



SLOVENSKI STANDARD
oSIST prEN IEC 60966-3-3:2022

01-februar-2022

Sestavi radiofrekvenčnih in koaksialnih kablov - 3-3. del: Podrobna specifikacija za delno upogibljive kabelske sklope (skakalni), frekvenčno območje do 18 GHz, delno upogibljiv koaksialni kabel tipa 50-141

Radio frequency and coaxial cable assemblies - Part 3-3: Detail specification for semi-flexible cable assemblies (jumper), Frequency range up to 18GHz, Type 50-141 semi-flexible coaxial cable

**iTeh STANDARD
PREVIEW**

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Cordons coaxiaux et cordons pour fréquences radioélectriques - Partie 3-3 : Spécification particulière relative aux cordons semi-flexibles (câble de pontage), bande de fréquences jusqu'à 18 GHz, câble coaxial semi-flexible de type 50-141

<https://standards.iteh.ai/catalog/standards/sist/a293447e->

[a07c-442c-be8d-9e6299909f72/osist-pren-iec-60966-3-3-2022](https://standards.iteh.ai/catalog/standards/sist/a07c-442c-be8d-9e6299909f72/osist-pren-iec-60966-3-3-2022)

Ta slovenski standard je istoveten z: prEN IEC 60966-3-3:2021

ICS:

33.120.10 Koaksialni kabli. Valovodi Coaxial cables. Waveguides

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46/844/CDV

COMMITTEE DRAFT FOR VOTE (CDV)

PROJECT NUMBER:

IEC 60966-3-3 ED1

DATE OF CIRCULATION:

2021-12-03

CLOSING DATE FOR VOTING:

2022-02-25

SUPERSEDES DOCUMENTS:

46/810/CD, 46/841/CC

IEC TC 46 : CABLES, WIRES, WAVEGUIDES, RF CONNECTORS, RF AND MICROWAVE PASSIVE COMPONENTS AND ACCESSORIES

SECRETARIAT:

United States of America

SECRETARY:

Mr David Wilson

OF INTEREST TO THE FOLLOWING COMMITTEES:

SC 46A

PROPOSED HORIZONTAL STANDARD:

Other TC/SCs are requested to indicate their interest, if any, in this CDV to the secretary.

FUNCTIONS CONCERNED:

 EMC ENVIRONMENT QUALITY ASSURANCE SAFETY SUBMITTED FOR CENELEC PARALLEL VOTING NOT SUBMITTED FOR CENELEC PARALLEL VOTING**Attention IEC-CENELEC parallel voting**

The attention of IEC National Committees, members of CENELEC, is drawn to the fact that this Committee Draft for Vote (CDV) is submitted for parallel voting.

The CENELEC members are invited to vote through the CENELEC online voting system.

This document is still under study and subject to change. It should not be used for reference purposes.

Recipients of this document are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.

TITLE:

Radio frequency and coaxial cable assemblies – Part 3-3: Detail specification for semi-flexible cable assemblies (jumper), Frequency range up to 18GHz, Type 50-141 semi-flexible coaxial cable

PROPOSED STABILITY DATE: 2028

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RADIO FREQUENCY AND COAXIAL CABLE ASSEMBLIES –

Part 3-3: Detail specification for semi-flexible cable assemblies(Jumper), Frequency range up to 18 GHz, Type 50-141 semi-flexible coaxial cable

1 Scope

This part of IEC 60966 is a detail specification that relates to semi-flexible cable assemblies composed of type 50-141 semi-flexible coaxial cables with polytetrafluoroethylene (PTFE) dielectric (IEC 61196-8-4) and connectors such as, type SMA(IEC 61169-15), type N (IEC 61169-16). It gives subfamily detail requirements and severities which shall be applied.

These cable assemblies are mainly used in the field of microwave and wireless equipment or other signal transmission equipment or units. The operating frequency is up to 18000 MHz.

The qualification will be conducted in accordance with IEC 60966-3. Once one variant obtain qualification approval, the other variant with same cable and connection type can obtain qualification approval by conducting tests whose results might depend on the variants.

Under capability approval, the qualification will be conducted on the relating CQCs (capability qualifying components) as defined in IEC 60966-3 and described in the CM(capability manual). Unless otherwise specified in the CM, only lot-by-lot tests from groups Ba and Eb will be conducted on delivered products, all other tests will be performed on CQCs as defined in IEC 60966-3 and described in the CM.

