

# INTERNATIONAL STANDARD



Radio frequency and coaxial cable assemblies –  
Part 1: Generic specification – General requirements and test methods

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## INTERNATIONAL ELECTROTECHNICAL COMMISSION

## RADIO FREQUENCY AND COAXIAL CABLE ASSEMBLIES –

## Part 1: Generic specification – General requirements and test methods

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International Standard IEC 60966-1 has been prepared by technical committee 46: Cables, wires, waveguides, RF connectors, RF and microwave passive components and accessories.

This third edition cancels and replaces the second edition published in 1999. This edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to the previous edition:

- a) Annex C (informative) Measurement method for screening effectiveness was cancelled;
- b) Subclause 8.9 gives references to relevant test procedures.

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

FDIS	Report on voting
46/700A/FDIS	46/704/RVD

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

This document has been drafted in accordance with the ISO/IEC Directives, Part 2.

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 "<http://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 1: Generic specification – General requirements and test methods

#### 1 Scope

This part of IEC 60966 specifies requirements for radio frequency coaxial cable assemblies operating in the transverse electromagnetic mode (TEM) and establishes general requirements for testing the electrical, mechanical and environmental properties of radio frequency coaxial cable assemblies composed of cables and connectors. Additional requirements relating to specific families of cable assemblies are given in the relevant sectional specifications.

**NOTE** The design of the cables and connectors used ~~should~~ will preferably conform to the applicable parts of IEC 61196 and IEC 61169 respectively.

NOTE 1 This document does not include tests which are normally performed on the cables and connectors separately. These tests are described in IEC 61196-1 (all parts) and IEC 61169-1 respectively.

NOTE 2 Wherever possible, cables and connectors used in cable assemblies, even if they are not described in the IEC 61196 or IEC 61169 series, are tested separately according to the tests given in the relevant generic specification.

NOTE 3 Where additional protection is applied to a cable assembly, the mechanical and environmental tests described in this document are applicable.

#### 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 (all parts), *Environmental testing*

~~IEC 60068-2-3:1969, *Environmental testing – Part 2: Tests – Test Ca: Damp heat, steady state*~~

IEC 60068-2-6:1995, *Environmental testing – Part 2-6: Tests – Test Fc: Vibration (sinusoidal)*

IEC 60068-2-11:1981, *Basic environmental testing procedures – Part 2-11: Tests – Test Ka: Salt mist*

IEC 60068-2-14:1984, *Environmental testing – Part 2-14: Tests – Test N: Change of temperature*

IEC 60068-2-27:1987, *Environmental testing – Part 2-27: Tests – Test Ea and guidance: Shock*

~~IEC 60068-2-29:1987, *Environmental testing – Part 2: Tests – Test Eb and guidance: Bump*~~

IEC 60068-2-42:1982, *Environmental testing – Part 2-42: Tests – Test Kc: Sulphur dioxide test for contacts and connections*

IEC 60068-2-68:1994, *Environmental testing – Part 2-68: Tests – Test L: Dust and sand*

IEC 60068-2-78, *Environmental testing – Part 2-78: Tests – Test Cab: Damp heat, steady state*

~~IEC 60096-1:1986, Radio frequency cables – Part 1: General requirements and measuring methods~~

~~IEC 60332-1:1993, Tests on electric cables under fire conditions – Part 1: Test on a single vertical insulated wire or cable~~

IEC 60332-1-2:2004, *Tests on electric and optical fibre cables under fire conditions – Part 1-2: Test for vertical flame propagation for a single insulated wire or cable – Procedure for 1 kW pre-mixed flame*

~~IEC 60339 (all parts), General purpose rigid coaxial transmission lines and their associated flange connectors~~

~~IEC 60512-5:1992, Electromechanical components for electronic equipment, basic testing procedures and measuring methods – Part 5: Impact tests (free components), static load tests (fixed components), endurance tests and overload tests~~

IEC 60512-6-2, *Connectors for electronic equipment – Tests and measurements – Part 6-2: Dynamic stress tests – Test 6b: Bump*

IEC 60512-7-2, *Connectors for electronic equipment – Tests and measurements – Part 7-2: Impact tests (free components) – Test 7b: Mechanical strength impact*

