SLOVENSKI STANDARD
SIST EN 50289-3-9:2002

01-september-2002

Communication cables - Specifications for test methods - Part 3-9: Mechanical test methods - Bending tests

Communication cables - Specifications for test methods -- Part 3-9: Mechanical test methods - Bending tests

Kommunikationskabel - Spezifikationen für Prüfverfahren -- Teil 3-9: Mechanische Prüfverfahren - Biegeprüfungen

Câbles de communication - Spécifications des méthodes d'essai -- Partie 3-9: Méthodes d'essais mécaniques - Essais de pliage

Ta slovenski standard je istoveten z: **EN 50289-3-9:2001**

ICS:

33.120.10 Koaksialni kabli. Valovodi Coaxial cables. Waveguides

SIST EN 50289-3-9:2002 **en**

EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN 50289-3-9

August 2001

ICS 33.120.10

English version

Communication cables - Specifications for test methods Part 3-9: Mechanical test methods - Bending tests

Câbles de communication -
Spécifications des méthodes d'essai
Partie 3-9: Méthodes d'essais mécaniques
- Essais de pliage

Kommunikationskabel -
Spezifikationen für Prüfverfahren
Teil 3-9: Mechanische Prüfverfahren -
Biegeprüfungen

This European Standard was approved by CENELEC on 2001-05-01. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CENELEC member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CENELEC member into its own language and notified to the Central Secretariat has the same status as the official versions.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

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

Ref. No. EN 50289-3-9:2001 E

Foreword

This European Standard was prepared by the Technical Committee CENELEC TC 46X, Communication cables.

The text of the draft was submitted to the formal vote and was approved by CENELEC as EN 50289-3-9 on 2001-05-01.

The following dates were fixed:

– latest date by which the EN has to be implemented at national level by publication of an identical national standard or by endorsement	(dop)	2002-04-01
– latest date by which the national standards conflicting with the EN have to be withdrawn	(dow)	2004-04-01

This European Standard has been prepared under the European Mandate M/212 given to CENELEC by the European Commission and the European Free Trade Association.

Contents

1 Scope

This Part 3-9 of EN 50289 details the methods of test to determine the bending tests used in analogue and digital communication systems to:

- 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

- measure the stiffness (clause 9) of such a cable;
- kink test (clause 10).

It is to be read in conjunction with Part 3-1 of EN 50289, which contains essential provisions for its application.

2 Normative references

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies (including amendments).

EN 50289-3-1	2001	Communication cables - Specifications for test methods -- Part 3-1: Mechanical test methods - General requirements
EN 50290-1-2[1)]		Communication cables -- Part 1-2: Definitions

3 Definitions

For the purposes of this European Standard the definitions of EN 50290-1-2 apply.

4 Single bending

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

4.2.1 Optical cables

The sample shall be terminated at each end in a manner such that the fibres, sheath(s) and any strain members are clamped together in a representative manner.

[1)] At draft stage.

4.2.2 Coaxial cables

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

4.2.3 Symmetrical cables

The sample shall be fitted at each end with suitable terminations.

4.3 Procedure

As indicated in the relevant cable specification, one of the following two procedures shall be used.

4.3.1 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.

A cycle consists of one wrapping and one unwrapping.

The diameter of the test mandrel, the number of turns per helix and the number of cycles shall be shown in the relevant cable specification.

4.3.2 Procedure 2

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

4.4 Requirements

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

4.5 Test report

The test report shall include:

- procedure to be used (procedure 1 or procedure 2);
- test mandrel diameter (or ratio of mandrel diameter to cable diameter);
- number of cycles;
- number of turns (for procedure 1);
- maximum allowable attenuation increase:
  - during the test (if applicable),
  - after the test (if applicable);
- test temperature;
- pass/fail criteria

5 Repeated bending

5.1 Equipment

The apparatus shall permit a sample to be bend 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 cable, 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 relevant cable 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 relevant 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 by 6 steps.

- Step 1 : Precondition sample at standard atmospheric conditions for 24 hours.
- Step 2 : Fix the sample to the apparatus as shown in Figures 1 and 2.
- Step 3 : Apply the weight of mass as shown in the relevant cable specification.
- Step 4 : Measure acceptance criteria parameters to establish baseline values.
- Step 5 : Carry out repeated bending for the number of cycles specified in the relevant cable specification.
- Step 6 : 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 relevant cable specification. Typical failure modes include loss of transmission performance of physical damage to the cable.

5.5 Test report

The test report shall include:

- the angle of displacement;
- number of cycles;
- mass of the weight;
- bending radius R;
- test temperature;
- pass/fail criteria.