2 References documents

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, *Basic environmental testing procedures – Part 2: Tests Test Ka: Salt mist*

IEC 60410, *Sampling plans and procedures for inspection by attributes*

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

IEC 60966-3, *Radio frequency and coaxial cable assemblies – Part 3: Sectional specification for semi-flexible coaxial cable assemblies*

IEC 60966-3-1, *Radio frequency and coaxial cable assemblies – Part 3-1: Blank detail specification for semi-flexible coaxial cable assemblies*

IEC 61169-15, *Radio-frequency connectors. Part 15: R.F. coaxial connectors with inner diameter of outer conductor 4,13 mm (0,163 in) with screw coupling - Characteristic impedance 50 Ω (Type SMA)*

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

IEC 61196-8-4, *Coaxial communication cables – Part 8-4: Detail specification for 50-141 type semi-flexible cables with solid polytetrafluoroethylene (PTFE) insulation*

IEC 61726, *Cable assemblies, cables, connectors and passive microwave components - Screening attenuation measurement by the reverberation chamber method*


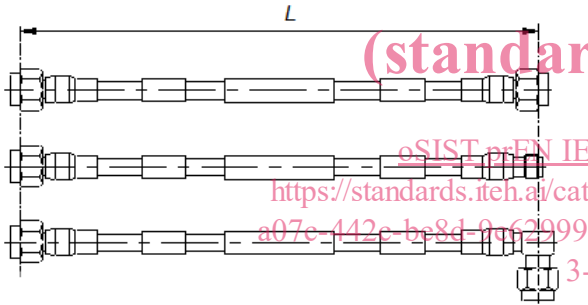
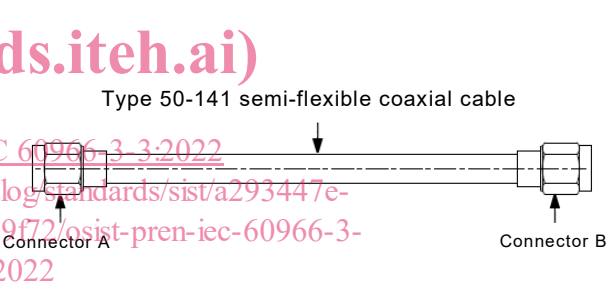
3 Terms and definitions

No terms and definitions are listed in this document.

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

- 47 • IEC Electropedia: available at <http://www.electropedia.org/>
- 48 • ISO Online browsing platform: available at <http://www.iso.org/obp>

49 **4 Detail specification**

RADIO FREQUENCY AND COAXIAL CABLE ASSEMBLIES – Part 3-3: Detail specification for semi-flexible cable assemblies(Jumper), Frequency range up to 18GHz, Type 50-141 semi-flexible coaxial cable		
<p>[1] Prepared by: IEC TC 46</p>		<p>[2] Document No.: IEC 60966-3-3 Issue: First issue Date:</p>
<p>[3] Available from: IEC</p>	<p>[4] Generic specification: IEC 60966-1 Sectional specification: IEC 60966-3 Blank detail specification: IEC 60966-3-1</p>	
<p>[5] Additional references:</p>		
<p>Detail specification for semi-flexible coaxial cable assemblies</p>		
		
		
<p>Figure 1 : length definition of cable assemblies</p>		
<p>Figure 2 : Semi-flexible cable assemblies with type 50-141 semi-flexible coaxial cable</p>		
<p>[6] Maximum diameter of type 50-141 semi-flexible coaxial cable < 4,7 mm</p>		
<p>[7] Characteristic impedance: 50 Ω</p>		<p>[8] Frequency: up to 18000 MHz</p>
<p>[9] Typically weight: Cable: 50 g/m Connector: Type SMA: 2.5 g Type N: 20 g</p>		<p>[10] Minimum inside radius: For static bending: 10 mm For dynamic bending: 40 mm</p>
<p>[11] Climatic category: 40/70/21</p>		<p>[12] Applicable test group: Ba, Eh, Eb, Ez, Ep, Ee, Et, Mn, Vv, Vc, Vt, Vf</p>
<p>[13] Connector reference number: IEC 61169-15(type SMA) ,IEC 61169-16(type N)</p> <p>Type(series),style,sex of the connector Type SMA, Straight or Right angled, Male or Female Type N, Straight or Right angled, Male or Female</p> <p>Reference no, type of the cable IEC 61196-8-4, IEC-50-141 or equivalent (IEC 61196-8-4).</p> <p>Marking method Marking of the assembly shall be applied to the sheath of the cable.</p> <p>Marking text The marking shall consist at least of the IEC cable assembly type and IEC standard number. (See annex A.2).</p>		
<p>[14] Variants: See annex A.1</p>		<p>[15] Page 1 of 7 pages</p>

