

TECHNICAL REPORT

Selection of optical fibre cable specifications relative to mechanical, ingress, climatic or electromagnetic characteristics – Guidance

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

ICS 33.180.10

ISBN 978-2-8322-8818-4

Warning! Make sure that you obtained this publication from an authorized distributor.

CONTENTS

FOREWORD	3
INTRODUCTION	5
1 Scope	6
2 Normative references	6
3 Terms, definitions, and abbreviated terms	6
3.1 Terms and definitions	6
3.2 Abbreviated terms	6
4 MICE attributes and severities	7
4.1 General	7
4.2 Mechanical	7
4.2.1 Shock/bump	7
4.2.2 Vibration	7
4.2.3 Tensile force	7
4.2.4 Crush	7
4.2.5 Impact	7
4.2.6 Bending, flexing and torsion	7
4.3 Ingress	8
4.3.1 Basic consideration	8
4.3.2 Particulate ingress	8
4.3.3 Water immersion	8
4.4 Climatic	8
4.4.1 General	8
4.4.2 Ambient temperature	8
4.4.3 Rate of change of temperature	8
4.4.4 Humidity	8
4.4.5 Solar radiation	8
4.4.6 Liquid pollution	9
4.4.7 Gaseous pollution	10
4.5 Electromagnetic	11
Annex A (informative) Details of MICE classification	12
Annex B (informative) IEC optical fibre cable standards	15
Annex C (informative) Fibre specifications and tests	17
C.1 Specifications	17
C.2 Measurements and tests	17
C.3 Technical reports	19
Bibliography	20
Table 1 – Resistance to solar radiation	9
Table 2 – Liquid pollution	9
Table 3 – Gaseous pollution resistance	10
Table 4 – Gaseous pollution resistance	10
Table A.1 – Details of MICE classification (mechanical)	12
Table A.2 – Details of MICE classification (ingress)	12
Table A.3 – Details of MICE classification (climatic and chemical)	13
Table A.4 – Details of MICE classification (electromagnetic)	14

INTERNATIONAL ELECTROTECHNICAL COMMISSION

**SELECTION OF OPTICAL FIBRE CABLE SPECIFICATIONS
RELATIVE TO MECHANICAL, INGRESS, CLIMATIC OR
ELECTROMAGNETIC CHARACTERISTICS – GUIDANCE**

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 itself does not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, access to IEC marks of conformity. IEC is not responsible for any services carried out by independent certification bodies.
- 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.

The main task of IEC technical committees is to prepare International Standards. However, a technical committee may propose the publication of a technical report when it has collected data of a different kind from that which is normally published as an International Standard, for example "state of the art".

IEC 62362 which is a Technical Report, has been prepared by subcommittee 86A: Fibres and cables, of IEC technical committee 86: Fibre optics.

This second edition cancels and replaces the first edition published in 2010. It constitutes a technical revision.

This edition includes the following significant technical changes with respect to the previous edition:

- a) replacement of references and information from ISO/IEC 24702 and ISO/IEC 11801 with ISO/IEC 11801-1;
- b) update of the MICE table;

c) update of the current optical fibre designations of IEC 60793-2-10 and IEC 60793-2-50.

The text of this technical report is based on the following documents:

Enquiry draft	Report on voting
86A/1987/DTR	86A/2029/RVDTR

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

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

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

Optical fibre cable specification standards are defined in IEC 60794 (all parts), which are listed in Annex B. They are organized in a hierarchy similar to the IECQ system. They differ from the IECQ system in that they are all performance standards. Optical fibre cable standards specify the attributes and tests on cables intended to verify adequate protection of fibres against external influences during the cabling process, cable installation handling and from environmental effects during storage and operation.. The attributes of the fibres within the cable are defined by reference to optical fibre specification standards of the IEC 60793 series, which are listed in Annex C. A complete and up-to-date listing of standards in the IEC 60793 and IEC 60794 series is available on the IEC website: <http://www.iec.ch>.

The different levels of hierarchy are: generic, sectional, family and product. The primary distinction between these is the level of detail. Typically, more options or wider ranges are present at the higher level. At a given level, the distinctions are with respect to application or cable construction. Clause 2 of this document gives a more complete mapping. Parts of the family specification include blank detail specifications for various attributes that do not have normative requirements.

At the sectional specification level, the main categories are indoor cables, outdoor cables, cables along overhead lines, microduct cabling and indoor/outdoor cables. Typically, the outdoor cables have tougher tests than the indoor cables. At the product specification level, there is a series of standards intended to support ISO/IEC 11801 (all parts) for premises cabling, using both indoor and outdoor varieties.

It is not the intention of this document to reproduce the requirements of all relevant specifications, but rather to discuss typical application situations and mention key options for tests, while seeking to guarantee the performance of cables in operation.

SELECTION OF OPTICAL FIBRE CABLE SPECIFICATIONS RELATIVE TO MECHANICAL, INGRESS, CLIMATIC OR ELECTROMAGNETIC CHARACTERISTICS – GUIDANCE

1 Scope

The purpose of this document is to provide information on the specification of optical fibre cables with respect to the mechanical, ingress, climatic and chemical or electromagnetic characteristics (MICE) as classified in ISO/IEC 11801-1.

In this classification system, each letter of the four initials of the acronym are subscripted with a value from one to three to indicate different severities. The current attributes and severities are found in Annex A.

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

IEC 60794-2 (all parts), *Optical fibre cables – Part 2: Indoor cables*

IEC 60794-3 (all parts), *Optical fibre cables – Part 3: Outdoor cables*

IEC 61753 (all parts), *Fibre optic interconnecting devices and passive components – Performance standard*

ISO/IEC 11801 (all parts), *Information technology – Generic cabling for customer premises*