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Communication cables - Specifications for tests methods - Part 3-10: Mechanical test methods - Torsion and twisting

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Communication cables – Specifications for tests methods Part 3-10: Mechanical test methods – Torsion and twisting

Câbles de communication –
Spécifications pour les méthodes d'essais
Partie 3-10: Méthodes d'essais mécaniques –
Torsion et vrillage

Kommunikationskabel –
Spezifikationen für Prüfverfahren
Teil 3-10: Mechanishe Prüfverfahren -
Torsion und Verdrillung

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

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Foreword

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

The text of the draft was submitted to the Unique Acceptance Procedure and was approved by CENELEC as EN 50289-3-10 on 2004-11-01.

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)	2005-11-01
– latest date by which the national standards conflicting with the EN have to be withdrawn	(dow)	2007-11-01

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.

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Contents

1 Scope

This Part 3-10 of EN 50289 details the method of test to determine the ability of a finished cable used in analogue and digital communication systems to withstand mechanical twisting and torsion.

The primary purpose of the torsion test is to measure any variation in optical power transmittance of a fibre or electrical performance of a copper cable when the cable is subjected to torsional and twisting forces external to the cable jacket. A secondary purpose is to evaluate the possibility of physical damage that may occur as a result of such stresses.

The primary purpose of the twisting test is to determine the change of RL and NEXT caused when the cable assembly is subjected either to bending or twisting.

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

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.

EN 50289-3-1	2001	Communication cables - Specifications for test methods Part 1-1: Mechanical test methods – General requirements
EN 50290-1-2	2004	Communication cables - Part 1-2: Definitions

3 Definitions

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

4 Torsion

4.1 Sample

The specimen shall be a sample of finished cable having a total length sufficient to permit the appropriate clamping and torsion, and long enough to permit optical transmittance or electrical measurements as required by the relevant cable specification.

4.2 Equipment

The torsional apparatus consists essentially of two cable gripping devices or clamps, one fixed and one that can rotate, supported as appropriate, and adjustable as to distance between them. The rotating clamp is connected to suitable turning equipment (e.g. a torquing lever). Any clamp supports, gripping devices, or torquing equipment used shall all be such as to permit access to both ends of the cable specimen for optical or electrical testing as may be required. Suitable apparatus is illustrated in Figures 1, 2 and 3.

The cable gripping devices shall be such that

- they may be tightened around the cable sufficiently to prevent movement within the grip,
- the clamps hold the cable firmly in a straight line,
- the clamps induce neither localized twisting damage on the cable caused by the inside edge of the clamp nor undue localized concentration of pressure on the cable,
- the process of clamping does not induce any significant or accurately measurable attenuation increase (or no more than a negligible increase) in the specimen.

If required by the relevant cable specification and/or to minimize specimen bending from a straight configuration, use weights or an appropriate loading mechanism to apply a tensile load to the cable gripping fixture (see Figures 1 and 3).

The apparatus shall include test equipment to measure the change in optical or electrical performance as required in the relevant specification.

4.3 Procedure

Install the specimen in the test apparatus such that the test length, *L* (see Figures 1, 2 and 3), is as required by the relevant cable specification. Take care to insure that no initial stress is applied to the specimen. Except for the necessary twisting operation, take care not to move or disturb the specimen ends throughout the test.

Minimize specimen sag (Figure 1 or 2) or vertical deviation from a straight line (Figure 3) as much as possible.

If optical or electrical tests are required by the relevant cable specification, measure the unstressed specimen. Compare results with those after clamping to ensure that the clamping has not significantly degraded the cable performance.

If not prohibited by the relevant cable specification, specimen sag or bend may be minimized by supporting the test length or by applying tension to the specimen cable between clamps. If required, apply tension as specified in the relevant cable specification to keep the specimen straight. If tension is required by the relevant cable specification, but specific tension loads are not stated, apply tension as shown in Table 1.

Table 1 - Tension to be applied

Nominal cable diameter range mm	**Minimum load** N
≤ 2,5	15
2,6 to 4,0	25
4,1 to 6,0	40
6,1 to 9,0	45
9,1 to 13,0	50
13,1 to 18,0	55
18,1 to 24,0	65
24,1 to 30,0	70
≥ 30,1	75

If optical or electrical tests are required by the relevant cable specification, perform the required tests after clamping and application of tensile load.

Rotate the movable cable clamp as follows:

- rotate 180° clockwise;
- return to the starting position;
- rotate 180° counter-clockwise;
- return to the starting position.

This total four-part movement constitutes one cycle. Unless otherwise specified in the relevant cable specification, complete each cycle within 1 min, maximum, for a total of 10 cycles.

During the final cycle (tenth), determine the number of transmitting fibres with the cable:

- rotated 180° clockwise;
- rotated 180° counter-clockwise;
- with no rotation, after completion of the final cycle.