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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 ≥ 20,50 dB(DC~6000 MHz) ≥ 18,97dB(>6000 MHz~12000 MHz) ≥ 16,51 dB(>12000 MHz~18000 MHz) 2) With right angled connector ≥ 19,91 dB(DC~6000 MHz) ≥ 17,65 dB(>6000 MHz~12000 MHz) ≥ 16,33 dB(>12000 MHz~18000 MHz)	
Uniformity of impedance	8.2	50 Ω ± 2 Ω	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 : see IEC 61196-8-4, in dB/100 m L : see figure 1, in m f : in GHz	a_f : see IEC 61196-8-4
Propagation time	8.5	(3,91 ns ± 0,05 ns)/m	
Stability of electrical length	8.6	≤ 7°	DC~18GHz Mandrel radius: 40 mm Test method: 2 Bending test
Phase difference	8.7	≤ 6°	18 GHz
Phase variation with temperature	8.8	≤ 5 °/GHz	Length of assemblies: 1 m Test temperature: -40 °C~70 °C t: 30 min Cycles: 6
Screening effectiveness	8.9	≤ -90 dB	According to IEC 61726 1000 MHz~18000 MHz
Voltage proof	8.10	1,5 kV	AC,1 min
Insulation resistance	8.11	≥ 5000 MΩ	Test voltage: 500 V, DC 60 s ± 5 s
Inner and outer conductor continuity	8.12	Inner conductor and outer conductor shall be continuous	Test voltage ≤ 36 V DC
Power rating	8.13	≥ 38 W	Temperature: 40 °C DC~18000 MHz
Intermodulation level	8.14	≤-155 dBc	Test power: 2×20 W Test frequency: 700 MHz, 900 MHz, 1800 MHz, 2100 MHz, 2600 MHz

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[16] Inspection values, ratings or characteristics	[17] IEC 60966-1:2019 Subclause	[18] Value	[19] Remarks
Mechanical			
Tensile	9.1	1) Inner conductor 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: 100 N Duration: 60 s Test: 8.1
Cable assembly crushing	9.4	1) Inner conductor 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: 200 N Duration: 60 s Test: 8.1
Torque	9.5	1) Inner conductor and insulator positions shall be in accordance with interface dimensions 2) No visual damage in cable assembly 3) Return loss shall meet 8.1	≥ 5 Ncm Test: 8.1
Multiple bending	9.6	1) Inner conductor and insulator positions shall be in accordance with interface dimensions 2) No visual damage in cable assembly 3) Return loss shall meet 8.1	Cycles: 20
Environmental			
Vibration	10.2	1) No visual damage in cable assembly 2) No electrical interruptions exceeding 1 μ s	98 m/s ² (10 g) 10 Hz to 2000 Hz
Bumps	10.2	No visual damage in cable assembly	
Shock	10.2	1) No visual damage in cable assembly 2) No electrical interruptions exceeding 1 μ s	147 m/s ² (15 g) Half-sine wave, 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

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[16] Inspection values, ratings or characteristics	[17] IEC 60966-1:2019 Subclause	[18] Value	[19] Remarks
Rapid change of temperature	10.5	1) Inner conductor 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: $T_A = -55\text{ °C}$, $T_B = 125\text{ °C}$ t: 4 h Cycles: 5 Tests: 7.2, 8.3, 8.10, 8.11
Solvents and contaminating fluids	10.6	1) No visual damage in cable assembly 2) Insertion loss shall meet 8.3 3) Insulation resistance shall meet 8.11	Cycles: 5 (connectors un-mated) Tests: 7.2, 8.3, 8.11
Water immersion	10.7	1) Insertion loss shall meet 8.3 2) Insulation resistance shall meet 8.11	(connectors mated) Tests: 8.3, 8.11
Salt mist and sulphur dioxide	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
Dust tests	10.9	1) No visual damage in cable assembly 2) Insertion loss shall meet 8.3	Cycles: 5 Tests: 7.2, 8.3
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	

