SLOVENSKI STANDARD
SIST EN 187000:1999/A1:1999

01-maj-1999

Generic Specification: Optical fibre cables

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Fachgrundspezifikation: Lichtwellenleiterkabel

Spécification Générique: Câbles à fibres optiques

Ta slovenski standard je istoveten z: **EN 187000:1992/A1:1995**

ICS:

33.180.10 (Optiļ na) vlakna in kabli Fibres and cables

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EUROPEAN STANDARD

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EN 187000/A1

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Descriptors: Quality, electronic components, optical fibres

English version

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This amendment A1 modifies the European Standard EN 187000:1992; it was approved on 1995-04-30. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this amendment 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 amendment 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.

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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

Foreword

This amendment to the European Standard was prepared by Working Group CLC/TC CECC/WG 28.

The text of the draft based on document CECC(Secretariat)3591 was submitted to the formal vote; together with the voting report, circulated as document CECC(Secretariat)3650, it was approved as amendment A1 to EN 187000:1992 on 1995-04-30.

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) 1995-12-24
- latest date by which the national standards conflicting with the EN have to be withdrawn (dow) 1996-12-24

This amendment includes:

- Methods 501 and 609 – replacement of existing text;
- Methods 515, 516, 517, 604, 610 and 611 – new clauses.

CONTENTS

3.3 Method 501 - Tensile performance

3.3.1 Object

This measuring method applies to optical fibre cables which are tested at a particular tensile strength in order to examine the behaviour of attenuation and/or fibre strain as a function of the load on a cable which may occur during installation. This method is intended to be non-destructive (the tension applied shall be within the operational values).

Two measuring methods are described below:

- Method 501A : procedure for determining attenuation changes;
- Method 501B : procedure for determining fibre elongation strain.

Method 501B can provide information on both the maximum allowable pulling force for field installation, as well as information about the strain margin of the cable.

One method or the other, or both, either separately or in combination, shall be used according to the Detail Specification or upon agreement between user and manufacturer.

3.3.2 Sample preparation

a) Test sample

A length of cable under test, sufficient to achieve the desired accuracy, is removed from the reel or coil.

A flat endface shall be prepared at both ends of the test fibre.

b) Calibration fibre

Refer to EN 188000 - Method XXX.(Fibre elongation measurement method).

3.3.3 Apparatus

a) Method 501A : Attenuation measuring apparatus for determination of attenuation change : (see EN 188000, Section 4)

and/or

Method 501B : Fibre elongation strain measuring apparatus : (see EN 188000 Method XXX : Fibre elongation measurement method)*.

b) 1) Tensile strength measuring apparatus which is able to accommodate the minimum length to be tested (see figure 101).

2) Load cell with a maximum error of ± 3 % of its maximum range.

3) Clamping device : Chuck drums with appropriate core diameter or an equivalent system. A transfer device with an appropriate diameter can be used to shorten the equipment.

NOTE - Care should be taken that the specific method of capturing the cable components does not affect the results.

* Revision in progress based on IEC 793-1-A7 presently in IEC 86A/301/DIS.

c) If required, mechanical or electrical means for measuring the cable elongation shall be provided.
The minimum measurement accuracy needed shall be specified in the Detail Specification.

d) Examples of suitable apparatus are shown in figure 101A or 101B.

It shall be checked that the distance between the transfer devices and also the diameters of the transfer devices are such that they do not affect the test conditions.

3.3.4 Procedure

a) The test shall be carried out at ambient temperature.

b) Load the cable onto the tensile rig and secure it. At both ends of the tensile rig a method of securing the cable shall be used which uniformly locks the cable so that all components of the cable are restricted in their movement. For most cable constructions (e.g. stranded type cables), clamping on cable elements, except the fibres, is practical and sufficient to obtain attenuation changes and/or both the maximum allowable pulling load and the strain margin of the cable. However, for certain cable constructions (e.g. single loose tube) it may be necessary to prevent the fibres from slipping in order to obtain the correct strain margin figures. Chuck drums or mandrels with a minimum of three cable turns around the drum are a suitable technique.

