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**Sestavi radiofrekvenčnih in koaksialnih kablov - 3-4. del: Podrobna specifikacija za delno upogibljive kabelske sklope (skakalni), frekvenčno območje do 6 GHz, delno upogibljiv koaksialni kabel tipa 50-141**

Radio frequency and coaxial cable assemblies - Part 3-4: Detail specification for semi-flexible cable assemblies (jumper), Frequency range up to 6GHz, Type 50-141 semi-flexible coaxial cable

**iTeh STANDARD  
PREVIEW**

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Cordons coaxiaux et cordons pour fréquences radioélectriques - Partie 3-4 :  
Spécification particulière relative aux cordons semi-flexibles (câble de pontage), bande de fréquences jusqu'à 6 GHz, câble coaxial semi-flexible de type 50-141

[https://standards.iteh.ai/catalog/standards/sist/d5f925dc-](https://standards.iteh.ai/catalog/standards/sist/d5f925dc-d953-45ba-837b-8104aa97ab18/osist-pren-iec-60966-3-4-2022)

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**Ta slovenski standard je istoveten z: prEN IEC 60966-3-4:2021**

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**ICS:**

33.120.10 Koaksialni kabli. Valovodi Coaxial cables. Waveguides

**oSIST prEN IEC 60966-3-4:2022**

**en**

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46/845/CDV

COMMITTEE DRAFT FOR VOTE (CDV)

PROJECT NUMBER:

IEC 60966-3-4 ED1

DATE OF CIRCULATION:

2021-12-03

CLOSING DATE FOR VOTING:

2022-02-25

SUPERSEDES DOCUMENTS:

46/811/CD, 46/842/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: <input type="checkbox"/> Other TC/SCs are requested to indicate their interest, if any, in this CDV to the secretary.
FUNCTIONS CONCERNED: <input type="checkbox"/> EMC <input type="checkbox"/> ENVIRONMENT <input checked="" type="checkbox"/> QUALITY ASSURANCE <input type="checkbox"/> SAFETY	
<input checked="" type="checkbox"/> SUBMITTED FOR CENELEC PARALLEL VOTING <input type="checkbox"/> NOT SUBMITTED FOR CENELEC PARALLEL VOTING	
<p><b>Attention IEC-CENELEC parallel voting</b></p> <p>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.</p> <p>The CENELEC members are invited to vote through the CENELEC online voting system.</p>	

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TITLE:

**Radio frequency and coaxial cable assemblies – Part 3-4: Detail specification for semi-flexible cable assemblies (jumper), Frequency range up to 6GHz, Type 50-141 semi-flexible coaxial cable**

PROPOSED STABILITY DATE: 2028

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## RADIO FREQUENCY AND COAXIAL CABLE ASSEMBLIES –

### Part 3-4: Detail specification for semi-flexible cable assemblies(Jumper), Frequency range up to 6 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 7-16 (IEC 61169-4), type 4,1-9,5 (IEC 61169-11), type S7-16 (IEC 61169-53) , type 4,3-10 (IEC 61169-54). It gives subfamily detail requirements and severities which shall be applied.

These cable assemblies are mainly used in the field of mobile communication base station antenna system, terrestrial microwave communication and radar systems. The operating frequency is up to 6000 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

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 61169-4, *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 – RF coaxial connectors with inner diameter of outerconductor 9.5 mm (0,374 in) with screw coupling – Characteristics impedance 50 Ω (type 4,1-9,5)*

IEC 61169-53, *Radio-frequency connectors – Part 53: Sectional specification – RF coaxial connectors with inner diameter of outerconductor 16 mm (0,630 in) with screw coupling – Characteristics impedance 50 Ω (type S7-16)*

IEC 61169-54, *Radio-frequency connectors – Part 54: Sectional specification – RF coaxial connectors with inner diameter of outerconductor 10 mm (0,394 in) with screw coupling – Characteristics impedance 50 Ω (type 4,3-10)*

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

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


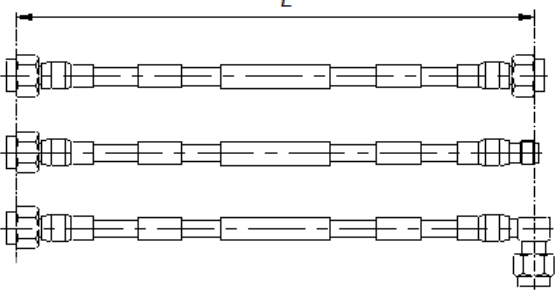
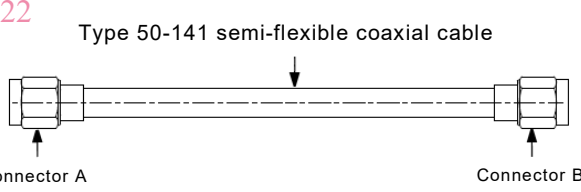
### 47 3 Terms and definitions

