

INTERNATIONAL STANDARD



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



THIS PUBLICATION IS COPYRIGHT PROTECTED

Copyright © 2015 IEC, Geneva, Switzerland

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from either IEC or IEC's member National Committee in the country of the requester. If you have any questions about IEC copyright or have an enquiry about obtaining additional rights to this publication, please contact the address below or your local IEC member National Committee for further information.

IEC Central Office
3, rue de Varembe
CH-1211 Geneva 20
Switzerland

Tel.: +41 22 919 02 11
Fax: +41 22 919 03 00
info@iec.ch
www.iec.ch

About the IEC

The International Electrotechnical Commission (IEC) is the leading global organization that prepares and publishes International Standards for all electrical, electronic and related technologies.

About IEC publications

The technical content of IEC publications is kept under constant review by the IEC. Please make sure that you have the latest edition, a corrigenda or an amendment might have been published.

IEC Catalogue - webstore.iec.ch/catalogue

The stand-alone application for consulting the entire bibliographical information on IEC International Standards, Technical Specifications, Technical Reports and other documents. Available for PC, Mac OS, Android Tablets and iPad.

IEC publications search - www.iec.ch/searchpub

The advanced search enables to find IEC publications by a variety of criteria (reference number, text, technical committee,...). It also gives information on projects, replaced and withdrawn publications.

IEC Just Published - webstore.iec.ch/justpublished

Stay up to date on all new IEC publications. Just Published details all new publications released. Available online and also once a month by email.

Electropedia - www.electropedia.org

The world's leading online dictionary of electronic and electrical terms containing more than 30 000 terms and definitions in English and French, with equivalent terms in 15 additional languages. Also known as the International Electrotechnical Vocabulary (IEV) online.

IEC Glossary - std.iec.ch/glossary

More than 60 000 electrotechnical terminology entries in English and French extracted from the Terms and Definitions clause of IEC publications issued since 2002. Some entries have been collected from earlier publications of IEC TC 37, 77, 86 and CISPR.

IEC Customer Service Centre - webstore.iec.ch/csc

If you wish to give us your feedback on this publication or need further assistance, please contact the Customer Service Centre: csc@iec.ch.

INTERNATIONAL STANDARD



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

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

ICS 33.180.10

ISBN 978-2-8322-3023-7

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

CONTENTS

FOREWORD.....	5
1 Scope.....	7
2 Normative references	7
3 Terms and definitions	8
4 Abbreviations and symbols	9
5 Specifications	9
5.1 General.....	9
5.2 Dimensional requirements.....	9
5.3 Mechanical requirements	10
5.4 Transmission requirements	11
5.5 Environmental requirements	12
5.5.1 General	12
5.5.2 Optical environmental requirements – Attenuation	13
5.5.3 Mechanical environmental requirements	13
Annex A (normative) Family specification for category B1.1 single-mode fibres	15
A.1 General.....	15
A.2 Dimensional requirements.....	15
A.3 Mechanical requirements	15
A.4 Transmission requirements	16
A.5 Environmental requirements	16
Annex B (normative) Family specification for category B1.2 single-mode fibres	17
B.1 General.....	17
B.2 Dimensional requirements.....	17
B.3 Mechanical requirements	17
B.4 Transmission requirements	18
B.5 Environmental requirements	18
Annex C (normative) Family specification for category B1.3 single-mode fibres	19
C.1 General.....	19
C.2 Dimensional requirements.....	19
C.3 Mechanical requirements	19
C.4 Transmission requirements	20
C.5 Hydrogen ageing for category B1.3.....	20
C.6 Environmental requirements	21
Annex D (normative) Family specification for category B2 single-mode fibres	22
D.1 General.....	22
D.2 Dimensional requirements.....	22
D.3 Mechanical requirements	22
D.4 Transmission requirements	23
D.4.1 General	23
D.4.2 Chromatic dispersion coefficient requirement for sub-category B2_a fibres	23
D.4.3 Chromatic dispersion coefficient requirement for sub-category B2_b fibres	24
D.5 Environmental requirements	24
Annex E (normative) Family specification for category B4 single-mode fibres	25
E.1 General.....	25

