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Coaxial communication cables – Part 1- 314: Mechanical test methods – Test for bending

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CONTENTS

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COAXIAL COMMUNICATION CABLES –

Part 1- 314: Mechanical test methods – Test for bending

FOREWORD

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International Standard IEC 61196-1-314 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 edition published in 2006. This edition constitutes a technical revision. This edition includes the following significant technical change with respect to the previous edition:

– Clause 4 (single bending test) was completely revised.

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

FDIS	Report on voting
46A/1264/FDIS	46A/1269/RVD

Full 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.

This standard is intended to be read in conjunction with IEC 61196-1:2005, on which it was based.

A list of all parts in 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 publication will remain unchanged until the stability date indicated on the IEC website 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- withdrawn,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- 314: Mechanical test methods – Test for bending

1 Scope

This part of IEC 61196 applies to coaxial communications cables. It specifies test methods to determine the bending tests for cables:

- bending around a test mandrel (Clause 4);
- repeated bending (Clause 5);
- repeated flexing in service (Clause 6);
- flexing in service (Clause 7);
- bending around rollers or bows during installation (Clause 8);

and for

- measuring the stiffness (Clause 9) of such a cable;
- kink test (Clause 10).

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 60050 (all parts), *International Electrotechnical Vocabulary,* available at http://www.electropedia.org/

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

EN 50289-3-1, *Communication cables – Specifications for test methods – Part 3-1: Mechanical test methods – General requirements*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 60050 and in IEC 61196-1 apply.

4 Bending around a test mandrel

4.1 Equipment

A single mandrel apparatus shall enable the sample to be wrapped tangentially in a close helix around a test mandrel.

4.2 Test sample

The sample shall be terminated at each end by suitable connectors.

4.3 Procedure

4.3.1 General

As indicated in the sectional or detail specification, one of the following two procedures detailed in 4.3.2 and 4.3.3 shall be used.

4.3.2 Procedure 1

The sample shall be wrapped in a close helix around the mandrel at a uniform rate. Sufficient tension shall be applied to ensure that the sample contours the mandrel. The sample shall then be unwrapped.

The test consists of one wrapping and one unwrapping.

The diameter of the test mandrel and the number of turns per helix shall be shown in the sectional or detail specification.

4.3.3 Procedure 2

The sample shall be bent around a mandrel through 180° and kept taut during the bending. The test consists of one U bend followed by a reverse U bend, and returned to the straight position. The diameter of the test mandrel shall be stated in the sectional or detail specification.

4.3.4 Requirements

The acceptance criteria for the test shall be stated in the sectional or detail specification. Typical failure modes include loss of electrical continuity, degradation of transmission performance or physical damage to the cable.

4.3.5 Test report

The test report shall include:

a) procedure to be used (procedure 1 or procedure 2);
b) test mandrel diameter (or ratio of mandrel diameter to cable diameter);
c) number of turns (for procedure 1);
d) maximum allowable attenuation increase:
   1) during the test (if applicable);
   2) after the test (if applicable);
e) test temperature;
f) pass/fail criteria.

5 Repeated bending

5.1 Equipment

The apparatus shall permit a sample to be bent backwards and forwards through angles up to 180°, the two extreme positions making an angle of 90° on both sides of the vertical, whilst being subjected to a tensile load. For testing cables, a suitable apparatus is shown in Figure 1. For testing cable/connector assemblies, a suitable apparatus is shown in Figure 2. Other equivalent apparatus may be used.

The bending arm shall have an adjustable clamp of fixture to permit holding the cable securely during the entire test. For connectorized cables, a connector may be used to hold the cable on the bending arm providing that its characteristics fit with the tensile load.

The apparatus shall be capable of cycling. Displacing the sample from the vertical position to the extreme right position then oscillating to the extreme left position and returning to the original vertical position is considered to be one cycle. Unless otherwise specified in the sectional or detail specification, the bending rate shall be approximately one cycle in 2 s.

The apparatus shall include any test equipment needed to measure the changes in transmission performance requested in the sectional or detail specification.

5.2 Test sample

5.2.1 Sample length

The sample length shall be sufficient to carry out the testing specified. When only physical damage is to be evaluated, the length may range from 1 m (for example for small diameter jumper cords) to 5 m (for larger diameter cables). Longer lengths may be necessary to permit transmission measurements.

5.2.2 Termination

The sample may be terminated at each end in a connector, or in a representative manner. The clamps on the bending apparatus may be adequate, or the sample may be long enough that no restraint is needed.

5.3 Procedure

The procedure can be defined in five steps.

a) Precondition sample at standard atmospheric conditions for 24 h.

b) Apply the weight of mass as shown in the sectional or detail specification.

c) Measure acceptance criteria parameters to establish baseline values.

d) Carry out repeated bending for the number of cycles specified in the sectional or detail specification.

e) Carry out acceptance criteria parameter measurements. If necessary, the sample may be removed from the apparatus for visual examination.

5.4 Requirements

The acceptance criteria for the test shall be stated in the sectional or detail specification. Typical failure modes include loss of transmission performance of physical damage to the cable.

