

INTERNATIONAL STANDARD

**Coaxial communication cables –
Part 11-1: Blank detail specification for semi-rigid cables with polyethylene (PE)
dielectric**

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CONTENTS

FOREWORD	3
1 Scope	5
2 Normative references	5
3 Terms and definitions	5
4 Guidance for the preparation of detail specifications	5
5 Blank detail specification	7

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

COAXIAL COMMUNICATION CABLES –

**Part 11-1: Blank detail specification for semi-rigid cables
with polyethylene (PE) dielectric**

FOREWORD

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IEC 61196-11-1 has been prepared by subcommittee 46A: Coaxial cables, of IEC technical committee 46: Cables, wires, waveguides, RF connectors, RF and microwave passive components and accessories. It is an International Standard.

This second edition cancels and replaces the first edition published in 2016. This edition constitutes a technical revision.

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

- a) Item [8], engineering information: Maximum tensile force and average power introduced,
- b) Item [9], electrical, environmental and mechanical characteristics more detailed,
- c) Item [9], requirements for “Content of toxic and harmful substances” introduced.

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

Draft	Report on voting
46A/1552/FDIS	46A/1560/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 of the IEC 61196 series, under the general title: *Coaxial communication cables*, 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

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

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COAXIAL COMMUNICATION CABLES –

Part 11-1: Blank detail specification for semi-rigid cables with polyethylene (PE) dielectric

1 Scope

This part of IEC 61196 applies to coaxial communication cables described in IEC 61196-11. It specifies the layout and style for detail specifications for semi-rigid coaxial communication cables with polyethylene (PE) dielectric. Semi-rigid coaxial communication cables with polyethylene (PE) dielectric are widely used in the interconnection between wireless communication equipment and antenna, as well as RF and microwave electronic equipment, broadcast television, microwave relay, navigation, etc.

This part of IEC 61196 is used in conjunction with IEC 61196-1 and IEC 61196-11, which determines the layout and style for detail specifications, based on the blank detail specification. It is prepared by a national organization, a manufacturer, or a user.

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 61196-1:2005, *Coaxial communication cables – Part 1: Generic specification: General, definitions and requirements*

IEC 61196-11:2022, *Coaxial communication cables – Part 2: Sectional specification for semi-rigid cables with polyethylene (PE) dielectric*

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)*

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:

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

4 Guidance for the preparation of detail specifications

The detail specification shall be written in accordance with the layout of the blank detail specification, which forms part of this document.

NOTE 1 When a characteristic does not apply, then NA (not applicable) is entered in the appropriate space.

NOTE 2 When a characteristic applies but a specific value is not considered necessary, then NS (not specified) is entered.

The numbers shown in brackets in this and the following pages correspond to the following items of required information, which should be entered in the space provided.

- [1] Name and address of the organization that has prepared the document.
- [2] IEC document number and date of issue.
- [3] Address of the organization from which the document is available.
- [4] Related documents.
- [5] Any other references to the cable, national reference, trade name, etc.
- [6] Complete description of the cable.
- [7] Cable construction.
- [8] Engineering information.
- [9] Parameter or characteristic.
- [10] Reference to the relevant subclause of the sectional specification.
- [11] Minimum requirements, the values entered shall meet as a minimum the requirements of the sectional specification.
- [12] Remarks.

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5 Blank detail specification

Title	
[1] Prepared by:	[2] Document No.: Issue: Date:
[3] Available from:	[4] Generic specification IEC 61196-1 Sectional specification IEC 61196-11
[5] Additional references:	
[6] Cable description: a) Type designation of cable b) Material of inner conductor c) Material of dielectric d) Outer conductor e) Material of sheath (if any)	
[7] Cable construction a) Inner conductor - Material: - Construction: - For corrugated inner conductor: - Peak diameter and tolerance (mm): - Root diameter and tolerance (mm): - Pitch and tolerance (mm): - For others: - Diameter and tolerance (mm): b) Dielectric - Material: PE - Construction: - Diameter (mm) nominal: - Tolerance (mm) tube: $\pm \dots$ (for cables with smooth tube outer conductor) c) Outer conductor - Material: - Construction: - For corrugated outer conductor: - Peak diameter and tolerance (mm): - Root diameter and tolerance (mm): - Pitch and tolerance (mm): - For smooth tube outer conductor: - Diameter and tolerance (mm): d) Sheath (if any) - Material: - Minimum thickness (mm): - Diameter (mm): - Tolerance (mm): $\pm \dots$	
[8] Engineering information (reference only) a) Operating temperature range, storage temperature range, installation temperature range: b) Maximum recommended operating frequency, cut-off frequency: c) Nominal characteristic impedance: d) Relative propagation velocity (velocity ratio): e) Maximum continue working voltage: f) Minimum bending radius (static state): g) Minimum bending radius (dynamic state): h) Nominal weight: i) Capacitance: j) Maximum tensile force: k) Average power: l) Peak power:	