Where multiple pass of the cable on the rig is used, in order to accommodate the specified minimum length of cable to be strained, the fixing at the ends shall be freely rotating.

NOTE - For aerial cable types, if required by the Detail Specification, the clamping of the cable shall be made by means of the anchoring devices relevant to the type of cable considered.

c) Connect the test fibre of the cable under tensile test to the measurement apparatus.

Carry out the cable tensile test. For method 501B, and when using method XXX of EN 188000 (Fibre elongation measurement method)*, care shall be taken that during the pulling of the sample the reference length does not change.

d) The tension shall be continuously increased to the required value(s) given in the Detail Specification.

NOTE - The rate of tension increase is under consideration.

e) The change of attenuation and/or fibre strain shall be recorded, preferably as a function of cable load or elongation.

f) For cables with a large number of fibres a multiple attenuation and/or fibre strain measuring device can be used.

g) A representative number of fibres and/or a number of test cycles shall be agreed between manufacturer and customer.

* Revision in progress based on IEC 793-1-A7 presently in IEC 86A/301/DIS.

3.3.5 Results

a) Final measurements

The attenuation and/or fibre strain of the sample shall not exceed the values given in the relevant detail specification.

b) The following data shall be presented with the results :

1) length of the cable and length under tension ;

2) end preparation ;

3) details of the load cell ;

4) details of the launching conditions and attenuation measuring device ;

5) details of fibre strain measuring device, if applicable ;

6) change of attenuation and/or fibre strain at a specified wavelength as a function of the load ;

7) rate of tension increase;

8) temperature.

9) for method 501B :

- If required by the Detail Specification, the residual elongation strain after removal of the load shall be measured.

- Data presented with the results shall include the calibration curve or factor of the measured phase shift or pulse delay versus fibre elongation of the relevant fibre.

- An example of a presentation of the cable and fibre elongation for a loosely packaged construction is given in figure 102.

If required, the load value where the beginning of fibre strain occurs is defined, on the plot of fibre strain versus load, as the intersection of the linear portion of the curve with the load axis.

NOTE - As a first approximation, the length of fibre under elongation strain is taken as equal to the length of cable under tensile load except for cables with tightly assembled constructions. It should be noted, however, that the calculated value of fibre elongation strain is affected by the accuracy of the value of this cable length and also by the excess length of fibre in the cable, which depends on the cable design (loose structures).

