



IEC 60794-3-60

Edition 1.0 2008-10

INTERNATIONAL STANDARD

**Optical fibre cables –
Part 3-60: Outdoor cables – Family specification for drinking water pipe cables
and subducts for installation by blowing and/or pulling/dragging/floating in
drinking water pipes**

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

PRICE CODE



ICS 33.180.10

ISBN 2-8318-1002-6

CONTENTS

FOREWORD.....	4
1 Scope.....	6
2 Normative references	6
3 Symbols and abbreviations.....	7
4 Family specification for drinking water pipe cables and subducts for installation by blowing and/or pulling/dragging/floating in drinking water pipes (blank detail specification and minimum requirements).....	8
4.1 Construction.....	8
4.1.1 General	8
4.1.2 Subducts	8
4.1.3 Drinking water pipe cables.....	8
4.2 Optical fibres.....	9
4.2.1 Single-mode dispersion unshifted (B1.1) optical fibre	9
4.2.2 Single-mode dispersion shifted (B2) optical fibre	9
4.2.3 Single-mode non-zero dispersion (B4) optical fibre.....	10
4.2.4 Single-mode (B6) optical fibre	10
4.2.5 Multimode fibres	10
4.3 Drinking water pipe cable constructions.....	11
4.3.1 Cable for installation within subducts (previously installed within the drinking water pipe).....	11
4.3.2 Cable for direct installation into the drinking water pipes	12
4.3.3 Subduct construction	13
4.4 Installation and operating conditions	13
4.4.1 Tests applicable to cables/cable elements	13
4.4.2 Installation conditions	13
4.5 Mechanical and environmental tests.....	14
4.5.1 Subducts	14
4.5.2 Cable for installation within subducts (previously installed into the drinking water pipes)	17
4.5.3 Cables for direct installation into the drinking water pipe	21
Annex A (informative) Blank detail specification.....	25
Annex B (informative) OF cables for drinking water pipes	28
Annex C (informative) Examples of subducts and drinking water pipe cables.....	29
Annex D (informative) Example for installation schemes of optical fibre cables in drinking water pipes (fibre in drinking water pipes).....	31
Figure C.1 – Examples of constructions of cables for installation in subducts within drinking water pipes.....	29
Figure C.2 – Examples of constructions for drinking water pipe cables	30
Figure D.1 – Schematic drawing – I/O-port for OF cables into drinking water lines.....	31
Figure D.2 – Schematic drawing – Installation of OF cables in drinking water lines.....	32
Figure D.3 – Installation of I/O-ports on high pressure PE drinking water pipe	32
Table 1 – Single-mode dispersion unshifted (B1.1) optical fibre	9
Table 2 – Single-mode dispersion shifted (B2) optical fibre	9
Table 3 – Single-mode non-zero dispersion (B4) optical fibre.....	10

Table 4 – Single-mode (B6) optical fibre 10

Table 5 – Characteristics – Cable for installation within subducts 11

Table 6 – Characteristics – Cable for direct installation within the high pressure gas pipe 12

Table 7 – Characteristics – Subduct construction..... 13

Table 8 – Tests applicable to cables/cable elements..... 13

Table 9 – Subducts tests applicable..... 14

Table 10 – Tests applicable to the cable for installation within subducts 17

Table 11 – Tests applicable to the cables for direct installation into the drinking water pipe 21

Table A.1 – Cable for installation within subducts 25

Table A.2 – Cables for direct installation into the drinking water pipes 26

Table A.3 – Subduct description 27

Table B.1 – OF cables for drinking water pipes 28

INTERNATIONAL ELECTROTECHNICAL COMMISSION

OPTICAL FIBRE CABLES –

**Part 3-60: Outdoor cables –
Family specification for drinking water pipe
cables and subducts for installation by blowing and/or
pulling/dragging/floating in drinking water pipes**

FOREWORD

- 1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as “IEC Publication(s)”). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
- 2) The formal decisions or agreements of IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees.
- 3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
- 4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.
- 5) IEC provides no marking procedure to indicate its approval and cannot be rendered responsible for any equipment declared to be in conformity with an IEC Publication.
- 6) All users should ensure that they have the latest edition of this publication.
- 7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
- 8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
- 9) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

International Standard IEC 60794-3-60 has been prepared by subcommittee 86A: Fibres and cables, of IEC technical committee 86: Fibre optics.

This standard is to be used in conjunction with IEC 60794-1-1, IEC 60794-1-2 and IEC 60794-3.

The text of this standard is based on the following documents:

FDIS	Report on voting
86A/1232/FDIS	86A/1243/RVD

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

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

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

The committee has decided that the contents of this publication will remain unchanged until the maintenance result date indicated on the IEC web site under "<http://webstore.iec.ch>" in the data related to the specific publication. At this date, the publication will be

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

A bilingual version of this publication may be issued at a later date.

OPTICAL FIBRE CABLES –

Part 3-60: Outdoor cables – Family specification for drinking water pipe cables and subducts for installation by blowing and/or pulling/dragging/floating in drinking water pipes

1 Scope

This part of IEC 60794 is a family specification that covers drinking water pipe cables and subducts for installation by blowing and/or pulling/dragging/floating in drinking water pipes. Systems built with components covered by this standard are subject to the requirements of sectional specification IEC 60794-3.

Drinking water pipe cable and subduct constructions have to meet the different requirements of the drinking water companies and/or associations regarding chemical, environmental, operational interactions and in general maintenance conditions.

A table of preferential applications, describing drinking water pipe cable characteristics versus methods of installation is reported in Annex A for drinking water pipe cables.

Clause 4 describes a blank detail specification for drinking water pipe cables and subducts for installation by blowing and/or pulling/dragging/floating in drinking water pipes. It incorporates some minimum requirements.

Detail specifications may be prepared on the basis of this family specification.

The parameters specified in this standard may be affected by measurement uncertainty arising either from measurement errors or calibration errors due to lack of suitable standards. Acceptance criteria should be interpreted with respect to this consideration.

The number of fibres tested is representative of the drinking water line cable and should be agreed between the customer and the supplier.

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.

IEC 60304, 1982: *Standard colours for insulation for low-frequency cables and wires*

IEC 60793-1-20, *Optical fibres – Part 1-20: Measurement methods and test procedures – Fibre geometry*

IEC 60793-1-40, *Optical fibres – Part 1-40: Measurement methods and test procedures – Attenuation*

IEC 60793-1-44, *Optical fibres – Part 1-44: Measurement methods and test procedures – Cut-off wavelength*

IEC 60793-2, *Optical fibres – Part 2: Product specifications – General*

IEC 60793-2-50, *Optical fibres – Part 2-50: Product specifications – Sectional specification for class B single-mode fibres*

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*

IEC 60794-3, *Optical fibre cables – Part 3: Sectional specification – Outdoor cables*

IEC 60794-3-10, *Optical fibre cables – Part 3-10: Outdoor cables – Family specification for duct and directly buried optical telecommunication cables*

IEC 60811-1-1, 1993: *Common test methods for insulating and sheathing materials of electric cables and optical cables – Part 1-1: Methods for general application – Measurement of thickness and overall dimensions – Tests for determining the mechanical properties*

IEC 60811-5-1, 1990: *Insulating and sheathing materials of electric and optical cables – Common test methods – Part 5-1: Methods specific to filling compounds – Drop-point – Separation of oil – Lower temperature brittleness – Total acid number – Absence of corrosive components – Permittivity at 23 °C – DC resistivity at 23 °C and 100 °C*

IEC 62305-1, *Protection against lightning – Part 1: General principles*