

# Radio-frequency cables —

## Part 2: Sectional specification for semi-rigid radio-frequency and coaxial cables with polytetrafluoroethylene (PTFE) insulation

The European Standard EN 61196-2:2003 has the status of a  
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## National foreword

This British Standard is the official English language version of EN 61196-2:2003. It is identical with IEC 61196-2:1995. It supersedes BS EN 61196-2:1997 which is withdrawn.

The UK participation in its preparation was entrusted by Technical Committee EPL/46, Cables, wires, waveguides, R.F. connectors, R.F. and microwave passive components and accessories, to Subcommittee EPL/46/1, Coaxial cables, which has the responsibility to:

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- present to the responsible international/European committee any enquiries on the interpretation, or proposals for change, and keep the UK interests informed;
- monitor related international and European developments and promulgate them in the UK.

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**Radio-frequency cables**  
**Part 2: Sectional specification for semi-rigid radio-frequency**  
**and coaxial cables with polytetrafluoroethylene (PTFE) insulation**  
**(IEC 61196-2:1995)**

Câbles pour fréquences radioélectriques  
Partie 2: Spécification intermédiaire  
pour câbles coaxiaux et semi-rigides  
pour fréquences radioélectriques  
à isolation polytétrafluoroéthylène  
(CEI 61196-2:1995)

Hochfrequenzkabel  
Teil 2: Rahmenspezifikation für halb-starre  
Hochfrequenz- und Koaxialkabel mit  
Polytetrafluorethylen (PTFE) Isolation  
(IEC 61196-2:1995)

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## CENELEC

European Committee for Electrotechnical Standardization  
Comité Européen de Normalisation Electrotechnique  
Europäisches Komitee für Elektrotechnische Normung

**Central Secretariat: rue de Stassart 35, B - 1050 Brussels**

## Foreword

The text of the International Standard IEC 61196-2:1995, prepared by SC 46A, Coaxial cables, of IEC TC 46, Cables, wires, waveguides, r.f. connectors, r.f. and microwave passive components and accessories, was submitted to the formal vote and was approved by CENELEC as EN 61196-2 on 2003-10-01.

This European Standard supersedes EN 61196-2:1995.

The following dates were fixed:

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- latest date by which the national standards conflicting  
with the EN have to be withdrawn (dow) 2006-10-01

Annexes designated "normative" are part of the body of the standard.  
Annexes designated "informative" are given for information only.  
In this standard, annex ZA is normative and annex A is informative.  
Annex ZA has been added by CENELEC.

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## Endorsement notice

The text of the International Standard IEC 61196-2:1995 was approved by CENELEC as a European Standard without any modification.

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## RADIO-FREQUENCY CABLES –

### Part 2: Sectional specification for semi-rigid radio-frequency and coaxial cables with polytetrafluoroethylene (PTFE) insulation

#### Section 1: General

##### 1.1 Scope and object

This sectional specification specifies requirements for semi-rigid radio frequency and coaxial cables with polytetrafluoroethylene (PTFE) insulation.

It is intended to be used with the generic specification (IEC 1196-1).

The object of this sectional specification is to prescribe recommended ratings and characteristics and to select from the generic specification the appropriate quality assessment procedures, test and measuring methods, and to give general performance requirements for semi-rigid coaxial cables plus complementary test methods. Test severities and requirements prescribed in detail specifications referring to this sectional specification should be of equal or higher performance levels.

##### 1.2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this sectional specification. At the time of publication, the editions indicated were valid. All normative documents are subject to revision, and parties to agreements based on this sectional specification are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

IEC 28: 1925, *International Standard of resistance for copper*

IEC 68-2-20: 1979, *Environmental testing – Part 2: Tests – Test T: Soldering*

IEC 1196-1: 1995, *Radio-frequency cables – Part 1: Generic specification: General, definitions, requirements and test methods*

##### 1.3 Definitions

For the definitions of general terms used in this specification, reference should be made to the generic specification.

## **1.4 Information to be given in a detail specification**

Detail specifications shall not specify requirements inferior to those in the generic or sectional specification. When more severe requirements are included, they shall be listed in the detail specification and indicated in the test schedules.

Information covered in 1.4.1 to 1.4.4 shall be included in the detail specification and the value quoted shall be selected from the preferred values given in this sectional specification. Examples of detail specifications are given in annex A.

### **1.4.1 *Outline drawing and dimensions***

There shall be an illustration of the cable as an aid to easy recognition and for comparison of the cable to others. As a minimum requirement, the diameter of the dielectric and the outer diameter of the cable shall be specified. All dimensions and their tolerances which affect interchangeability and termination shall be given in millimetres and tabulated below the drawing.