Carry out the specified measurements. Allow the specimen to « rest » for a minimum period of 5 min. If necessary, the sample may be removed from the apparatus for visual examination using normal corrected vision.

4.4 Requirements

The acceptance criteria for the sample under test shall be stated in the relevant cable specification. Typical failure modes include loss of optical continuity, increase in fibre loss, degradation of return loss, degradation of NEXT, and damage to the cable jacket or core components.

4.5 Test report

The test report shall give the test conditions:

- test length, *L*;
- any tension which is to be applied;
- number of fibres to be monitored for optical transmittance;
- maximum allowable change in optical or electrical performance;
- temperature

and record the pass/fail conditions as required in the relevant cable specification.

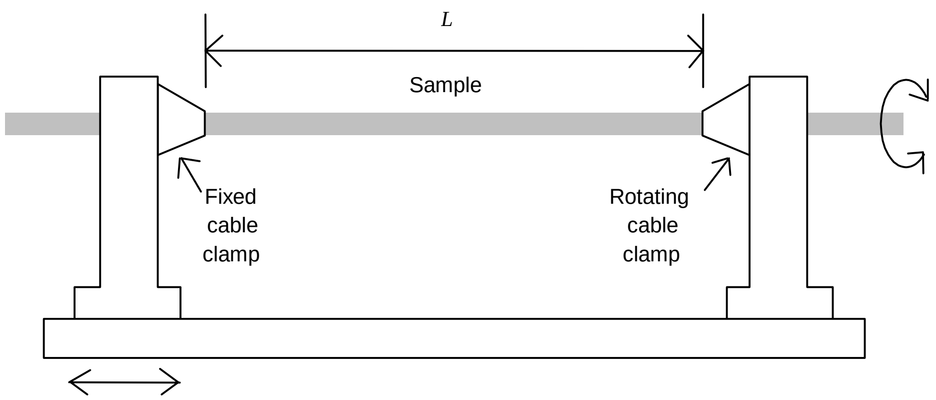

Figure 1 - Cable torsion apparatus

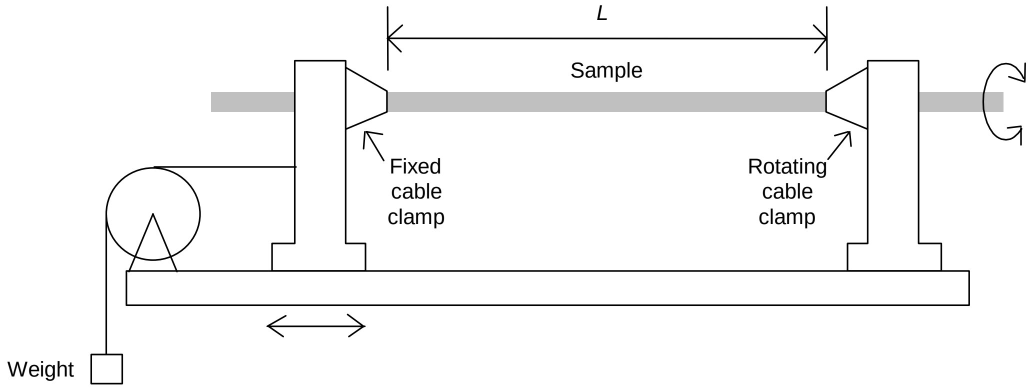

Figure 2 - Cable torsion apparatus with tension applied

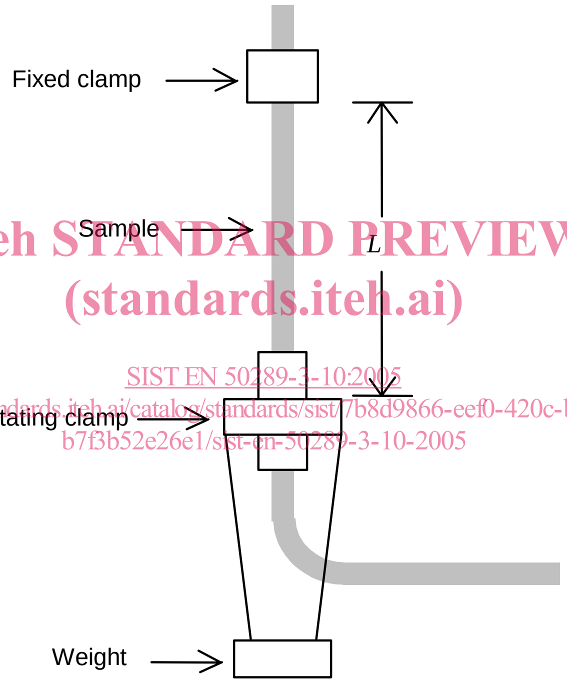

Figure 3 - Alternative cable torsion apparatus with tension applied