IEC 60794-1-307

Edition 1.0 2025-03

INTERNATIONAL STANDARD

NORME INTERNATIONALE

Optical fibre cables – Part 1-307: Generic specification – Basic optical cable test procedures – Cable element test methods – Tube kinking, method G7

Câbles à fibres optiques – Partie 1-307: Spécification générique – Procédures fondamentales d'essai des câbles optiques – Méthodes d'essai des éléments de câble – Pliure du tube, méthode G7

IEC 60794-1-307:2025-03(en-fr)

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FOREWORD

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IEC 60794-1-307 has been prepared by subcommittee 86A: Fibres and cables, of IEC technical committee 86: Fibre optics. It is an International Standard.

This first edition partially cancels and replaces the second edition of IEC 60794-1-23 published in 2019. This edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to IEC 60794-1-23:2019:

a) renumbering of the existing test method G7 as G7A;
b) addition of test parameter L and calculated loop diameter D in Table 1 for method G7A;
c) addition of a new test procedure for tubes routed within installation devices and numbering it as G7B.

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

Draft	Report on voting
86A/2537/FDIS	86A/2548/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.

A list of all parts in the IEC 60794 series, published under the general title *Optical fibre cables*, can be found on the IEC website.

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- withdrawn, or
- revised.

INTRODUCTION

This document contains method G7 of IEC 60794-1-23:2019, which will be withdrawn. The system for optical fibre test methods has been restructured and renumbered.

The optical cable element test methods contained in IEC 60794-1-23:2019 will now be individually numbered in the IEC 60794-1-3xx 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.

OPTICAL FIBRE CABLES –

Part 1-307: Generic specification – Basic optical cable test procedures – Cable element test methods – Tube kinking, method G7

1 Scope

This part of IEC 60794 describes test procedures used in establishing uniform requirements of tubes for the mechanical property kinking.

This document applies to optical fibre cables for use with telecommunication equipment and devices employing similar techniques, and to cables having a combination of both optical fibres and electrical conductors.

Throughout the document, the wording "optical cable" can also include optical fibre units, microduct fibre units, etc.

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

3 Terms and definitions

No terms and definitions are listed in this document.

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

4 General requirements

IEC 60794-1-2 is the reference guide to test methods of all types. It shall be considered for general requirements and definitions.

5 Method G7: Tube kinking

5.1 Object

The purpose of this test is to determine the ability of tubes containing optical fibres to withstand mechanical stresses encountered during cable installation and splicing. The test is carried out on tubes taken from an optical cable. The goal is to determine if the tube shows no kink when coiled in a storage area.

5.2 Method G7A

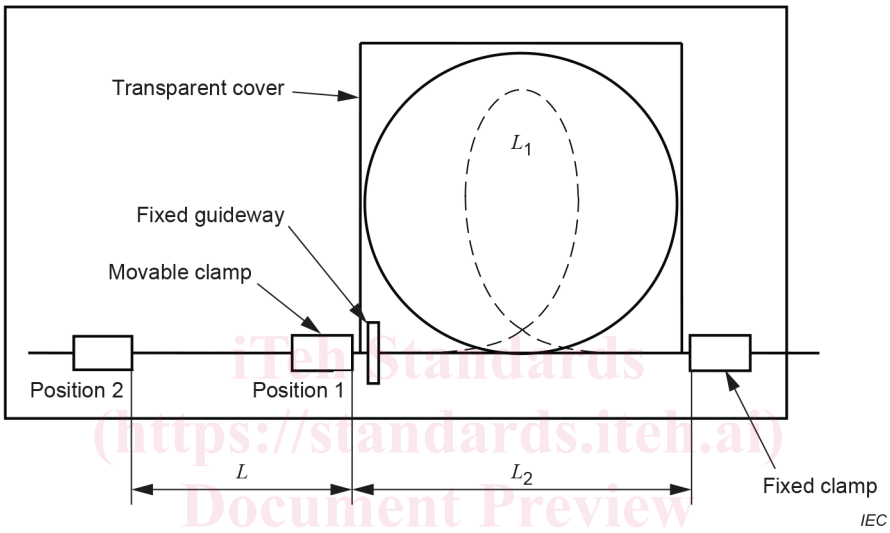
5.2.1 Sample

Tube containing fibres, with a length of at least L_1 + 50 mm, shall be taken from an optical fibre cable.

