



**NATIONAL STANDARD OF THE
PEOPLE'S REPUBLIC OF CHINA**

GB/T 15972.41-2021

**Specifications for optical fibre test methods - Part 41:
Measurement methods and test procedures for transmission
characteristics - Bandwidth**

Issued on: April 30, 2021

Implemented on: November 1, 2021

**Issued by: State Administration for Market Regulation, China National
Standardization Administration**

Table of Contents

1 Scope	1
2 Normative references	1
3 Terms and definitions	1
4 Abbreviations	2
5 Method overview	2
6 Test device	3
7 Samples and sample preparation	6
8 Procedure	7
9 Calculation	10
10 Length normalized	10
11 Results	10
Appendix A (informative appendix) Structure changes of this part compared with IEC 60793-1-41.2010	12
Appendix B (Normative Appendix) Intra-mode dispersion factor and normalized inter-mode dispersion limit	13
Appendix C (Normative Appendix) Optical fiber transfer function transfer function $H(f)$, power spectrum $ H(f) $ and f_{3dB}	16
Appendix D (Normative Appendix) Calculation of other expression functions	18
Appendix E (Normative Appendix) Mode Stirring Requirements for Full Injection of Multimode Fiber	19
Reference	23

Foreword

GB/T 15972 "Specifications for Optical Fiber Test Methods" consists of several parts, and its expected structure and corresponding international standards are.

---Part 10.General principles of measurement methods and test procedures (corresponding to IEC 60793-1-1);

---Part 20~Part 29.Measurement methods and test procedures of dimensional parameters (corresponding to IEC 60793-1-20 to IEC 60793-1-29);

---Part 30~Part 39.Measurement methods and test procedures of mechanical properties (corresponding to IEC 60793-1-30 to IEC 60793-

1-39);

---Part 40~Part 49.Measurement methods and test procedures of transmission characteristics (corresponding to IEC 60793-1-40 to IEC 60793-

1-49);

---Part 50~Part 59.Environmental performance measurement methods and test procedures (corresponding to IEC 60793-1-50 to IEC 60793-

1-59).

Among them, GB/T 15972.40~49 consists of the following parts.

---Part 40.Measurement methods and test procedures for transmission characteristics attenuation;

---Part 41.Measurement methods of transmission characteristics and test procedure bandwidth;

---Part 42.Measurement methods and test procedures for transmission characteristics. Wavelength dispersion;

---Part 43.Measurement methods of transmission characteristics and test procedures numerical aperture;

---Part 44.Measurement methods of transmission characteristics and test procedures cut-off wavelength;

---Part 45.Measurement methods and test procedures for transmission characteristics; Mode field diameter;

---Part 46.Transmission characteristics measurement methods and test procedures light transmittance changes;

---Part 47.Measurement methods and test procedures for transmission characteristics, macrobending loss;

---Part 48.Measurement methods and test procedures for transmission characteristics Polarization mode dispersion;

---Part 49.Differential modulus delay for measurement methods and test procedures of transmission characteristics.

This part is part 41 of GB/T 15972.

This section was drafted in accordance with the rules given in GB/T 1.1-2009.

This part replaces GB/T 15972.41-2008 "Specification for optical fiber test methods Part 41.Measurement of transmission characteristics and optical characteristics

Method and test method bandwidth". Based on the testing needs of new categories and new sub-categories of multimode optical fibers, this part is consistent with GB/T 15972.41-2008

In comparison, the main technical differences are as follows.

- Added the definition of transfer function and power spectrum (see Chapter 3);
- Added abbreviations (see Chapter 4);
- Added method C---Full injection mode bandwidth method calculated by DMD (see Chapter 5);
- Added the test requirements for A3 and A4 multimode fibers (see Chapter 1, 6.2, Appendix E);
- Added the requirements for the placement state of the tested fiber (see 7.4);
- Added length normalization requirements (see Chapter 10);
- Added the provisions of the intra-mode dispersion factor and the normalized inter-mode dispersion limit (see Appendix B);
- Added the requirements of fiber transfer function $H(f)$, power spectrum $|H(f)|$ and f_{3dB} (see Appendix C);
- Added the calculation of other expression functions (see Appendix D);
- Added the mode-stirring requirement for the full injection condition of multimode fiber (see Appendix E).

This part uses the redrafting method to modify and adopt IEC 60793-1-41.2010 "Optical Fiber Part 1-41.Measurement Method and Test Procedure

Sequence bandwidth".

Compared with international standards, the main structural changes of this part are as follows.

---According to the layout format and presentation requirements of my country's standards, some content arrangements have been adjusted, and the scope of IEC documents has been adjusted.

The content is adjusted to the method overview chapter of this part, abbreviations have been added, and Appendix A has been added to explain the relationship between this part and the IEC chapter.

Correspondence.

Compared with IEC 60793-1-41.2010, the main technical differences and the reasons for this part are.

---In the normative reference documents, in order to adapt to the technical conditions of our country, the following technical differences have been adjusted.

* Replace IEC 60793-1-20 with GB/T 15972.20;

* Replace IEC 60793-1-42 with GB/T 15972.42;

* Replace IEC 60793-1-43 with GB/T 15972.43.

---This section adds the definition of terms for frequency response;

---In order to meet the requirements of broadband multimode fiber testing of the new sub-categories A1a.3 and A1a.4, this section adds A1a.3 and A1a.4 optical fiber

Fiber measurement method.

This section has made the following editorial changes.

--- Modify the standard name to "Specifications for Optical Fiber Test Methods Part 41.Measurement Methods and Test Procedures for Transmission Characteristics width";

---Corrected the formula reference error in the IEC file, and changed the formula B1 cited in 6.3 in the IEC file to the formula (13) of this part;

---Corrected the presentation error in IEC Appendix A, and changed the name of Table A.1 in Appendix A to "the highest expected color of commercial A1 optical fiber

"Discrete" is amended to "Minimum expected IDF for commercial category A1 multimode fiber".

1 Scope

This part of GB/T 15972 specifies the test method for the bandwidth of multimode optical fiber, and establishes the test equipment, injection conditions, procedures, and calculations.

Technical requirements for methods and results.

This section applies to the measurement of the bandwidth of A1, A3, and A4 multimode optical fibers.

2 Normative references

The following documents are indispensable for the application of this document. For dated reference documents, only the dated version applies to this article

Pieces. For undated reference documents, the latest version (including all amendments) is applicable to this document.

GB/T 15972.20 Specification for optical fiber test methods Part 20.Dimensional parameter