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Recommended grouping of test			Recommended severities					[27] Length of specimen
[20] Group	[21] IEC60966-1:2019 Subclause	Test	[22] Periodicity	[23] IL ^c	[24] AQL ^d	[25] n ^a	[26] c ^b	
Ba	7.2	Visual inspection	Lot-by-lot	S3	4.0			
	7.3	Dimensions inspection	Lot-by-lot	S3	4.0			
Eh	8.1	Reflection properties (return loss)	Lot-by-lot	II	1.0			
	8.3	Insertion loss	Lot-by-lot	II	1.0			
	8.14	Intermodulation level	Lot-by-lot	II	II			
Eb	8.10	Voltage proof	Lot-by-lot	II	1.0			
	8.11	Insulation resistance	Lot-by-lot	II	1.0			
	8.12	Inner and outer conductor continuity	Lot-by-lot	II	1.0			
Ez	8.2	Uniformity of impedance	Lot-by-lot	II	1.0			
Ep	8.5	Propagation time	Lot-by-lot	100%				2
	8.6	Stability of electrical length	1 year	S3	4.0			
	8.7	Phase difference	Lot-by-lot	100%				2
	8.8	Phase variation with temperature	3 years	e		3	0	1
Ee	8.9	Screening effectiveness	3 years	e	—	3	0	
Et	8.13	Power rating	1 year	I		1	0	
Mn	9.1	Tensile	3 years	e		3	0	
	9.4	Cable assembly crushing	3 years	e				1
	9.5	Torque	3 years	e				
	9.6	Multiple bending	3 years	e				
Vv	10.2	Vibration, bumps and shock	3 years	e	—	3	0	
Vc	10.3	Climatic sequence	3 years	e	—	3	0	
Vt	10.4	Damp heat, steady state	3 years	e	—			
	10.5	Rapid change of temperature	3 years	e	—			
	10.6	Solvents and contaminating fluids	1 year	e	—			
	10.8	Salt mist and sulphur dioxide	1 year	e	—			
Vf	10.7	Water immersion	3 years	e	—			
	10.9	Dust tests	3 years	e	—			
	10.10	Flammability	3 years	e	—			

^a n is the number of samples to be tested;
^b c is the acceptance criterion;
^c IL is the inspection level according to IEC 60410;
^d AQL is the acceptable quality level according to IEC 60410;
^e This periodic test shall be completed on a CQC(capability qualifying component) defined between the customer and his supplier.

**Annex A
(Informative)**

Identification and marking

A.1 Identification

A.1.1 Type name

Type name of cable assemblies shall consist of cable type, connector variants and length, as following:

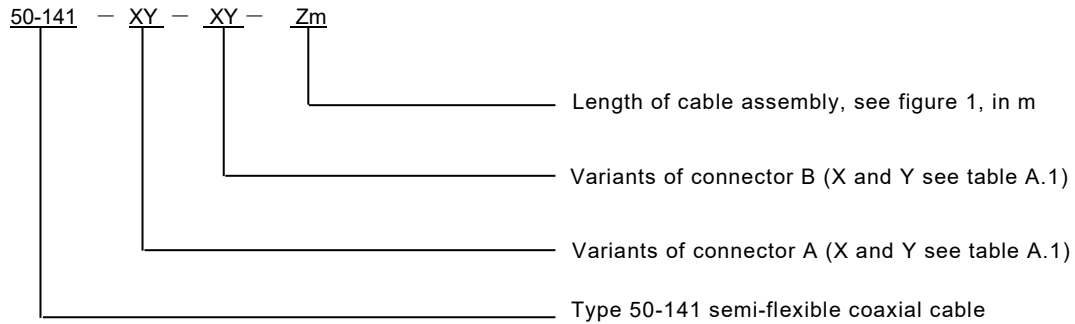
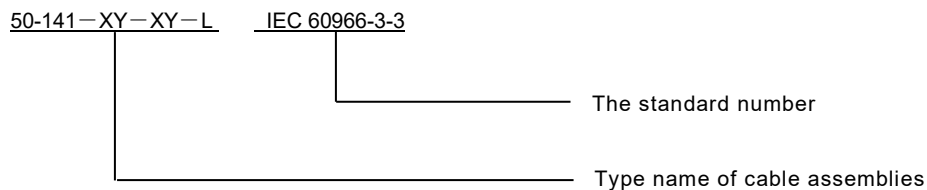


Table A.1 – The meaning of connector variants

“X”	Connector series	“Y”	Connector style and sex
S	SMA	M	Straight male
N	N	RM	Right angled male
		F	Straight female
		RF	Right angled female

A.2 Cable assemblies marking

Cable assemblies marking shall consist of type name of cable assembly and IEC standard number, as following:



For example: 50-141-SM-NRM-3m IEC 60966-3-3 means a semi-flexible cable assemblies consist of type 50-141 semi-flexible coaxial cable and SMA straight male connector and N right angled male connector, 3 m length, according to IEC 60966-3-3 standard.

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