



SLOVENSKI STANDARD
oSIST prEN IEC 60966-4:2022
01-september-2022

Sestavi radiofrekvenčnih in koaksialnih kablov - 4. del: Področna specifikacija za sestave poltogh koaksialnih kablov

Radio frequency and coaxial cable assemblies - Part 4: Sectional specification for semi-rigid coaxial cable assemblies

Konfektionierte Koaxial- und Hochfrequenzkabel - Teil 4: Rahmenspezifikation für halbstarre konfektionierte Koaxialkabel

Cordons coaxiaux et cordons pour fréquences radioélectriques - Partie 4: Spécification intermédiaire pour cordons coaxiaux semi-rigides

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Radio frequency and coaxial cable assemblies - Part 4: Sectional specification for semi-rigid coaxial cable assemblies

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NOTE FROM TC/SC OFFICERS:

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

**RADIO FREQUENCY AND COAXIAL CABLE ASSEMBLIES -
Part 4: Sectional specification for semi-rigid coaxial cable assemblies****1 Scope**

This part of IEC 60966 is a sectional specification that relates to semi-rigid coaxial cable assemblies operating in the transverse electromagnetic mode (TEM). It specifies the design and construction, IEC type designation, workmanship, marking and packaging, standard rating and characteristics, electrical, mechanical and environmental requirements of finished semi-rigid cable assemblies, quality assessment, delivery and storage, etc

This part of IEC 60966 applies to semi-rigid cable assemblies composed of semi-rigid coaxial cables and coaxial connectors. Semi-rigid cable assemblies are widely used in mobile communication systems, microwave test equipment, radar, aerospace and other fields.

NOTE 1: For the purpose of this sectional specification, a cable assembly is always regarded as an integral unit. All specifications apply to the finished assembly and not to individual and non-assembled parts thereof.

NOTE 2: This sectional specification should be supplemented with detail specifications giving additional details as required by the particular application. This application will not necessarily require all tests.

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

IEC 61169 (all parts), *Radio-frequency connectors*

IEC 61196-1-126 *Coaxial communication cables Part 1-126: Electrical test methods – Corona extinction voltage*

IEC 61196-10 *Coaxial communication cables-Part 10: Sectional specification for semi-rigid cables with fluoropolymer dielectric*

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

IEC 62321 *Electrotechnical products-Determination of levels of six regulated substance (lead, mercury, cadmium, hexavalent chromium, polybrominated biphenyls, polybrominated diphenyl ethers)*

3 Definitions

For the purposes of this document, the definitions given in IEC 60966-1:2019 apply.

89 4 Design and construction

90 4.1 Cable design and construction

91 Cables should conform to IEC 61196-10 or IEC 61196-11 and their related detail
92 specifications. Where cable designs deviating from these publications are required, they shall
93 comply with the requirements of the relevant detail specification of the cable.

94 If required, the manufacturer may use additional protective tubing or cable deviating from IEC
95 61196-10 or IEC 61196-11 to comply with the requirements of the relevant detail specification.

96 The materials used in the cable shall be given as engineering information in the relevant
97 detail specification.

98 According to local regulation, raw material of the cable as well as those of additional
99 protection shall be chosen to comply with regional or national Directives and Regulations such
100 as RoHS and REACH in Europe.

101 4.2 Connector design and construction

102 Connectors should conform to IEC 61169. Where connector designs deviating from IEC 61169
103 are required, the interface should conform to the relevant part of IEC 61169 where available
104 and shall comply with the requirements of the relevant detail specification.

105 The materials used in the connector shall be given as engineering information in the relevant
106 detail specification.

107 According to local regulation, raw material of the connector as well as those of additional
108 protection shall be chosen to comply with regional or national Directives and Regulations such
109 as RoHS and REACH in Europe.

110 4.3 The relative position dimensions of the interface

111 The relative position dimensions of the interface of end connector(s) of the cable assemblies
112 should comply with the interface of the relevant part of IEC 61169 or the relevant detail
113 specification. The relative position dimensions of the interface of end connector(s) include the
114 dimension of inner conductor relative to dielectric and inner conductor relative to out
115 conductor.

