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Coaxial communication cables – Part 1-308: Mechanical test methods – Test for tensile strength and elongation for copper-clad metals

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IEC Central Office
3, rue de Varembé
CH-1211 Geneva 20
Switzerland

Tel.: +41 22 919 02 11
Fax: +41 22 919 03 00
info@iec.ch
www.iec.ch

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FOREWORD

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International Standard IEC 61196-1-308 has been prepared by subcommittee 46A: Coaxial cables, of IEC technical committee 46: Cables, wires, waveguides, R.F. connectors, R.F. and microwave passive components and accessories.

This second edition cancels and replaces the first edition published in 2005. It constitutes a technical revision. Changes from the previous edition of the document are the addition of test methods for annealed copper-clad conductors. This second edition makes a distinction between annealed and hard-drawn solid copper clad metals. Requirements are more precise than in the first edition.

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

FDIS	Report on voting
46A/1041/FDIS	46A/1062/RVD

4Full information on the voting for the approval of this standard can be found in the report on voting indicated in the above table.

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

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 publication will remain unchanged until the stability date indicated on the IEC web site under "http://webstore.iec.ch" in the data related to the specific publication. At this date, the publication will be

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- withdrawn,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

A bilingual version of this publication may be issued at a later date.

COAXIAL COMMUNICATION CABLES –

Part 1-308: Mechanical test methods – Test for tensile strength and elongation for copper-clad metals

1 Scope

This part of IEC 61196 applies to coaxial communication cables. It specifies test methods for tensile strength and percentage elongation at fracture for annealed and hard-drawn solid copper clad metals to be used as inner conductor for coaxial cables.

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 61196-1, *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, as well as the following, apply.

3.1
gauge length
L
length of the section of the test piece on which elongation is measured

3.1.1
original gauge length
L_o
gauge length before application of force

3.1.2
gauge length at fracture
L_t
gauge length at fracture of the test piece

3.2
tensile strength
R_m
stress corresponding to the maximum force (F_m)

3.3
maximum force
F_m
the greatest force which the test piece withstands during the test once the yield point has been passed

For materials without yield point, it is the maximum value during the test.

3.4
percentage elongation at fracture
A_t
total elongation (elastic elongation plus plastic elongation) of the gauge length at the moment of fracture expressed as a percentage of the original gauge length (L_o)

4 Test for tensile strength and elongation at fracture for metals

4.1 Principle

The test involves straining a test piece by tensile force, for the determination of the tensile strength and percentage elongation at the time of fracture.

The test is carried out at ambient temperature between 10 °C and 35 °C, unless otherwise specified.

4.2 Test equipment

The error of indication of the force-measuring system of the testing machine shall not be greater than 1 %.

An extensometer or other device suitable for measuring elongation over a gauge length of 250 mm shall be used. The equipment shall have a vernier resolution not worse than 0,25 mm.

4.3 Test specimen

The original gauge length (L_o) of test specimen should be 250 mm, and the total length of the test specimen should be about 300 mm.

The test specimen shall be straightened by hand or other applicable manners.

4.4 Procedure

4.4.1 Determination of the original cross-sectional area (S_o)

The original cross-sectional area (S_o) shall be determined to an accuracy of ± 1 %.

The original cross-sectional area shall be expressed as follows.

$$S_o = \frac{1}{4}\pi d^2$$

where

S_o is the original cross-sectional area, in mm^2;

D is the arithmetic mean of diameter, in mm; it is calculated from the arithmetic mean of two 90° measurements carried out around the circumference of the conductor.

4.4.2 Perform tensile and elongation test

A test specimen shall be fitted in the jaws of the testing machine and loaded to 10 % of the minimum specified breaking load. An extensometer or other suitable device shall be attached to the test specimen to measure the extension over 250 mm.

The elongation shall be observed while applying a tensile load to the specimen and the maximum tensile force and elongation at which fracture occurs shall be recorded as the tensile force (F_m) and elongation (L_t) of the specimen.

For hard-drawn conductors, the rate of jaw travel shall not exceed 25 mm/min.

For annealed conductors, the rate of jaw travel shall not exceed 300 mm/min.

Tests in which a fracture occurs within 25 mm of the jaws or extensometer clamps shall be disregarded.

4.5 Expression of results

The tensile strength shall be expressed as follows.

$$R_m = F_m / S_o$$

where

R_m is the tensile strength, in N/mm^2;

F_m is the stress corresponding to the maximum force, in N;

S_o is the original cross-sectional area, in mm^2.

The percentage elongation at fracture shall be expressed as follows.

$$A_t = (L_t - L_o)/L_o \times 100\ \%$$

where

A_t is the percentage elongation at fracture;

L_t is the gauge length at fracture;

L_o is the original gauge length.

4.6 Requirement

The tensile strength and elongation shall be as specified in the relevant cable specification.

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