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NATIONAL STANDARD OF THE PEOPLE'S REPUBLIC OF CHINA

GB/T 15972.31-2021

Specifications for optical fibre test methods - Part 31: Measurement methods and test procedures for mechanical characteristics - Tensile strength

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Foreword

GB/T 15972 "Specifications for Optical Fiber Test Methods" consists of several parts, and its structure is as follows.

---Part 10 General Principles of Measurement Methods and Test Procedures;

---Part 20~Part 29.Measurement methods and test procedures of dimensional parameters;

---Part 30~Part 39.Measurement methods and test procedures of mechanical properties;

---Part 40~Part 49.Measurement methods and test procedures for transmission characteristics;

--- Part 50 ~ Part 59.Environmental performance measurement methods and test procedures.

Among them, GB/T 15972.3x consists of the following parts.

---Part 30.Measurement methods and test procedures of mechanical properties, optical fiber screening test;

---Part 31.Measuring methods of mechanical properties and test procedures for tensile strength;

---Part 32.Measurement methods and test procedures for mechanical properties, coating

peelability;

---Part 33.Measurement methods of mechanical properties and test procedures for stress corrosion sensitivity parameters;

--- Part 34.Measurement methods and test procedures for mechanical properties of optical fiber warpage.

This part is part 31 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 15972.31-2008 "Specification for Optical Fiber Test Methods Part 31.Measurement Methods and Tests of Mechanical Properties

Compared with GB/T 15972.31-2008, the main technical changes are as follows.

---Added the introduction;

---Modified the scope of application and added Class C and Class D single-mode fibers (see Chapter 1, Chapter 1 of the.2008 edition);

---Added equipment requirements (see Chapter 4);

---Added sample preparation requirements (see Chapter 5);

---Added the requirements of the procedure (see Chapter 6);

---Added calculation method (see Chapter 7);

---Added a typical dynamic tensile strength test device (see Appendix A);

---Added fiber clamping guidelines (see Appendix B);

---Added the stress rate guidelines (see Appendix C);

---Added the "long sample" measurement method (see Appendix D).

This part uses the redrafting method to modify and adopt IEC 60793-1-31.2019 ``Optical Fiber Part 1-31.Measurement Methods and Test Procedures

tensile strength".

Compared with IEC 60793-1-31.2019, the structural changes of this part are as follows.

---Chapter 3 "Terms and Definitions" was deleted, and Chapter 3 was changed to "Method Overview", and the content of Chapter 4 was adjusted to that of Chapter 6.

Note, resulting in the postponement of subsequent chapters and articles;

--- Incorporate Chapter 10 "Specification Information" into Chapter 8 "Results";

---Informative Appendix D has been added.

The technical differences between this part and IEC 60793-1-31.2019 and the reasons are as follows.

---Regarding normative reference documents, this section has made adjustments with technical differences to adapt to my country's technical conditions and adjustments.

The situation is collectively reflected in Chapter 2 "Normative Reference Documents", and the specific adjustments are as follows.

* Replace IEC 60793-1-20 with the modified GB/T 15972.20-2021;

* Added reference to GB/T 15972.10-2021 and GB/T 15972.21-2008.

---In the "Scope" chapter, the measurement applicable to Class D fiber has been added;

--- Deleted Chapter 3 "Terms and Definitions" of International Standards;

---Change the hazardous content in Chapter 4 of the International Standard to the note in Chapter 6;

---Change the example in the international standard 5.2 to the content of the clause;

---Modified the test procedure of 6.2;

---Corrected the error of formula (6);

---Move the "long sample" test method in International Standard 6.2 to the informative Appendix D;

---The median fracture stress and the 15th percentile value of fracture stress in the IEC file correspond to the domestic practice of GB/T 9771 and amended to

The tensile strength at the Weibull probability level of 50% and the tensile strength at the Weibull probability level of 15%.

This section has made the following editorial changes.

---Change the standard name to "Specification for Optical Fiber Test Methods Part 31.Measurement Methods and Test Procedures for Mechanical Properties

Spend";

---Added the note in 6.3;

---Adjusted references.

Introduction

The fracture stress distribution can be used to predict fiber reliability under different conditions. IEC TR62048.2014 explains the mathematics of this method

principle. The test is restricted by the following conditions.

1) Differences in fiber samples, such as. coating, manufacturing time, diameter;

2) Gauge length, that is, the length of the test part;

3) Stress or strain rate;

4) Test environment;

5) Pretreatment or aging treatment;

6) Sample size.

The test method is to measure the strength of the optical fiber at a specified constant strain rate. This is a destructive test and cannot replace fiber screening

test.

The method in this part is used for the gauge length of 0.5m and the specified maximum constant strain rate of 25%/min.

Fiber with a tensile strength greater than 3.1GPa (450kpsi) at a rate level of 50%. For the resistance to tension at the Weibull probability level of 50%

For low-degree optical fibers, the method in this part is not accurate enough.

Note. kpsi=thousand pounds per square inch.

There are two typical lengths for testing, one is "short sample", the length is about 1m; the other is "long sample", the length is 10m~

20m, the sample size is 15~30.

The test environment, any pretreatment or aging will affect the test results. There is no universally recognized model that can convert an environment

The result is extrapolated to another environment. However, for the fracture stress at a given stress or strain rate, as the relative humidity increases, the fracture stress

reduce. Under certain temperature and humidity conditions for one or two days of pretreatment, it can be observed that the parameters of the measured intensity distribution may be

Increases may also decrease.

The test is based on the theory of fracture mechanics of brittle materials and the power law of defect growth (see IEC TR62048.2014). Although there are

Other theories, but the fracture mechanics based on the power law theory is the most universally recognized.

Typical samples include fibers that have not been intentionally damaged or environmentally aging. A typical fiber has a nominal diameter of 125μm, 250μm