Five samples shall be tested, unless otherwise specified.

5.2.2 Apparatus

The apparatus consists of a testing device as shown in Figure 1.



Key

L_1 length of tube under test

L_2 distance between the tube clamping point of the movable clamp and the tube clamping point of the fixed clamp at the start of the test

L moving distance (the length of which determines the reduction of the ellipse dimension)

The minimum diameter of the loop is not fixed by a curvature in the test equipment, but only controlled by the fixed length L_1 of the specimen and the moving length L.

Whilst the loop tends to form an ellipse rather than a perfect circle during the test, it is possible to simplify the understanding of the test parameters considerably by assuming that a circle is formed. Based on this assumption, the cable element loop diameter D (mm) can be calculated.

The minimum allowed loop diameter can be calculated by

$$D = (L_1 - L_2 - L)/\pi \quad (1)$$

The fixed guideway ensures a defined position of the sample. A transparent cover allows the sample to be kept in the same plane and observed whilst being tested. The distance between the two covers shall be typically three times the tube diameter. Too great a distance will allow the tube to move sideways during the test and does not ensure that the test is severe enough.

Figure 1 – Tube kinking test set-up method G7A

The recommended parameters for tube kinking are shown in Table 1.

Table 1 – Recommended parameters for the tube kinking test

Nominal tube diameter mm	L_1 mm	L_2 mm	L mm	D mm
≤ 3,1	350	100	60	60
3,1 < D ≤ 6,1	650	200	70	120
6,1 < D ≤ 10,1	1 050	300	120	200
Parameter "D" is not required to perform the kink test but is the calculated and rounded loop diameter by using Formula (1).				

5.2.3 Procedure

The test shall be carried out at standard atmospheric conditions.

The sample shall be marked with a length L_1 and mounted in the test device as shown in Figure 1, with the movable and fixed clamps separated by a distance L_2.

The moveable clamp shall be moved between positions 1 and 2 over a distance L and returned to position 1 at a speed approximately 10 mm/s. This movement is one cycle. During the last cycle, the sample shall remain in position 2 for 60 s.

The values of test parameters L, L_1, L_2 and the number of cycles (five, unless stated otherwise) should simulate the service deployment conditions. They shall be agreed between customer and supplier.

NOTE 1 As a mechanical test, a typical minimum value for the tube loop diameter is 60 mm, since this aligns with the minimum specified bend diameter for most classes of fibre and also represents a minimum practical value of coiled tube loops within a joint or other connectivity plant.

NOTE 2 Using D = 60 mm, then L can be calculated (for tubes ≤ 3,1 mm) from Formula (1), which also yields the value of 60 mm. Since the loop does form an ellipse, which makes the effective loop diameter in one plane much more severe, it is possible that 60 mm is taken as the maximum length specified for the moving length, L. Lower values can be specified.

NOTE 3 If this test is used to simulate installation of a tube within a joint, then the value for D can be replaced by the available width within a joint.

5.2.4 Requirements

During the test, no kinking of the sample shall be visible.

5.2.5 Details to be specified

The detail specification shall include the following:

a) number of samples to be tested (five, unless otherwise specified in the relevant specification);
b) lengths L, L_1, L_2 (use L, L_1 and L_2 according to Table 1, unless otherwise specified in the relevant specification);
c) number of cycles for movement *L* for each sample (if different from five)

5.2.6 Details to be reported

The test report shall include all the details specified in 5.2.5 and additionally the following:

a) pass or fail.