SLOVENSKI STANDARD
oSIST prEN IEC 60794-1-217:2023

01-oktober-2023

Optični kabli - 1-217. del: Splošna specifikacija - Osnovni preskusni postopki za optične kable - Okoljske preskusne metode - Krčenje kabla (izbočena vlakna), metoda F17

Optical fibre cables - Part 1-217: Generic specification - Basic optical cable test procedures - Environmental test methods - Cable shrinkage (fibre protrusion), Method F17

Lichtwellenleiterkabel - Teil 1-217: Fachgrundspezifikation - Grundlegende Prüfverfahren für optische Kabel - Umweltprüfverfahren - Kabelschrumpfung (Faserüberstand), Verfahren F17

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COMMITTEE DRAFT FOR VOTE (CDV)

PROJECT NUMBER: **IEC 60794-1-217 ED1**	
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IEC SC 86A : FIBRES AND CABLES

SECRETARIAT: France	SECRETARY: Mr Laurent Gasca
OF INTEREST TO THE FOLLOWING COMMITTEES: SC 86B	PROPOSED HORIZONTAL STANDARD: ☐
	Other TC/SCs are requested to indicate their interest, if any, in this CDV to the secretary.

FUNCTIONS CONCERNED:

☐ EMC ☐ ENVIRONMENT ☐ QUALITY ASSURANCE ☐ SAFETY

☒ SUBMITTED FOR CENELEC PARALLEL VOTING ☐ NOT SUBMITTED FOR CENELEC PARALLEL VOTING

Attention IEC-CENELEC parallel voting

The attention of IEC National Committees, members of CENELEC, is drawn to the fact that this Committee Draft for Vote (CDV) is submitted for parallel voting.

The CENELEC members are invited to vote through the CENELEC online voting system.

This document is still under study and subject to change. It should not be used for reference purposes.

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TITLE:

Optical fibre cables - Part 1-217: Generic specification - Basic optical cable test procedures - Environmental test methods - Cable shrinkage (fibre protrusion), Method F17

PROPOSED STABILITY DATE: 2026

NOTE FROM TC/SC OFFICERS:

CONTENTS

INTERNATIONAL ELECTROTECHNICAL COMMISSION

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OPTICAL FIBRE CABLES –

Part 1-217: Generic specification – Basic optical cable test procedures – Environmental test methods – Cable shrinkage (fibre protrusion), Method F17

FOREWORD

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IEC 60794-1-217 has been prepared by subcommittee 86A: Fibres and cables, of IEC technical committee 86: Fibre optics. It is an International Standard.

This first edition of IEC 60794-1-217 cancels and replaces Method F17 of the second edition of the IEC 60794-1-22:2017, which will be withdrawn. It includes an editorial revision, based on the new structure and numbering system for optical fibre test methods. Additionally, there are a few technical changes.

This edition includes the following significant technical changes with respect to IEC 60794-1-22:2017:

a) added clarification in the objective that the purpose of this test procedure is to measure the permanent fibre protrusion of cables without rigid strength members;
b) replaced the reference to method F1 for the apparatus with a detailed description for the temperature chamber and temperature sensing device as done in IEC 60794-1-211;
c) added a measuring device in the clause for apparatus;

d) added conditioning before cutting the cable sample as done in IEC 60794-1-211

e) added a few sub-clauses for the section with the procedure;

f) added all required steps in the subclause for temperature cycling as well as the table for the minimum soak time and the figure for the cycle procedure, and removed the reference to IEC 60794-1-22, method F1;

g) improved the figures and added a figure for preparation of the cable sample;

h) added the informative Annex A for the test procedure recommended for cables with rigid strength members.

The text of this International Standard is based on the following documents:

Draft	Report on voting
86A/XX/FDIS	86A/XX/RVD

Full information on the voting for its approval can be found in the report on voting indicated in the above table.

The language used for the development of this International Standard is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/publications.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under webstore.iec.ch in the data related to the specific document. At this date, the document will be

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

INTRODUCTION

This document defines the test method F17 to measure the change of fibre protrusion at both cable ends caused by cable shrinkage due to thermal exposure.