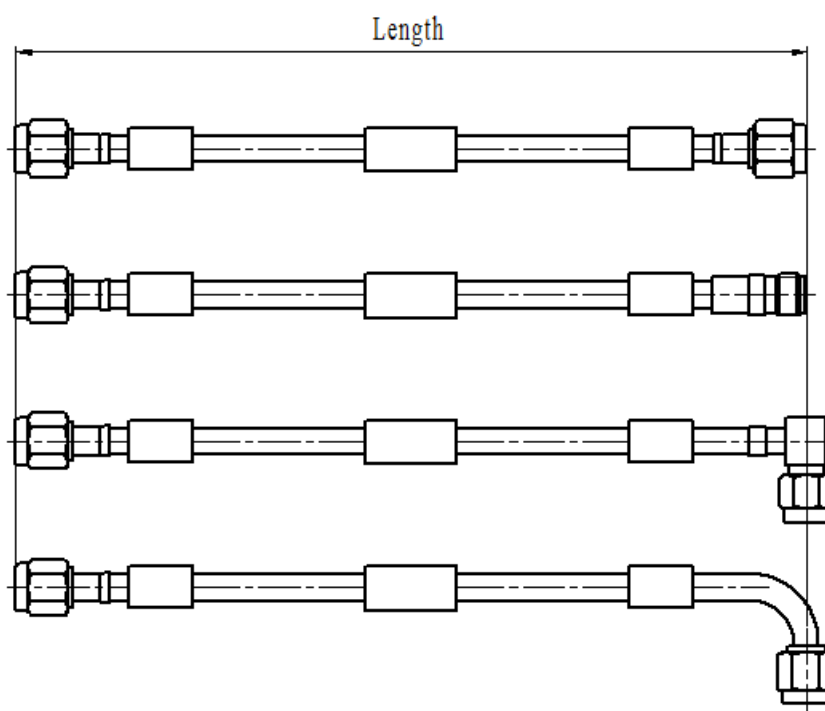
116 The relative position dimensions of the interface of some typical connectors are shown in
117 Annex A.

118 4.4 Outline of the cable assembly

119 The outline shall be in accordance with the relevant detail specification of the cable assembly.

120 The length, unless otherwise specified in the relevant detail specification, is defined as
121 between the reference planes of the connectors. In the case of right-angle connectors, the
122 length applies to the axis of the connectors (see Figure 1 and Figure 2).

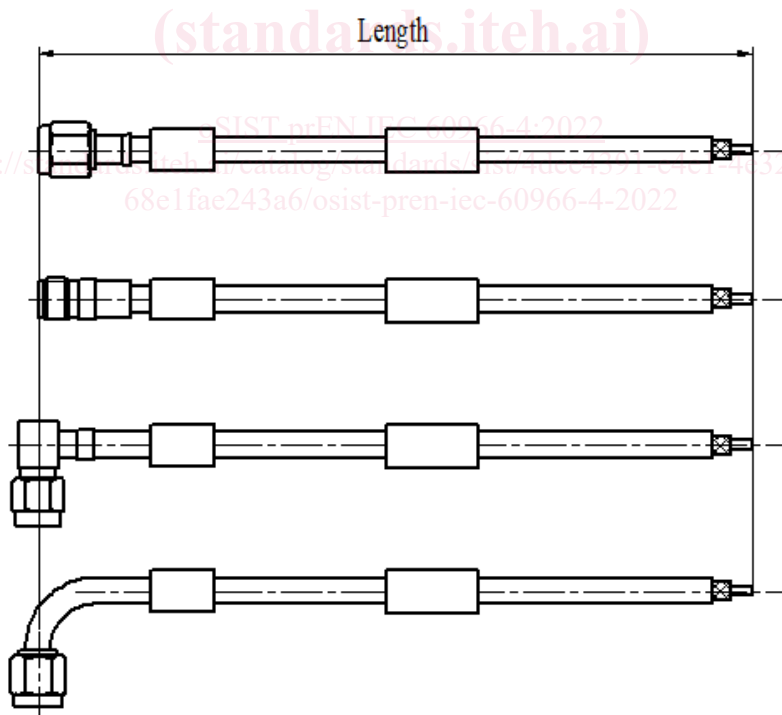
123 If not indicated in the relevant detail specification, the length tolerance shall be ± 1 % for
124 cables equal to, or longer than, 300 mm and ± 3 mm for cables shorter than 300 mm.



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Figure 1 - Length definition of cable assemblies with two connectors



