

INTERNATIONAL STANDARD



**Coaxial communication cables –
Part 1-303: Mechanical test methods – Test for silver and tin plating thickness**

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

COAXIAL COMMUNICATION CABLES –

**Part 1-303: Mechanical test methods –
Test for silver and tin plating thickness**

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International Standard IEC 61196-1-303 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.

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

FDIS	Report on voting
46A/1348/FDIS	46A/1355/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.

This publication is to be read in conjunction with IEC 61196-1:2005.

A list of all the parts in the IEC 61196 series published 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 "<http://webstore.iec.ch>" in the data related to the specific document. At this date, the document will be

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COAXIAL COMMUNICATION CABLES –

Part 1-303: Mechanical test methods – Test for silver and tin plating thickness

1 Scope

This part of IEC 61196 defines the requirements for measuring the plating thickness for silver and tin conductors for coaxial cables used in analogue and digital communication systems.

This test method uses a procedure for determining the plating thickness of silver and tin coatings on conductors by galvanic removal (coulometric method).

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*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 61196-1 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>

4 Procedure

4.1 Test equipment and method

The thickness of the silver or tin coating shall be measured with an electronic thickness tester.

In a conventional measuring equipment, the reading for the amount of coating is reduced to a time reading by metering with direct current. The voltage in the test sample changes significantly if the coating to be measured is completely removed. This voltage impulse is amplified and acts to terminate the measurement procedure.

The electronic tester measures the time for the removal of the silver or tin coating and is proportional to the average plating thickness.

4.2 Test solution

The test solution specified by the equipment manufacturer should be used.

In case the specified solution is not available, the following test solutions may be used:

- for silver: 180 g potassium thiocyanate with 1 000 ml of distilled water (H₂O);
- for tin: 100 ml of 37 % concentrated hydrochloric acid.

Special care shall be taken when handling the test solutions. The user should establish appropriate safety and health procedures.

4.3 Test sample

Cut a straight length of the conductor to be tested to approximately 200 mm. Lay the conductor sample under test on a flat surface along a ruler and mark with a crayon (or equivalent) to a length according to the diameter of the conductor (see Table 1 and Figure 1) from one end of the conductor.

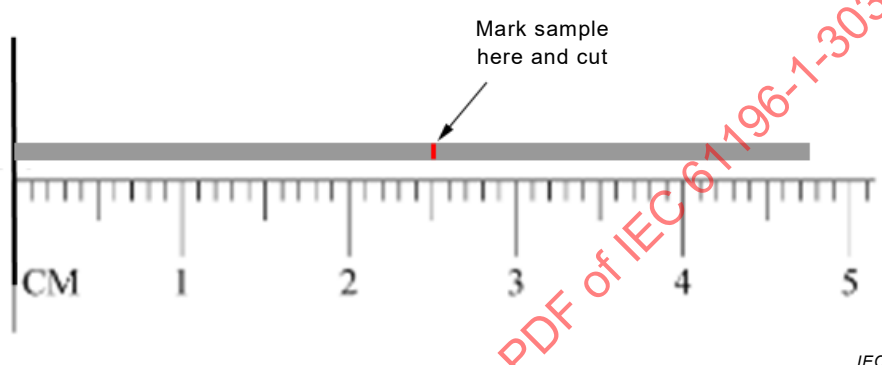


Figure 1 – Example of a conductor with a diameter of 0,3 mm

The test sample should be given an open 180° bend half way between the crayon mark and the end to allow them to be submerged in the test solution without touching the beaker.

Table 1 – Length of the test sample in dependence upon the diameter of the conductor

Diameter of the conductor mm	Length of the test sample mm
0,050 to 0,140	100 ± 5
0,141 to 0,290	50 ± 5
0,291 to 0,700	25 ± 2
> 0,700	12 ± 2

The test samples shall be clean. If the wire is dirty or not free of oil, remove it with a solvent before testing.

4.4 Procedure

Connect the electronic thickness tester to the power 15 minutes before starting the measurement, to allow a warm-up of the tester. Follow the instruction of the manufacturer of the electronic thickness tester and make sure that the selector of the electronic tester is in the position “Silver” or “Tin”. Select the desired unit (inch or µm).

Fill the stainless steel beaker approximately 75 mm from the bottom with the test solution. Maintain the temperature of the solution at 20 °C to 25 °C, see Figure 2.

Do the calibration of the electronic test equipment according to the manufacturer's instruction for silver or tin wires.

Insert the test sample into the terminal on the horizontal arm of the accessory unit. Tighten the terminal so that the conductor is held firmly in a vertical position. Lower the conductor into the beaker until the test solution level is exactly at the crayon mark. Adjust the arm so that the conductor is in the approximate centre of the beaker.

Press the start button to start the measurement. Follow the instruction of the manufacturer of the electronic test equipment.

Make no adjustments at the test sample while the measurement is in operation. If an adjustment is necessary, the measurement has to be repeated on a new sample.



Figure 2 – Conductor before and after measurement

If the silver or tin plating is removed, the test equipment stops and the counter can read out.

If the silver plating after the measurement is not completely removed, the measurement has to be repeated with a new test solution.

If the tin plating after the measurement is not completely removed, the start button can be pressed again and both times (counter) can be added.

Lay the conductor sample on a flat surface along a ruler and measure the length of the removed silver or tin, see Figure 3.

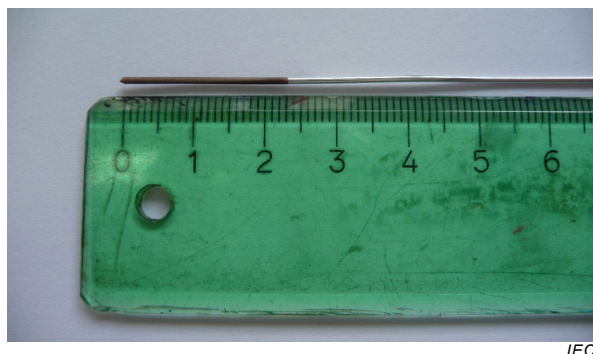


Figure 3 – Measure the length of the removed silver or tin

The thickness of the silver or tin plating can be calculated according to the following formula or to the instruction of the manufacturer of the electronic test equipment:

$$T = \frac{C \cdot CF}{l \cdot d}$$

where

T is the thickness of the silver or tin plating in μm ;

C is the number shown on the counter;

CF is the correction factor (depends from the measuring equipment);

l is the length of the removed silver or tin conductor in mm;

d is the diameter of the conductor under test mm.

The average silver or tin plating thickness can be measured with an accuracy of $\pm 5\%$ by using a conventional apparatus.

After the test, the test solution should not be stored in the stainless steel beaker. After a daily use, return the test solution to a re-use storage bottle, and rinse the beaker thoroughly with water and dry it. Do not return used solutions to the original stock solution. Use a separate bottle for the used solution.

The test solution may be reused. In general, solutions may be reused approximately eight or ten times before discarding.

Follow the instruction of the safety inspector to depollute the test solution.

5 Test report

The test report shall include the following:

- thickness of silver or tin plating.

6 Requirements

The thickness of the silver or tin plating shall comply with the requirements of the relevant detailed specification.

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