E.2	Dimensional requirements.....	25
E.3	Mechanical requirements	25
E.4	Transmission requirements	26
E.4.1	General	26
E.4.2	Chromatic dispersion coefficient limits for sub-category B4_c fibres	26
E.4.3	Chromatic dispersion coefficient limits for sub-category B4_d fibres	27
E.4.4	Chromatic dispersion coefficient limits for sub-category B4_e fibres	27
E.5	Environmental requirements	27
Annex F (normative)	Family specification for category B5 single-mode fibres.....	28
F.1	General.....	28
F.2	Dimensional requirements.....	28
F.3	Mechanical requirements	28
F.4	Transmission requirements	29
F.4.1	General	29
F.4.2	Chromatic dispersion coefficient for category B5 fibres.....	29
F.5	Environmental requirements	30
Annex G (normative)	Family specification for category B6 single-mode fibres	31
G.1	General.....	31
G.2	Dimensional requirements.....	31
G.3	Mechanical requirements	32
G.4	Transmission requirements	32
G.5	Environmental requirements	33
Annex H (informative)	System design information for category B4 single-mode fibres	34
H.1	General.....	34
H.2	One standard deviation limits for sub-category B4_d fibres	34
H.3	One standard deviation limits for sub-category B4_e fibres	35
Annex I (informative)	Map from IEC nomenclature to ITU-T recommendations	36
Bibliography.....		37
Figure H.1	– Sub-category B4_d chromatic dispersion coefficient limits	35
Figure H.2	– Sub-category B4_e chromatic dispersion coefficient limits	35
Table 1	– Dimensional attributes and measurement methods.....	9
Table 2	– Dimensional requirements common to all category B fibres	10
Table 3	– Mechanical attributes and test methods.....	10
Table 4	– Mechanical requirements common to all class B fibres	11
Table 5	– Transmission attributes and measurement methods	11
Table 6	– Transmission, requirements common to all class B fibres	12
Table 7	– Additional transmission attributes required in the family specifications	12
Table 8	– Environmental exposure tests	12
Table 9	– Attributes measured in environmental exposure tests	12
Table 10	– Change in attenuation for environmental tests.....	13
Table 11	– Coating strip force for environmental tests.....	13
Table 12	– Tensile strength for environmental tests	13
Table 13	– Stress corrosion susceptibility for environmental tests.....	14
Table A.1	– Dimensional requirements specific to category B1.1 fibres	15

Table A.2 – Mechanical requirements specific to category B1.1 fibres	15
Table A.3 – Transmission requirements specific to category B1.1 fibres	16
Table B.1 – Dimensional requirements specific to category B1.2 fibres	17
Table B.2 – Mechanical requirements specific to category B1.2 fibres	18
Table B.3 – Transmission requirements specific to category B1.2 fibres	18
Table C.1 – Dimensional requirements specific to category B1.3 fibres.....	19
Table C.2 – Mechanical requirements specific to category B1.3 fibres	19
Table C.3 – Transmission requirements specific to category B1.3 fibres	20
Table D.1 – Dimensional requirements specific to category B2 fibres.....	22
Table D.2 – Mechanical requirements specific to category B2 fibres	23
Table D.3 – Transmission requirements specific to category B2 fibres	23
Table E.1 – Dimensional requirements specific to category B4 fibres.....	25
Table E.2 – Mechanical requirements specific to category B4 fibres	26
Table E.3 – Transmission requirements specific to category B4 fibres	26
Table F.1 – Dimensional requirements specific to category B5 fibres.....	28
Table F.2 – Mechanical requirements specific to category B5 fibres.....	29
Table F.3 – Transmission requirements specific to category B5 fibres	29
Table G.1 – Dimensional requirements specific to category B6 fibres	32
Table G.2 – Mechanical requirements specific to category B6 fibres	32
Table G.3 – Transmission requirements specific to category B6 fibres.....	33
Table H.1 – Examples for $\lambda_{\min} = 1\,530\text{ nm}$ and $\lambda_{\max} = 1\,565\text{ nm}$	34
Table I.1 – Map of IEC to ITU	36

INTERNATIONAL ELECTROTECHNICAL COMMISSION

OPTICAL FIBRES –

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

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.

International Standard IEC 60793-2-50 has been prepared by subcommittee 86A: Fibres and cables, of IEC technical committee 86: Fibre optics.

This fifth edition cancels and replaces the fourth edition, published in 2012. This edition constitutes a technical revision.

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

- a) aligns the requirements with the ITU-T Recommendations G.654 (2012-10) and G.657 (2012-10);
- b) adds a new sub-category B1.2_d;
- c) modifies B6 sub-categories in terms of attenuation and chromatic dispersion coefficient.

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

CDV	Report on voting
86A/1571/CDV	86A/1614/RVC

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 in the IEC 60793 series published under the general title *Optical fibres*, can be found on the IEC website.

The committee has decided that the contents of this publication will remain unchanged until the stability 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.

IMPORTANT – The 'colour inside' logo on the cover page of this publication indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this document using a colour printer.

OPTICAL FIBRES –

Part 2-50: Product specifications – Sectional specification for class B single-mode fibres

1 Scope

This part of IEC 60793 is applicable to optical fibre categories B1.1, B1.2, B1.3, B2, B4, B5 and B6. A map illustrating the connection of IEC designations to ITU-T designations is shown in Annex I. These fibres are used or can be incorporated in information transmission equipment and optical fibre cables.

Three types of requirements apply to these fibres:

- general requirements, as defined in IEC 60793-2;
- specific requirements common to the class B single-mode fibres covered in this standard and which are given in Clause 5;
- particular requirements applicable to individual fibre categories or specific applications, which are defined in Annexes A to G.

For some fibre categories (shown in the relevant family specifications), there are sub-categories that are distinguished on the basis of difference in transmission attribute specifications. The designations for these sub-categories are documented in the individual family specifications.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 60793-1 (all parts), *Optical fibres – Measurement methods and test procedures*

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

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

IEC 60793-1-21, *Optical fibres – Part 1-21: Measurement methods and test procedures – Coating geometry*

IEC 60793-1-22, *Optical fibres – Part 1-22: Measurement methods and test procedures – Length measurement*

IEC 60793-1-30, *Optical fibres – Part 1-30: Measurement methods and test procedures – Fibre proof test*

IEC 60793-1-31, *Optical fibres – Part 1-31: Measurement methods and test procedures – Tensile strength*