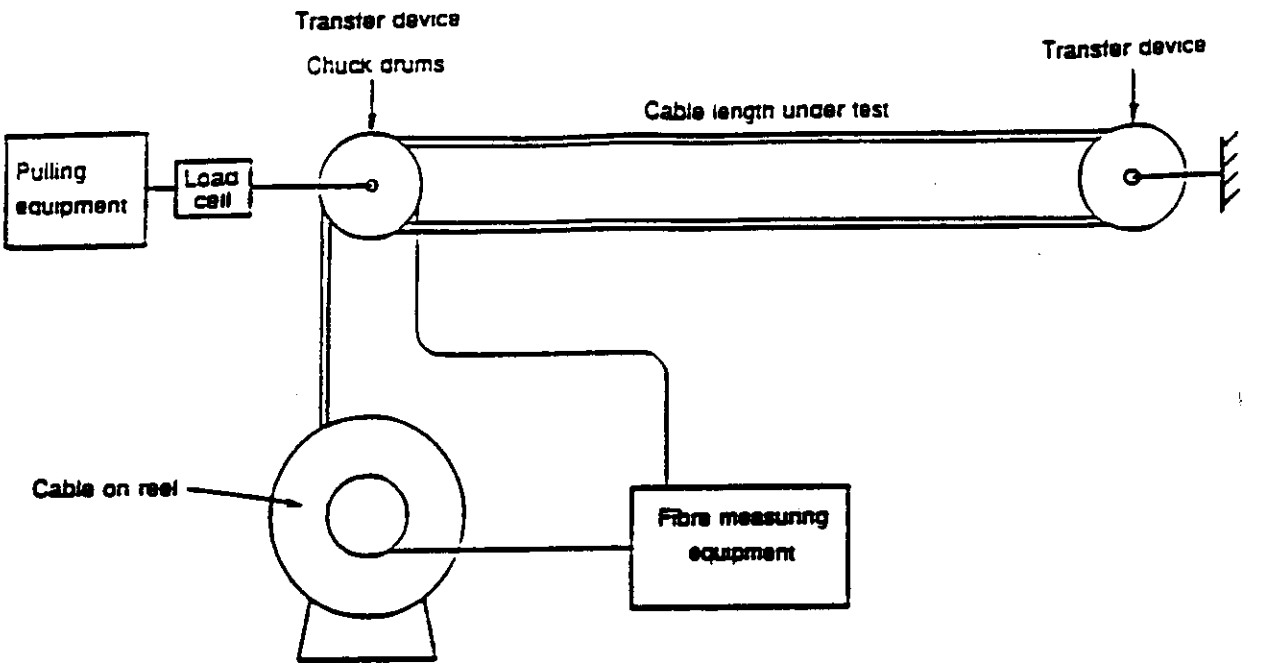


Fig. 101A - Tensile performance measuring apparatus with multiple pass of the cable on the ring

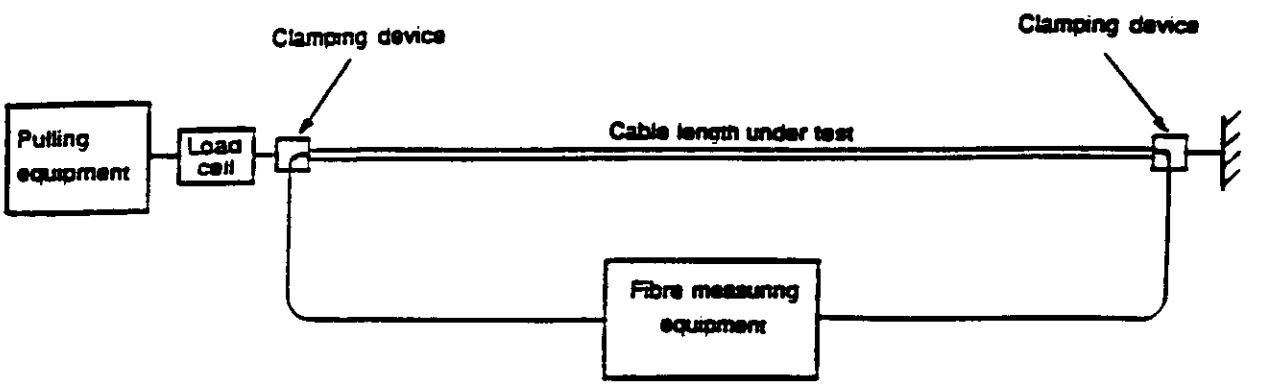
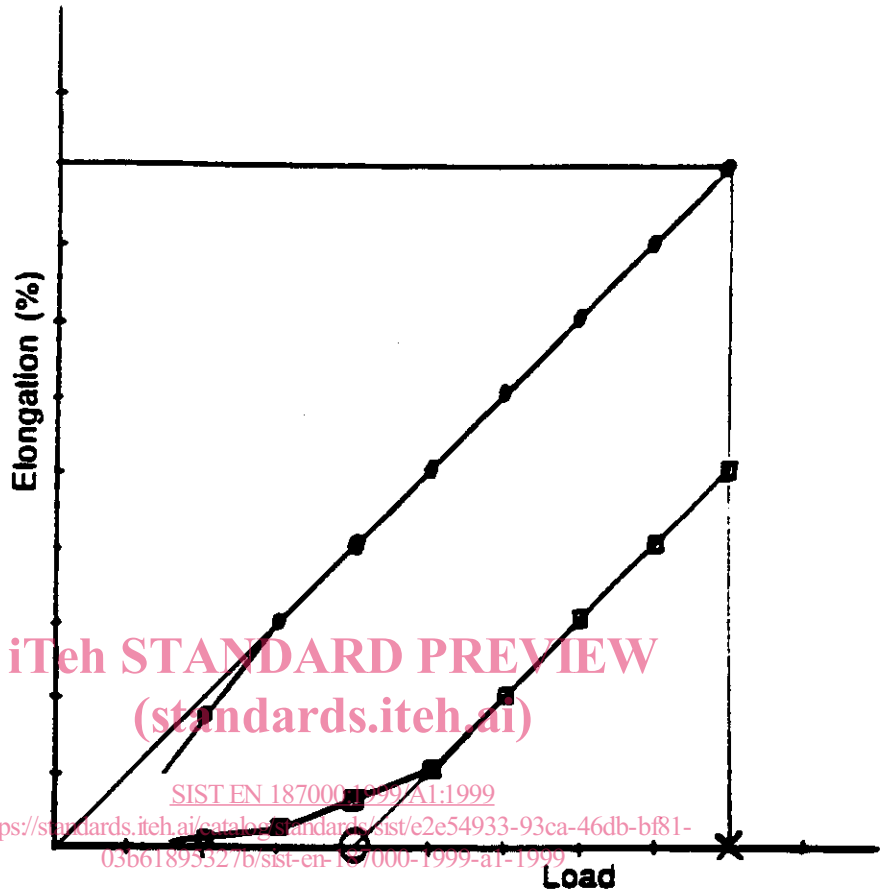