48 No terms and definitions are listed in this document.

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

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

### 53 4 Detail specification

<b>RADIO FREQUENCY AND COAXIAL CABLE ASSEMBLIES –</b> <b>Part 3-4: Detail specification for semi-flexible cable assemblies(Jumper),</b> <b>Frequency range up to 6GHz, Type 50-141 semi-flexible coaxial cable</b>	
<b>[1] Prepared by:</b> IEC TC 46	 <b>[2] Document No.:</b> IEC 60966-3-4 <b>Issue:</b> First issue <b>Date:</b>
<b>[3] Available from:</b> IEC	<b>[4] Generic specification:</b> IEC 60966-1 <b>Sectional specification:</b> IEC 60966-3 <b>Blank detail specification:</b> IEC 60966-3-1
<b>[5] Additional references:</b>	
oSIST prEN IEC 60966-3-4:2022 <b>Detail specification for semi-flexible coaxial cable assemblies</b> <a href="https://standards.iec.ch/catalog/standards/sist/d51925dc-d953-45ba-837b-8104aa97ab18/osist-pren-iec-60966-3-4-2022">https://standards.iec.ch/catalog/standards/sist/d51925dc-d953-45ba-837b-8104aa97ab18/osist-pren-iec-60966-3-4-2022</a>	
 <p><b>Figure 1 : length definition of cable assemblies</b></p>	 <p><b>Figure 2 : Semi-flexible cable assemblies with type 50-141 semi-flexible coaxial cable</b></p>
<b>[6] Maximum diameter of type 50-141 semi-flexible coaxial cable &lt; 4,7 mm</b>	
<b>[7] Characteristic impedance: 50 Ω</b>	<b>[8] Frequency: up to 6000 MHz</b>
<b>[9] Typically weight:</b> Cable: 50 g/m Connector: Type 7-16: 120 g Type S7-16:25g Type 4.1-9.5:85g Type 4,3-10: 56 g	<b>[10] Minimum inside radius:</b> For static bending: 10 mm For dynamic bending: 40 mm

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<b>[11]</b> Climatic category: 40/70/21	<b>[12]</b> Applicable test group: Ba, Eh, Eb, Ez, Ep, Ee, Et, Mn, Vv, Vc, Vt, Vf
<b>[13]</b> Connector reference number:  Type(series),style,sex of the connector  Reference no, type of the cable Marking method Marking text	IEC 61169-4(type 7-16), IEC 61169-53(type S7-16) IEC 61169-11(type 4,1-9,5) IEC 61169-54(type 4,3-10)  Type 7-16, Straight or Right angled, Male or Female Type 4,1-9,5, 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  IEC 61196-8-4, IEC-50-141 or equivalent (IEC 61196-8-4). Marking of the assembly shall be applied to the sheath of the cable. The marking shall consist at least of the IEC cable assembly type and IEC standard number. (See annex A.2).
<b>[14]</b> Variants: See annex A.1	<b>[15]</b> Page 1 of 7 pages

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<b>[16]</b> Inspection values, ratings or characteristics	<b>[17]</b> IEC 60966-1:2019 Subclause	<b>[18]</b> Value	<b>[19]</b> Remarks
<b>Electrical</b>			
Reflection properties (Return loss)	8.1	1) With straight connector $\geq 26,45$ dB(DC~3000 MHz) $\geq 19,10$ dB(>3000 MHz~6000 MHz) 2) With right angled connector $\geq 23,13$ dB(DC~3000 MHz) $\geq 17,70$ dB(>3000 MHz~6000 MHz)	
Uniformity of impedance	8.2	$50 \Omega \pm 2 \Omega$	Rise time of pluse <150 ps
Insertion loss	8.3	$\leq 0,01 \times a_f \times L + 2 \times 0,05 \sqrt{f}$ $a_f$ : 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 $\pm$ 0,05 ns)/m	
Stability of electrical length	8.6	$\leq 5^\circ$	DC~6GHz Mandrel radius: 40 mm Test method: 2 Bending test
Phase difference	8.7	$\leq 4^\circ$	2 GHz
Phase variation with temperature	8.8	$\leq 5^\circ/\text{GHz}$	Length of assemblies: 1 m Test temperature: 40 °C~70 °C t: 30 min Cycles: 6