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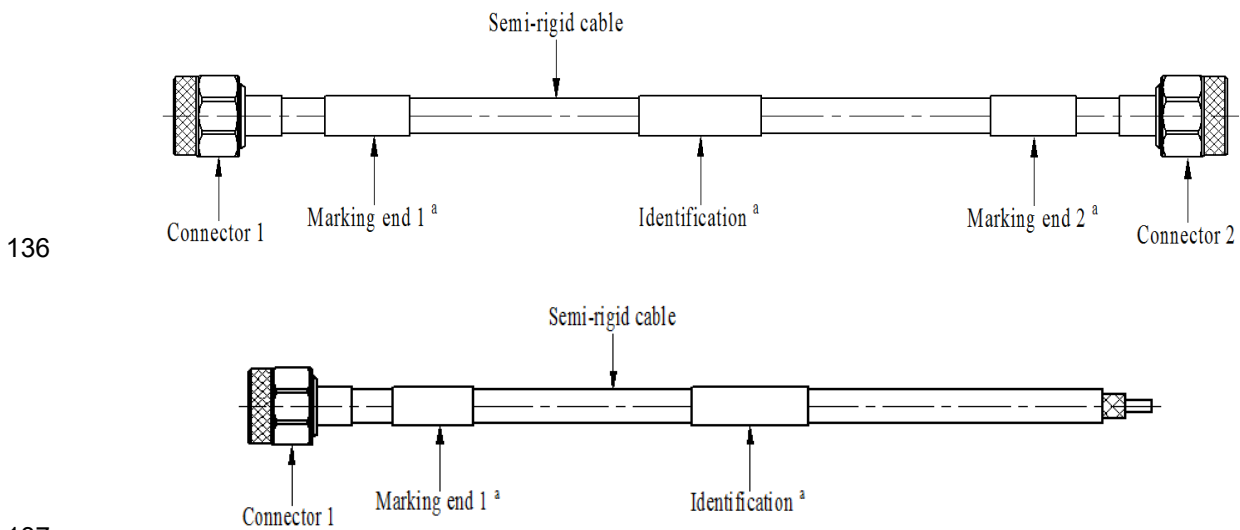
Figure 2 - Length definition of cable assemblies with one connector

129 5 Workmanship, marking and packaging

130 Clause 5 of IEC 60966-1:2019 and the following apply:

131 Cable assemblies made in accordance with this sectional specification comprise a section of
 132 cable and two connectors (see Figure 1). Occasionally the cable assembly will comprise only
 133 a cable and one connector (see Figure 2). When specified in the relevant detail specification,

134 the assembly may additionally include markers for identification of the assembly and
 135 interconnecting ends. End caps and other accessories may also be specified (see Figure 3).



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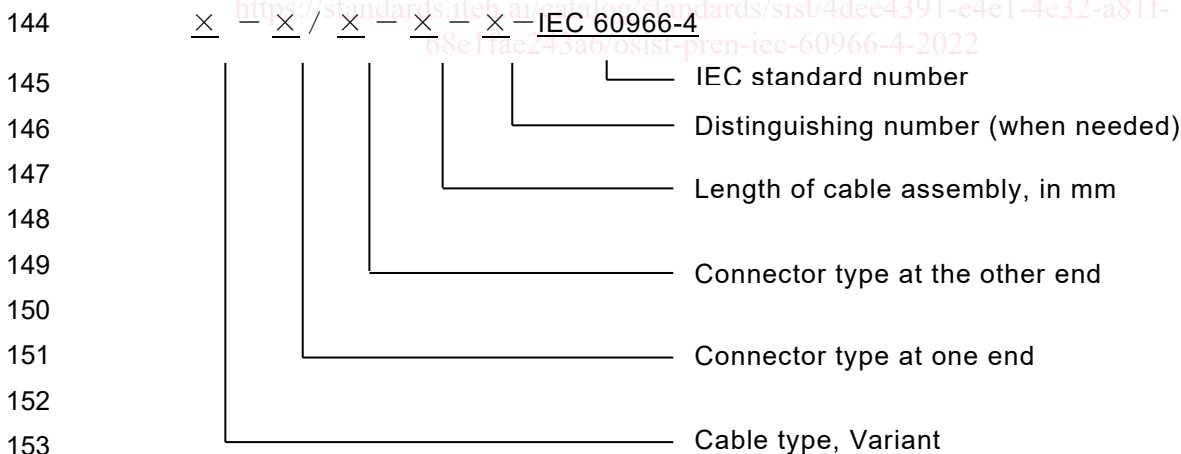
138 ^a When specified

139 **Figure 3 – The marking example of a cable assembly**

140

141 **6 IEC type designation**

142 IEC type designation of cable assembly consists of the type of cable and connectors, the
 143 length of the cable assembly and the IEC standard number, as shown below:



154 For example 1 : 50-5(1/4")-LSZH-H-SMA-P/SMA-P-100-A-IEC60966-4 cable assembly is
 155 comprised with 50-5(1/4")-LSZH-H semi-rigid cable, one end is SMA-P pin connector and the
 156 other end is SMA-P pin connector, the length of the cable assembly is 100 mm, its
 157 distinguishing number is A. This cable assembly comply with IEC 60966-4.

158 For example 2: 50-5(1/4")-LSZH-H-SMA-P-100-A-IEC60966-4 cable assembly is comprised
 159 with 50-5(1/4")-LSZH-H semi-rigid cable, one end is SMA-P pin connector and the other end
 160 empty, the length of the cable assembly is 100 mm, its distinguishing number is A. This cable
 161 assembly comply with IEC 60966-4.