5.5 Test report

The test report shall include:

a) the angle of displacement;

b) number of cycles;

c) mass of the weight;

d) bending radius R;

e) test temperature;

f) pass/fail criteria.

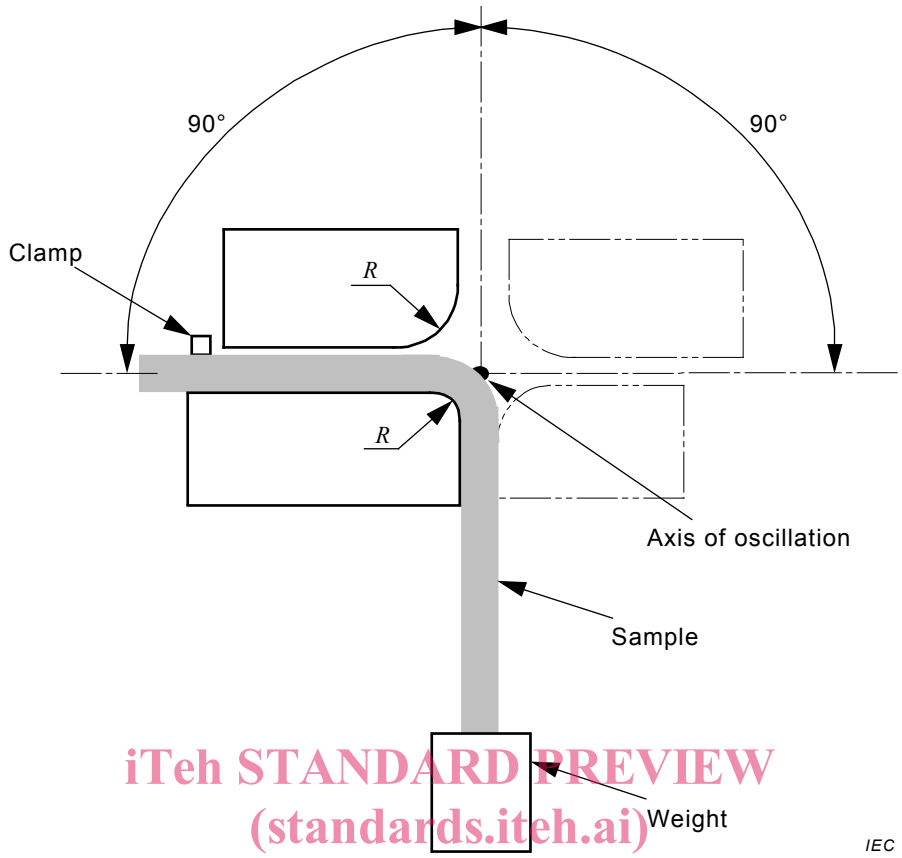

Figure 1 – Repeated bending test for cable

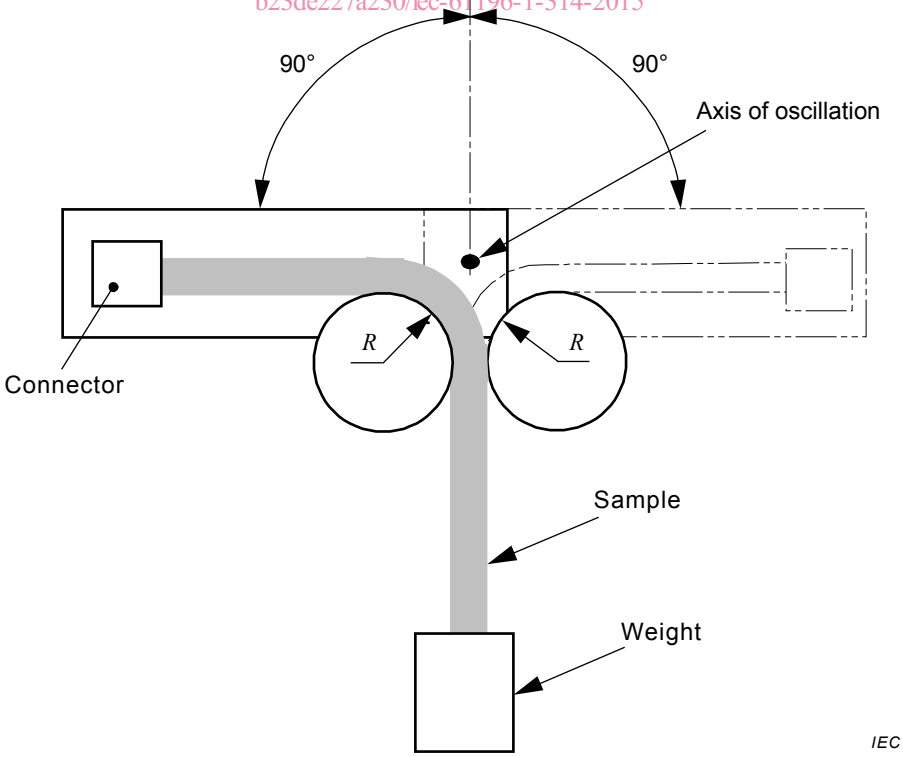

Figure 2 – Repeated bending test for cable/connector assembly