[9] Parameter	[10] IEC 61196- 11:2022 Subclause	[11] Value	[12] Remarks
Electrical characteristics	8.2		
Continuity	8.2.1	Inner conductor shall be continuous. Outer conductor shall be continuous.	
Inner and outer conductor direct current resistance	8.2.2	$\leq \dots \Omega/\text{km}$	
Withstand voltage of dielectric	8.2.3	$\dots \text{ kV RMS}$	40 Hz to 60 Hz
Withstand voltage of sheath (or spark test)	8.2.4	$\dots \text{ kV RMS}$	40 Hz to 60 Hz
Insulation resistance	8.2.5	$\geq 10^4 \text{ M}\Omega \cdot \text{km}$	
Capacitance	8.2.6	$(\dots \pm \dots) \text{ pF/m}$	
Mean characteristic impedance	8.2.7	$(50 \pm 2) \Omega$, or as specified in the detailed specification.	200 MHz
Regularity of impedance	8.2.8	$\geq 40 \text{ dB}$ or resp $\leq 1 \%$	
Propagation velocity	8.2.9	$\geq 80 \%$, or as specified in the detailed specification.	30 MHz to 200 MHz
Return loss	8.2.10	$\dots \text{ MHz to MHz}$ $\geq \dots \text{ dB}$	Specimen length: 20 m
Attenuation	8.2.11	$\dots \text{ MHz} \leq \dots \text{ dB/100 m}$ at 20 °C	If necessary, refer to a table at the end of the detail specification
Attenuation stability ^a	8.2.12	According to IEC 61196-11:2022, 8.3.1	
Passive intermodulation ^a	8.2.13	Better than -158 dBc	This test is only applicable to the cable with a characteristic impedance of 50 Ω . Both ends of the specimen should be attached with suitable RF connectors (recommended type 7-16 connectors, according to IEC 61169-4) PIM should be performed under the minimum bending radius. Input power: $2 \times 20 \text{ W}$ Test frequency ^c
Transfer impedance ^a	8.2.14	$\leq \dots \text{ m}\Omega/\text{m}$ Frequency: $\dots \text{ MHz to } \dots \text{ MHz}$	
Screening attenuation	8.2.15	Better than -110 dB , or as specified in the detailed specification.	0,5 GHz to 3 GHz

[9] Parameter	[10] IEC 61196-11:2022 Subclause	[11] Value	[12] Remarks
Environmental characteristics	8.3		
Ageing ^b	8.3.1	a) The return loss shall be in accordance with the detail specification b) The attenuation shall be in accordance with the detail specification c) No crack in inner conductor and sheath. d) No visible black spots in the outer conductor	The test temperature: 90 °C ± 2 °C Duration: 168 h
Cold bend performance	8.3.2	a) No cracks, flaws or other damage in the corrugated outer conductor, inner conductor, insulation and sheath b) The return loss shall be in accordance with the detail specification	The test temperature: PE sheath: -30 °C ± 2 °C, LSZH sheath: -15 °C ± 2 °C
Water penetration ^a	8.3.3		
Climatic sequence – method 1 ^a	8.3.4	a) No physical damages shall be visible in the cable. b) The return loss shall be in accordance with the detail specification	CUT shall be specified in the detail specification T_A = minimum environmental rated temperature T_B = maximum environmental rated temperature t_1 = 16 h, unless otherwise specified in the detail specification. Humidity: 55 °C, 93 % RH 1 day (after cold and heat) No. of cycles: 2, unless otherwise specified in the detail specification.
Environmental stress cracking	8.3.5	No physical damages shall be visible in the cable.	
Ultraviolet stability of the sheath ^a	8.3.6	– After 720 h, change in elongation $\leq \pm 20$ % – After 720 h, change in tensile strength $\leq \pm 20$ % – No visual cracks	Test procedure shall be specified in the detail specification (only for PE sheath).

[9] Parameter	[10] IEC 61196- 11:2022 Subclause	[11] Value	[12] Remarks
Mechanical characteristics	8.4		
Visual examination	8.4.1	The sheath shall be free of cracks, splits, irregularities, and imbedded foreign material. The outer conductor shall be free of black spots or cracks.	
Dimensional examination	8.4.2	The requirement shall be specified in the detailed specification.	
Ovality of inner conductor	8.4.3	≤ 7 %	
Eccentricity of dielectric	8.4.4	≤ 7 %	
Adhesion of dielectric	8.4.5	Adhesion ≥ 98 N, or value in accordance with the detail specification.	Test temperature: 20 °C ± 5 °C Specimen length: $L = 50$ mm
Cable bending	8.4.6	a) The maximum impedance irregularity shall be ...%. b) The return loss shall be in accordance with the detail specification. c) No physical damage in cable. PIM shall remain within the specified limits in 8.2.13.	a) Single bending (Clause 4, Procedure 2): single bend radius; b) Repeated bending (Clause 5): multiple bend radius and number of bends;
Tensile strength of cable (longitudinal pull)	8.4.7	a) The maximum impedance irregularity shall be ≤...%. b) The return loss shall be in accordance with the detail specification. c) No physical damage in cable.	The maximum tension applied shall be greater than the cable weight of 100 m or be specified in the detail specification.
Crush resistance of cable ^b	8.4.8	a) The maximum impedance irregularity shall be ≤...%. b) The return loss shall be in accordance with the detail specification. c) No physical damage in cable.	When applicable, load shall be specified in the detail specification, applied for 2 min.
Shrinkage for insulations	8.4.9	≤6,4 mm	Test temperature: 115 °C ± 2 °C Time: 4 h cooling down to standard atmospheric conditions
Fire performance requirement	8.5		
Flame propagation ^a	8.5.1	The distance between the upper carbonization point and the lower edge of the upper support is greater than 50 mm, and the distance between the lower carbonization point and the lower edge of the upper support is not greater than 540 mm, or is specified in the detail specification.	
Halogen acid gas emission ^a	8.5.2	≤5 mg/g or specified in the detailed specification.	
Toxic gas emission ^a	8.5.3	According to the detail specification.	
Smoke density ^a	8.5.4	Transmittance ≥60 % or specified in the detailed specification.	