Fig. 101B - Tensile performance measuring apparatus in straight configuration



● Cable elongation (optional)

□ Fibre elongation

○ T_{I_0}

× $T_{I_{(max)}}$

Note T_{I_0} corresponds to the load at which the fibre becomes under strain.

$T_{I_{(max)}}$ corresponds to the maximum specified pulling load.

Fig. 102 - Example of fibre and cable elongation as a function of load

3.15 Method 515 : Aeolian vibration and galloping / low frequency vibration tests for overhead optical fibre cables

3.15.1 Object

The object of the test is to subject optical overhead cables to vibrations similar to conditions imposed by wind effects.

These effects are:

a) high frequency, low amplitude vibration, often called "Aeolian vibration"

b) low frequency, high amplitude vibration, often called "Galloping"

Dependant upon the overhead line configuration the tests to be undertaken shall test for either a) or b) or both as required in the detail test specification.

Overhead cable vibrations are produced either by laminar windstream causing curls at the lee-side of the cable (often called aelioan vibration) or by variations in wind direction relative to the cable axis (often called galloping effect). The effect of laminar windstream is covered by the procedure 1 in 3.15.4.1. The effect of wind direction is related to procedure 2 in 3.15.4.2.

Overhead lines differ with respect to span lengths, we can distinguish two kinds :

- overhead lines with long spans (typically > 100 m) and high installation tension (typically > 8 kN). These lines are more prone to aeolian vibration than :

- overhead lines with short spans (typically < 100 m) and low installation tension (typically equivalent to half of the mass/unit length (kg/km)). These lines are more prone to galloping / low frequency vibration.

3.15.2 Sample preparation

The minimum length of the test sample is set in the Detail Specification.

The cable ends are prepared in order to allow the monitoring of transmitted optical power in one or several fibres (as specified in the detail specification) during the test. Termination assemblies and/or intermediate/suspension assemblies, including vibration dampers if used in practice, shall be fitted on the optical fibre cable within the test span or the two test spans if necessary (for example when intermediate/suspension assemblies are used), as specified in the Detail Specification. The test sample shall be terminated at both ends prior to tensioning in a manner such that the optical fibres cannot move relative to the cable.