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

**01-april-2023**

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**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



**Ta slovenski standard je istoveten z:** **prEN IEC 60794-1-217:2023**

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**ICS:**

33.180.10 (Optična) vlakna in kabli Fibres and cables

**oSIST prEN IEC 60794-1-217:2023** **en**

# 86A/2275/CDV

COMMITTEE DRAFT FOR VOTE (CDV)

| | |
|---|---|
| PROJECT NUMBER: **IEC 60794-1-217 ED1** | |
| DATE OF CIRCULATION: **2023-02-03** | CLOSING DATE FOR VOTING: **2023-04-28** |
| SUPERSEDES DOCUMENTS: **86A/2217/CD, 86A/2266/CC** | |

| IEC SC 86A : FIBRES AND CABLES | |
|---|---|
| SECRETARIAT: France | SECRETARY: Mr Laurent Gasca |
| OF INTEREST TO THE FOLLOWING COMMITTEES: | 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**<br>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.<br>The CENELEC members are invited to vote through the CENELEC online voting system. | |



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- any relevant patent rights of which they are aware and to provide supporting documentation,
- any relevant “in some countries” clauses to be included should this proposal proceed. Recipients are reminded that the enquiry stage is the final stage for submitting "in some countries" clauses. See AC/22/2007.

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

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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) 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;

b) added a measuring device in the clause for apparatus;

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

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

e) improved the figures and added a figure for preparation of the cable sample.

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

| Draft | Report on voting |
|---|---|
| XX/XX/FDIS | XX/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/standardsdev/publications.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under "http://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 (e.g. 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 (e.g. 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.

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 specifications – 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 against 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 60794-1-22, *Optical fibre Cables – Part 1-22: Generic specification – Basic optical cable test procedures – Environmental test methods*



## 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 terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at http://www.electropedia.org/
- ISO Online browsing platform: available at http://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 is to measure the permanent fibre protrusion compared against the cable elements and cable sheath due to temperature changes.

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 (e.g. 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 with a minimum resolution of 1 mm.

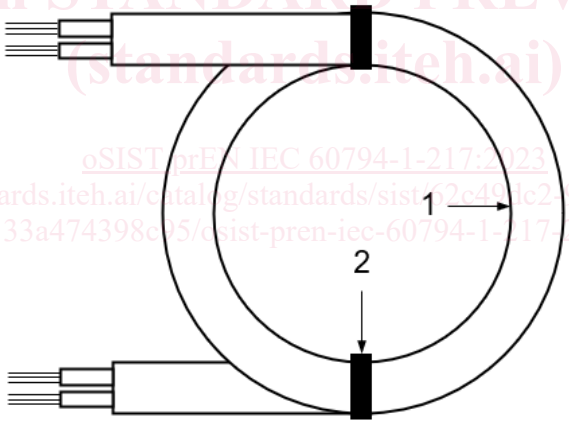
### 4.4 Procedure

#### 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

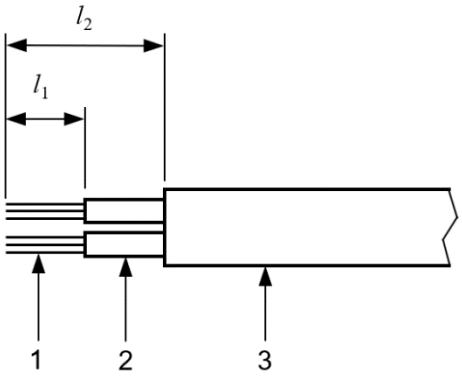
**Figure 1 – Preparation of cable sample with prepared ends**

#### 4.4.2 Preparation of the cable ends

The cable outer 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 cable outer 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*




208

| $l_1$ | $l_2$ |
|---|---|
| 100 | 200 |

209 **Key**

210 1 fibre or bundle of fibres

211 2 secondary fibre protection or fibre tube

212 3 cable sheath

213 **Figure 2 – Preparation of cable sample ends**



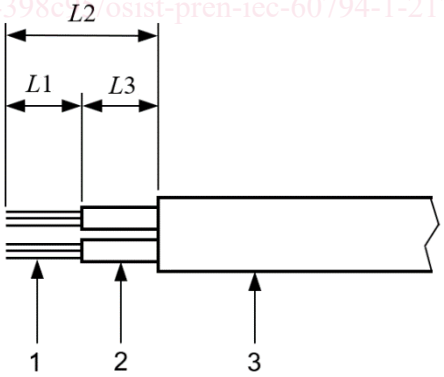
214 The cable sample shall be put into the temperature chamber.



215 **4.4.3 Initial measurements**

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






219 **Key**

220 1 fibre or bundle of fibres

221 2 secondary fibre protection or fibre tube

222 3 cable sheath

223 NOTE The protrusion of the secondary fibre protection or fibre tube is represented as length $L3$, that can be
224 calculated as $L2$ minus $L1$.

225 **Figure 3 – Fibre protrusion measurement**

226 If multiple fibres are within a fibre tube, then one fibre shall be selected for the measurements
227 (e.g. red coloured fibre).