IEC 60529, *Degrees of protection provided by enclosures (IP Code)*

IEC 60966-2 (all parts), *Radio frequency and coaxial cable assemblies*

IEC 60966-3 (all parts), *Radio frequency and coaxial cable assemblies*

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IEC 60966-4 (all parts), *Radio frequency and coaxial cable assemblies*

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

IEC 61169-1:1992 2013, *Radio-frequency connectors – Part 1: Generic specification – General requirements and measuring methods*

IEC 61196 (all parts), *Coaxial communication cables*

~~IEC 61196-1:1995, Radio-frequency cables – Part 1: Generic specification – General definitions, requirements and test methods~~

IEC 61196-1-119, *Coaxial communication cables – Part 1-119: Electrical test methods – RF power rating*

~~IEC 61726:1995, Cable assemblies, cables, connectors and passive microwave components – Screening attenuation measurement by the reverberation chamber method~~

IEC 62037-2, *Passive RF and microwave devices, intermodulation level measurement – Part 2: Measurement of passive intermodulation in coaxial cable assemblies*

IEC 62153-4-6, *Metallic cables and other passive components test methods – Part 4-6: Electromagnetic compatibility (EMC) – Surface transfer impedance – Line injection method*

IEC 62153-4-7:2015, *Metallic communication cable test methods – Part 4-7: Electromagnetic compatibility (EMC) – Test method for measuring of transfer impedance  $Z_T$  and screening attenuation  $a_s$  or coupling attenuation  $a_C$  of connectors and assemblies up to and above 3 GHz – Triaxial tube in tube method*

~~IEC QC 001002:1986, *Rules of procedure of the IEC quality assessment system for electronic components (IECQ)*~~

~~ISO 9000, *Quality management and quality assurance standards*~~

~~ISO 9001:1994, *Quality systems – Model for quality assurance in design, development, production, installation and servicing*~~

~~ISO 9002:1994, *Quality systems – Model for quality assurance in production, installation and servicing*~~

### 3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

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

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

#### 3.1

##### **cable assembly**

combination of cable(s) and connector(s) with or without any additional protection and with specified performance, used as a single unit

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#### 3.2

##### **flexible cable assembly**

cable assembly where the cable is capable of repeated flexure

Note 1 to entry: The cable usually has a braid outer conductor.

#### 3.3

##### **semi-flexible cable assembly**

cable assembly not intended for applications requiring repeated flexure of the cable in service, but bending or forming is permissible to facilitate installation

#### 3.4

##### **semi-rigid cable assembly**

cable assembly not intended to be bent or flexed after manufacture

Note 1 to entry: Any bending or flexing during installation or use may degrade the performance of the cable assembly.

#### 3.5

##### **insertion loss**

loss introduced by inserting a cable assembly into a system

Note 1 to entry: In this standard, it is the ratio, expressed in decibels, of the power ( $P_1$ ) delivered to a load connected directly to a source and the power ( $P_2$ ) delivered to a load when the cable assembly is inserted between the source and the load.

$$\text{Insertion loss} = 10 \times \log \left( \frac{P_1}{P_2} \right)$$

### 3.6

#### reflection factor

ratio of the complex wave amplitude of the reflected wave to the complex wave amplitude of the incident wave at a port or transverse cross-section of a transmission line

### 3.7

#### electrical length

equivalent free-space length of the cable assembly

### 3.8

#### electrical length difference

difference in electrical length between cable assemblies

### 3.9

#### phase difference

difference in phase between a transverse electromagnetic mode (TEM) wave which has traversed the cable assembly and an identical wave which has traversed another cable assembly

### 3.10

#### propagation time

time taken for the propagation of a TEM wave between the reference planes of the two connectors

### 3.11

#### minimum static bending radius

radius used in climatic tests

Note 1 to entry: It is the minimum permissible radius for fixed installation of the cable.

### 3.12

#### dynamic bending radius

~~the bending~~ radius ~~is~~ used for the insertion loss stability, stability of electrical length and flexing endurance tests

Note 1 to entry: It is the minimum bending radius for applications where the cable assembly is flexed. Larger bending radii will allow the increase of the maximum number of flexures.

### ~~3.10 screening effectiveness~~

### 3.13

#### transfer impedance

quotient of the induced voltage on the inside of the cable assembly and the inducing current outside the assembly

Note 1 to entry: In practice, this is between defined points on connectors mated to the connectors of the cable assembly

### 3.14

#### screening attenuation

ratio of the signal power inside the cable assembly to the total power that radiates outside the cable assembly