marking of the assembly shall be applied to the sheath of the cable
Marking text	The marking shall consist at least of the IEC cable assembly type and IEC standard number (see Clause A.2)
[14] Variants: See Clause A.1	
[15] Page 1 of pages	

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[16] Inspection values, ratings or characteristics	[17] IEC 60966-1:2019 subclause	[18] Value	[19] Remarks
Electrical			
Reflection properties (return loss)	8.1	1) With straight connector: ≥ 26 dB (DC~2 200 MHz) ≥ 23 dB (> 2 200 MHz to 4 000 MHz) ≥ 20 dB (> 4 000 MHz to 6 000 MHz) 2) With right angled connector: ≥ 25 dB (DC~2 200 MHz) ≥ 22 dB (> 2 200 MHz to 4 000 MHz) ≥ 19 dB (> 4 000 MHz to 6 000 MHz)	
Uniformity of impedance	8.2	$50 \Omega \pm 2 \Omega$	Rise time of pluse < 150 ps
Insertion loss	8.3	$\leq 0,01 \times a_f \times L + 2 \times 0,05 \sqrt{f}$ a_f : is the insertion loss of the cable, and it shall be as specified in the relevant detail specification, in dB/100 m L : see Figure 1, in m f : in GHz	
Propagation time	8.5	$3,79 \text{ ns} \pm 0,09 \text{ ns}$	
Screening effectiveness	8.9	$\geq 110 \text{ dB}$	
Voltage proof	8.10	1) 2 kV (type 7-16, type 4.1-9.5, type S7-16) 2) 1.5 kV (type N, type 4.3-10)	AC, 1 min
Insulation resistance	8.11	$\geq 5\,000 \text{ M}\Omega$	Test voltage: 500 V DC $60 \text{ s} \pm 5 \text{ s}$
Inner and outer conductor continuity	8.12	Inner conductor and outer conductor shall be continuous	Test voltage $\leq 36 \text{ V DC}$
Power rating	8.13	$\geq 350 \text{ W}$	Temperature: 40°C DC~6 000 MHz
Intermodulation level measurement (PIM3)	8.14	$\leq -155 \text{ dBc}$	Test power: $2 \times 20 \text{ W}$ Test frequency: 700 MHz, 900 MHz, 1 800 MHz, 2 100 MHz, 2 600 MHz
Mechanical			
Tensile	9.1	1) Inner contact and insulator positions shall be in accordance with interface dimensions 2) No visual evidence of the movement of the cable relative to the connector 3) Return loss shall meet 8.1	Force: 500 N Duration: 60 s Test: 8.1

[16] Inspection values, ratings or characteristics	[17] IEC 60966-1:2019 subclause	[18] Value	[19] Remarks
Torque	9.5	1) Inner contact and insulator positions shall be in accordance with interface dimensions 2) No visual damage in cable assembly 3) Return loss shall meet 8.1	$\leq 5 \text{ Nm}$ Test: 8.1
Environmental			
Vibration	10.2	1) No visual damage in cable assembly 2) No electrical interruptions exceeding $1 \mu\text{s}$	196 m/s^2 (20 g) 10 Hz to 2 000 Hz
Bumps	10.2	No visual damage in cable assembly	490 m/s^2 (50 g) Number of bumps: 1 000
Shock	10.2	1) No visual damage in cable assembly 2) No electrical interruptions exceeding $1 \mu\text{s}$	490 m/s^2 (50 g) Half-sine 11 ms
Climatic sequence	10.3	1) No visual damage in cable assembly 2) Insertion loss shall meet 8.3 3) Voltage proof shall meet 8.10 4) Insulation resistance shall meet 8.11	Cycles: 1 (connectors un-mated) Tests: 7.2, 8.3, 8.10, 8.11
Damp heat, steady state	10.4	1) No visual damage in cable assembly 2) Insertion loss shall meet 8.3	Cycles: 1 Days: 21 (connectors un-mated) Tests: 7.2, 8.3
Rapid change of temperature	10.5	1) Inner contact and insulator positions shall be in accordance with interface dimensions 2) No visual damage in cable assembly 3) Insertion loss shall meet 8.3 4) Voltage proof shall meet 8.10 5) Insulation resistance shall meet 8.11	Test temperature: $T_A = -40 \text{ }^\circ\text{C}$, $T_B = 70 \text{ }^\circ\text{C}$ $t: 4 \text{ h}$ Cycles: 5 Tests: 7.2, 8.3, 8.10, 8.11
Salt mist and sulphur dioxide tests	10.8	1) No visual damage in cable assembly 2) Insertion loss shall meet 8.3 3) Insulation resistance shall meet 8.11	According to IEC 60068-2-11 Duration of spraying: 96 h
Water immersion and dust tests (IP code)	IEC 60529	Shall meet IP67	
Flammability	10.10	1) The cable shall not continue to burn for more than 15 s after removal from the flame 2) During the test, burning particles shall be not detached from the cable	