162 **7 Rating and characteristics**

163 **7.1 Nominal characteristic impedance**

164 The nominal characteristic impedance shall be 50Ω or specified in the relevant detail
165 specification.

166 **7.2 Temperature range**

167 The rated temperature range of the cable assemblies with different cables shall be in
168 accordance with Table 1 or Table 2 or as specified in detail specification.

169 **Table 1-Rated temperature of cable assemblies with semi-rigid cables with**
170 **polyethylene dielectric (IEC 61196-11)**

Parameter	PE Sheath °C	LSZH Sheath °C
Operational temperature range	-40~70	-25~70
Storage temperature range	-40~70	-25~70
Installation temperature range	-30~60	-15~60

171

172

173

Table 2-Rated temperature of cable assemblies with semi-rigid cables with
fluoropolymer dielectric (IEC 61196-10)

Parameter	No sheath °C	PVC Sheath °C	PVDF Sheath °C	LSZH Sheath °C
Operational temperature range	-55~125 ^a	-40~75	-40~125	-25~70
Storage temperature range	-55~125 ^b	-40~75	-40~125	-25~70
Installation temperature range	-10~40	-30~60	-40~60	-15~60

^a Operational temperature range of type 50-1(0,034 ") and 50-6(0,250") is -55°C ~105°C.
^b Storage temperature range of type 50-1(0,034 ") and 50-6(0,250") is -55°C ~105°C.

174 **8 Requirements of finished cable assemblies**

175 **8.1 General**

176 For finished cable assemblies, the requirements given below shall apply when they are tested
177 in accordance with IEC 60966-1:2019 and the test methods specified herein.

178 When needed, cable assemblies with one connector shall be terminated with a suitable
179 connector at the cable end to do the test and cut off after the test.

180 Unless otherwise specified, all measurements shall be carried out under standard
181 atmospheric conditions for testing in accordance with clause 5 of IEC 60068-1:2013.

182 **8.2 Electrical requirements**

183 Electrical requirements are given in Table 3.

Table 3-Electrical requirements

Subclause	Parameter	Test method IEC 60966- 1:2019	Requirements/Remarks
8.2.1	Reflection properties (Return loss)	8.1	<p>While the parameter return loss (A_r) is preferred, the reflection factor (r) or the VSWR (voltage standing wave ratio) may be specified</p> <p>where $A_r = -20 \log_{10} r$ and $\text{VSWR} = \frac{1 + r }{1 - r }$ </p> <p>The return loss shall meet the following requirements within operating frequency range of the cable or in accordance with the relevant detail specification.</p> <p>For semi-rigid cables with polyethylene $\geq 24.5\text{dB}$(10MHz~2200MHz) $\geq 21.5\text{dB}$(2200MHz~4000MHz) $\geq 20.0\text{dB}$(4000MHz~6000MHz)</p> <p>For semi-rigid cables with fluoropolymer dielectric $\geq 23,1\text{dB}$(10MHz~6000MHz) $\geq 20,8\text{dB}$(6000MHz~12000MHz) $\geq 19,1\text{dB}$(12000MHz~18000MHz) $\geq 16,5\text{dB}$(18000MHz~26500MHz) $\geq 15,6\text{dB}$(26500MHz~40000MHz)</p>
8.2.2	Uniformity of impedance	8.2	<p>Rise time of the TDR system according to the relevant detail specification.</p> <p>The characteristic impedance variation shall not exceed $\pm 5\%$ of the nominal value or in accordance with the relevant detail specifications.</p>
8.2.3	Insertion loss	8.3	Value in accordance with the relevant detail specification
8.2.4	Propagation time	8.5	When required, value in accordance with the relevant detail specification
8.2.5	Phase difference	8.7	When required, value in accordance with the relevant detail specification
8.2.6	Phase variation with temperature	8.8	When required, value in accordance with the relevant detail specification
8.2.7	Screening effectiveness	8.9	<p>The value of transfer impedance or shield attenuation in accordance with detail specification.</p> <p>a) transfer impedance: when test frequency is less than 30 MHz, the maximum value is $300 \mu\Omega/\text{m}$;</p> <p>b) shield attenuation: better than $(100-f) \text{dB}$, f:GHz.</p>
8.2.8	Voltage proof	8.10	<p>Value in accordance with the relevant detail specification.</p> <p>There shall be no breakdown, arcing or flashover throughout.</p>
8.2.9	Insulation resistance	8.11	$\geq 5000 \text{ M}\Omega$, or in accordance with the relevant detail specification.
8.2.10	Inner and outer conductor	8.12	Test voltage: $\leq 36 \text{ V DC}$.