The numbering of this test method continues the F-series numbering sequence of IEC 60794-1-22:2017. This document cancels and replaces method F17 of IEC 60794-1-22:2017, which will be withdrawn. It includes an editorial revision, based on the new structure and numbering system for optical fibre cable test methods. Additionally, technical changes were implemented. The environmental tests contained in IEC 60794-1-22:2017 will be individually numbered in the IEC 60794-1-2xx series. Each test method is now considered to be an individual document rather than part of a multi-test method compendium. Full cross-reference details are given in IEC 60794-1-2.

All cables have a memory effect in the form of coils and are elastic depending on the applied force that makes repeatable and reproducible measurements from one end to the other end on a longer cable sample (for example 10 m or longer) very difficult or impossible. Therefore, measurement of the fibre or cable element protrusion at both ends is a suitable and simple alternative.

The advantage of this method is that the change in protrusion length can be directly compared with the capability to accommodate this change of protrusion length in the application situation (for example in a fibre distribution box). The limitation of this method is that the absolute changes of the cable elements and sheath lengths cannot be determined.

The test method in this document determines the permanent fibre protrusion of cables without rigid strength members compared to the cable elements and cable sheath due to temperature changes. The reference for the fibre protrusion is in this case the end of the cable sheath.

The determination of the permanent fibre protrusion according to this test method is not applicable if the strongest rigid strength member, often the central strength member, is to serve as a reference. This is the case when the fixing of the rigid strength member is used in a protective housing and the fixing of the rigid strength member is stronger than the fixing of the cable sheath. For such an installation situation, the recommended test procedure is given in Annex A.

IEC TR 62959 describes the test method F17 that can be optionally used as an indicator for cables terminated with hardened connectors, terminated into passive components, fixed into a module, a divider or a protective housing with the fibres terminated with splices.

IEC TR 62959 provides information on cable shrinkage characterisation of optical fibre cables that consist of standard glass optical fibres for telecommunication applications. The characterisation is directed to the effects of cable shrinkage or cable element shrinkage on the termination of cables. Recommended test methods for the evaluation of cable shrinkage as an indicator and classification by several grades are given.

A test procedure other than method F17 to measure shrinkage effects exists. Method F11 according to IEC 60794-1-211 defines shrinkage testing on a cable sample with a nominal length of 1 m or less by calculation of the change in sheath length measured before and after thermal exposure.

OPTICAL FIBRE CABLES –

Part 1-217: Generic specification – Basic optical cable test procedures – Environmental test methods – Cable shrinkage (fibre protrusion), Method F17

1 Scope

This part of IEC 60794 defines the test procedure to measure the permanent fibre protrusion compared to the cable elements and cable sheath due to thermal exposure of a cable.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 60794-1-1, *Optical fibre cables – Part 1-1: Generic specification – General*

IEC 60794-1-2, *Optical fibre cables – Part 1-2: Generic specification – Basic optical cable test procedures – General guidance*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 60794-1-1 and the following apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

- IEC Electropedia: available at https://www.electropedia.org/
- ISO Online browsing platform: available at https://www.iso.org/obp

3.1
shrinkage
irreversible contraction after extrusion of plastic materials caused by heating or over time at ambient temperature

4 Method F17 – Cable shrinkage (fibre protrusion)

4.1 Objective

The purpose of this test procedure is to measure the permanent fibre protrusion of cables without rigid strength members compared to the cable elements and cable sheath due to temperature changes. The reference for the fibre protrusion is in this case the end of the cable sheath.

The determination of the permanent fibre protrusion according to this test method is not applicable if the strongest rigid strength member, often the central strength member, is to serve as a reference. This is the case when the fixing of the rigid strength member is used in a protective housing and the fixing of the rigid strength member is stronger than the fixing of the

cable sheath. For such an installation situation, the recommended test procedure is given in Annex A.

Low shrinkage of cable elements and cable sheath is important for termination of connectors and passive optical components as well as in installations of protective housings with reinforced cables. The permanent (or irreversible) fibre protrusion at the cable ends can occur when the cable is used in areas with elevated temperature or direct exposure to the sun. Cable designs with low friction between the stabilisation elements (for example rigid strength member) and high material shrinkage (created by the extrusion process) can cause excessive and permanent fibre protrusion at the cable end and can lead to an attenuation increase, cable attachment degradation, sealing weakening and in severe cases fibre breakage.