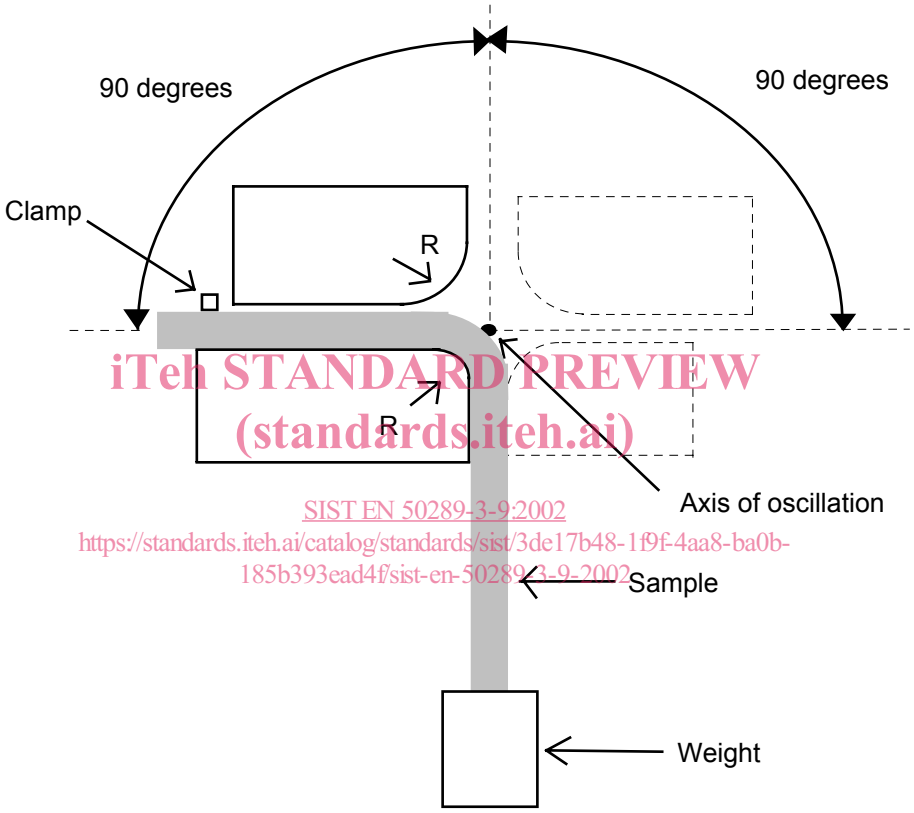

Figure 1 - Repeated bending test for cable

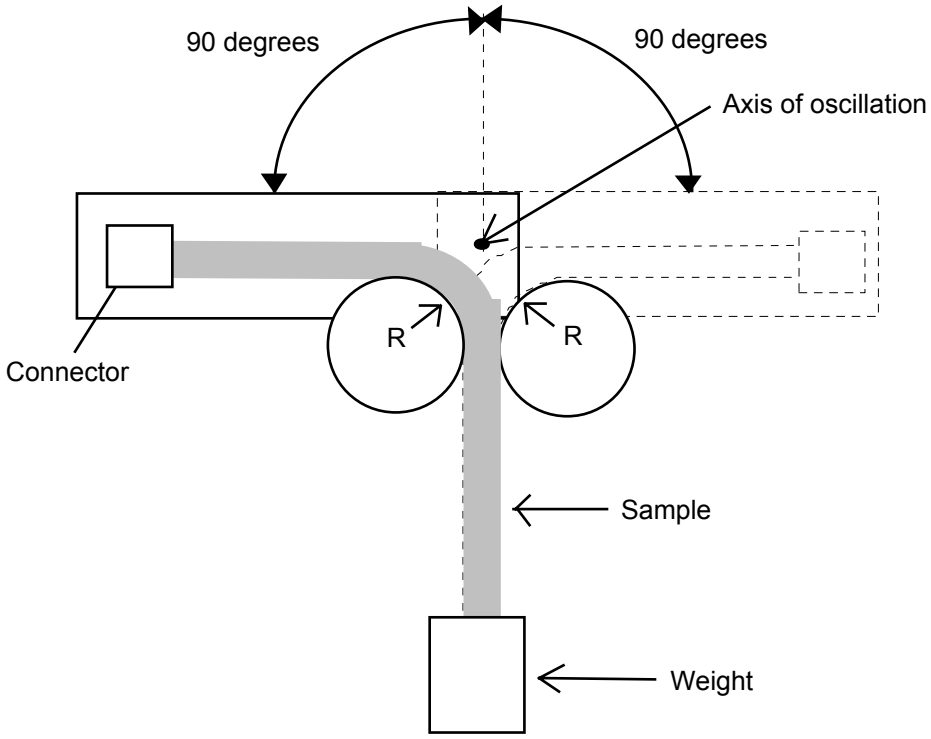

Figure 2 - Repeated bending test for cable/connector assembly