### **1.4.2 *Materials***

The detail specification shall specify the materials of both the inner and outer conductors. The insulation shall be of solid polytetrafluoroethylene having a thickness as specified in the detail specification.

### **1.4.3 *Ratings and characteristics***

The ratings and characteristics shall be in accordance with the relevant clauses of this specification.

### **1.4.4 *Marking of package***

The package containing the cable shall be clearly marked with the manufacturer's name and the cable IEC type designation.

## **Section 2: Ratings and characteristics**

The values given in the detail specification shall be selected from the following recommended requirements.

### **2.1 Climatic category**

Due to the particular structure of semi-rigid coaxial cables and the associated differential thermal expansion coefficients of materials, rated temperatures are specific for each cable and shall be given in the detail specification.

The operating temperature range is between the limits within which a cable may be operated continuously without any reduction in the basic properties of the cable. This includes the ambient temperature plus the increased temperature due to cable operation.

The temperature range is given as a guideline, since the mechanical, environmental and electrical requirements of the application can affect the operating temperature range. In no case shall the testing temperatures be considered as giving the operating temperature range. Testing is usually carried out under accelerated conditions in an attempt to reveal any faults in the materials used in the construction of the cable assembly.

The maximum power-handling capability, in watts, is the amount of power that a coaxial cable can safely transmit without overheating or developing a dielectric breakdown throughout the usable frequency range. The safe power-handling capabilities are shown on the associated curves. These curves have been derated with an assumption of a VSWR of 2 and an ambient temperature of 25 °C. The curves have also taken into account the effects of a typical system installation, for example bends, clamps and thermally insulated sections.

## 2.2 Recommended ratings

### 2.2.1 *Characteristic impedance*

Preferred values are 50  $\Omega$  or 75  $\Omega$ .

### 2.2.2 *Tolerance on characteristic impedance*

Tolerances on rated characteristic impedances shall be selected from the following values:

$$\pm 0,5 \Omega, \pm 1 \Omega, \pm 1,5 \Omega, \pm 2 \Omega$$

### 2.2.3 *Rated temperature*

The standard value of rated temperature is 20 °C.

## Section 3: Additional requirements

### 3.1 Design and construction of outer conductor

The outer conductor shall be a smooth and continuous metallic tube, either of copper or light metal alloy.

#### *Copper*

The type used shall be annealed, electrolytically refined with a copper content of at least 99,9 % and an electrical conductivity of at least 100 % according to IEC 28.

The mechanical characteristics of the copper tube shall comply with a flattening and bending test which is carried out on a section of tube. The tube shall be completely flattened and then folded back on itself. After this test the tube shall not exhibit splits, cracks, fissures or tears.

*Light metal alloy*

Under consideration.

## 3.2 Tests and measurements

### 3.2.1 Dimensions

#### 3.2.1.1 Eccentricity of dielectric

The eccentricity of the dielectric shall be measured in accordance with the method specified in 9.2 of the generic specification.

##### 3.2.1.1.1 Requirements

The lowest measured value of the dielectric core thickness shall be at least 85 % of the highest measured value in the same cross-section.

### 3.2.2 Electrical tests

#### 3.2.2.1 Structural return loss

##### 3.2.2.1.1 Procedure

The specimen shall be of sufficient length to exhibit no more than 26 dB attenuation at the highest swept-frequency and no less than 3 dB attenuation at the lowest swept-frequency specified. If the specified frequency range is such that one specimen cannot fulfil this requirement, then an additional specimen shall be used. A swept-frequency, slotted-line technique shall be used to determine the structural return loss within the specified frequency range. Suitable connectors shall be attached to both ends of the specimen and the assembly checked with a TDR that is capable of producing a step-function rise-time of 150 ps or less. With the far end of the specimen connected to a matched load, the impedance variation exhibited by each connector-cable interface shall not be greater than the maximum impedance variation permitted for the cable itself. Correction curves will be used for other than matched systems. Figure 1 shows a block diagram of typical equipment to be used for the swept-frequency measurement of the standing wave ratio (SWR). The total SWR (excluding the test specimen) of the slotted-line connectors and the load shall be less than 1,06. A calibration grid shall be established on the X-Y recorder chart terminating the slotted line with a matched load. Starting from zero attenuation, the variable attenuator setting is increased in uniform steps with each sweep, until a series of calibration lines sufficient to cover the SWR range of the test assembly is traced on the chart. One of the calibration lines shall contain frequency marker pips.