4.2 Sample

The cable sample shall have a minimum length of 10 m.

NOTE IEC TR 62959 recommends a length of 20 m for evaluation of the fibre protrusion because the observed change of fibre protrusion of cable samples with a length of 20 m were often larger than with a sample length of 10 m.

4.3 Apparatus

A temperature chamber of appropriate size and a temperature sensing device. The temperature chamber shall be able to accommodate the cable sample and maintain the specified temperature within ± 3 °C.

A length measuring device of sufficient length for measuring the protrusion length of the fibres and secondary fibre protection or fibre tube with a minimum resolution of 1 mm (see Figure 2 and Figure 3).

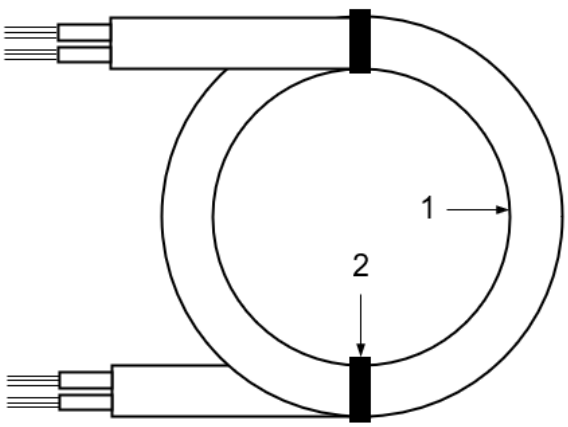
NOTE For the test procedure recommended for cables with rigid strength member(s), see Figure A.1 and Figure A.2.

4.4 Procedure

4.4.1 Preparation of the cable sample

The cable on the supply reel, or alternatively the cable coil, shall be conditioned for 24 h at ambient temperature before cutting the cable sample, unless otherwise specified.

The cable sample shall be coiled in loose windings with a minimum diameter of 0,6 m, unless otherwise specified. The cable coils shall be loosely fixed at least at two places distributed around the circumference in a way that the cable elements are not held inside the cable and are free to move (expand and contract), as shown in Figure 1.



Key

1 coiled cable sample

2 loose fixing of cable sample coils

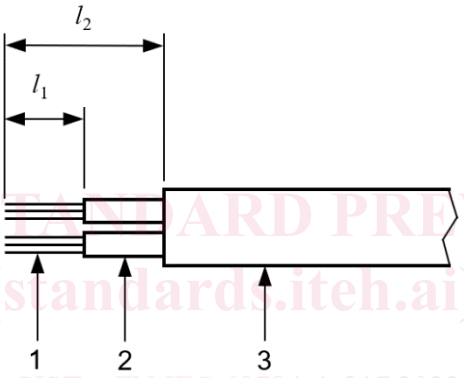
Figure 1 – Preparation of cable sample with prepared ends

4.4.2 Preparation of the cable ends

The outer cable sheath shall be removed over a length of l_2 from the cable sample end, as shown in Figure 2. Also the strength members, inner sheath and other cable elements should be stripped closely to the end of the outer cable sheath. The secondary fibre protection or fibre tubes shall be removed over a length of l_1 from the end of the fibres as shown in Figure 2. This preparation shall be done at both cable sample ends.

For cable types where the fibres are loosely embedded in the cable, the pulling out and pushing in the fibres should be avoided during preparation and measurement.

Dimensions in millimetres



l_1	l_2
100	200

Key

1 fibre or bundle of fibres

2 secondary fibre protection or fibre tube

3 cable sheath

Figure 2 – Preparation of cable sample ends

At ambient temperature, the complete cable sample, including both cable ends, shall be put in the temperature chamber.

4.4.3 Initial measurements

The initial fibre protrusion shall be measured from the edge of the secondary fibre protection or fibre tube (*L*1) and from the edge of the cable sheath (*L*2) of all cable elements at both ends, as shown in Figure 3.