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[16] Inspection values, ratings or characteristics	[17] IEC 60966-1:2019 Subclause	[18] Value	[19] Remarks
Screening effectiveness	8.9	1) $\leq -90$ dB (screw thread) 2) $\leq -70$ dB (type 4,3-10 quick lock)	According to IEC 61726 1000 MHz~6000 MHz
Voltage proof	8.10	1,5 kV	AC,1 min
Insulation resistance	8.11	$\geq 5000$ M $\Omega$	Test voltage: 500 V, DC 60 s $\pm$ 5 s
Inner and outer conductor continuity	8.12	Inner conductor and outer conductor shall be continuous	Test voltage $\leq 36$ V DC
Power rating	8.13	$\geq 65$ W	Temperature: 40 °C DC~6000 MHz
Intermodulation level	8.14	$\leq -155$ dBc	Test power: 2x20 W Test frequency: 700 MHz, 900 MHz, 1800 MHz, 2100 MHz, 2600 MHz
<b>Mechanical</b>			
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	$\geq 5$ 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
<b>Environmental</b>			
Vibration	10.2	1) No visual damage in cable assembly 2) No electrical interruptions exceeding 1 $\mu$ s	98 m/s <sup>2</sup> (10 g) 10 Hz to 2000 Hz
Bumps	10.2	No visual damage in cable assembly	

[16] Inspection values, ratings or characteristics	[17] IEC 60966-1:2019 Subclause	[18] Value	[19] Remarks
Shock	10.2	1) No visual damage in cable assembly 2) No electrical interruptions exceeding 1 µs	147 m/s <sup>2</sup> (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
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 <sup>c</sup>	[24] AQL <sup>d</sup>	[25] n <sup>a</sup>	[26] c <sup>b</sup>	
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	—			

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

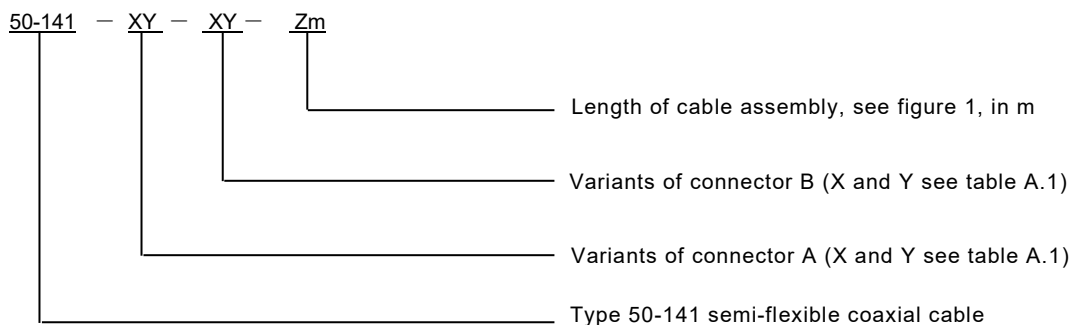
**Annex A  
(Informative)**

**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:



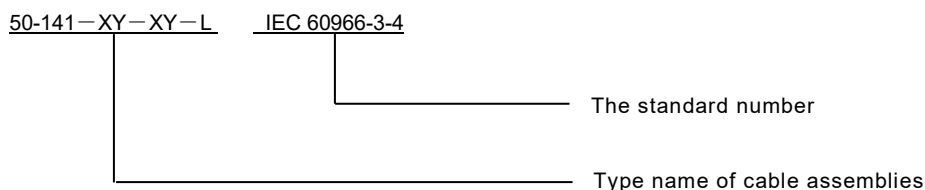
**Table A.1 – The meaning of connector variants**

“X”	Connector series	“Y”	Connector style and sex
D or 7-16	7-16	M	Straight male
SD or S 7-16	S 7-16	F	Straight female
L20 or 4,3-10	4,3-10	RM	Right angled male
S20 or 4,1-9,5	4,1-9,5	RF	Right angled female

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**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-DF-L20F-3m IEC 60966-3-4 means a semi-flexible cable assemblies consist of type 50-141 semi-flexible coaxial cable and 7-16 straight female connector and 4,3-10 straight female connector, 3 m length, according to IEC 60966-3-4 standard.