

Optical Cable Material Specifications



Overview

APPLICATION Optical cable for industrial environments. The cable is suitable for both indoor and outdoor installation.

Key Takeaways

Optical cables are specified by fiber type, core and cladding dimensions, optical performance, mechanical properties, and environmental resistance according to international standards. Fiber Types and Core Specifications

Single-mode fiber (SMF) has a small core diameter of 8–9 μm , allowing only one mode of light to propagate. It is optimized for long-distance transmission at 1310 nm and 1550 nm wavelengths, with low attenuation and dispersion, as defined in ITU-T G.652 standards. Key attributes include mode field diameter, cladding diameter, core concentricity error, cut-off wavelength, macrobending loss, and refractive index profile. Multimode fiber (MMF) has a larger core, typically 50–62.5 μm , supporting multiple light modes for short-distance applications such as data centers and enterprise networks. MMF types are classified as OM1, OM2, OM3, OM4, and OM5 according to ISO/IEC 11801, with differences in core size, modal bandwidth, data rate, and jacket color. For example, OM1 has a 62.5 μm core and supports 10 Gbit/s up to 33 m, while OM5 supports short-wavelength division multiplexing (SWDM) with higher modal bandwidth for multi-wavelength applications.

Optical Performance Parameters

- Attenuation coefficient: Measures signal loss per kilometer; lower values are preferred for long-distance transmission.

- Chromatic dispersion: Variation of light speed with wavelength, critical for high-speed systems .
- Polarization mode dispersion (PMD): Relevant for single-mode fibers in high-speed networks .
- Effective modal bandwidth (EMB): Important for multimode fibers to determine maximum data rate over a given distance .

Mechanical and Environmental Specifications

Optical cables must withstand mechanical stress and environmental conditions. Key material specifications include:

- Cable construction: Loose tube, central tube, or all-dielectric designs for indoor/outdoor use .
- Water blocking: Use of water-swellable yarns or tapes to prevent moisture ingress .
- Temperature and UV resistance: Materials must maintain performance across temperature ranges and outdoor exposure .
- Mechanical protection: Anti-bending, anti-impact, anti-vibration, and thermal aging resistance .
- Flame and smoke ratings: Low Smoke Zero Halogen (LSZH) or CPR-rated for indoor safety .

Standards and Compliance

- ITU-T G.652: Single-mode fiber specifications for 1310/1550 nm transmission .
- ISO/IEC 11801: Multimode fiber types OM1-OM5, defining core size, bandwidth, and applications .
- National and industry guidelines: For raw materials, installation, and performance testing, such as TEC GR No. 89010:2021 .

Summary

Optical cable material specifications encompass fiber type, core and cladding dimensions, optical performance, mechanical robustness, environmental resistance, and compliance with international standards. Single-mode fibers are suited for long-distance, high-speed applications, while multimode fibers are optimized for short-range, high-bandwidth networks. Proper selection ensures reliable signal transmission, durability, and safety in diverse installation environments .

Article Content

Fiber Optic Materials: What Fiber Optic Cables Are Made Of

Today we explain the materials commonly used inside optical fibers and around them, what each layer does, and

Fiber Optic Cable Components & Materials: Complete Technical Guide

Explore the 5 key fiber optic cable components and materials used in modern networks. Learn how glass, coatings,

Corning® ClearCurve® OM2, OM3, and OM4 Optical Fibers

Corning fibers with ColorPro® identification technology deliver better efficiency in cable manufacturing, simplify inventory

What Are the Raw Materials of Fiber Optic Cables? Full Guide

A complete guide to the raw materials of fiber optic cables—optical fibers, PBT tubes, FRP rods, aramid yarn, steel

Fiber Optic Cable Types Explained

Our comprehensive guide to types of fiber optic cables. Learn all about the differences between single mode and multimode cables,

Optical Fibre Cable Technical Specification

1.1 Scope This Specification covers the design requirements and performance standard for the supply of optical fibre cable in the

Fiber Optic Cables Specifications

Find Fiber Optic Cables on GlobalSpec by specifications. Fiber optic cables are composed of one or more transparent optical fibers

Fiber-optic cable

A fiber-optic cable, also known as an optical-fiber cable, is an assembly similar to an electrical cable but containing one or more

What Is The Raw Material Of Fiber Optic Cables?

The most critical raw material in fiber optic cables is the optical fiber itself. Optical fibers consist of two main

Understanding and Selecting Optical Fibre and Cable

In this document, the relationship between the cable features, followed standards, test parameters, and acceptance criteria are

Recommendation ITU-T G.652 (08/2024)

This document outlines the specifications for a single-mode optical fiber and cable designed for use around the 1310 nm zero

A Guide to the Materials used in Fiber Optic Cable Manufacturing

Ever wondered how fiber optic cables are made? Learn more about the materials required and manufacturing process

Fiber Optic Cables

APPLICATION Optical cable for industrial environments. The cable is suitable for both indoor and outdoor installation. The outer

CORNING OPTICAL COMMUNICATIONS GENERIC

2.0 Fiber Specifications 2.1 Detailed information on the cabled performance of the fiber types available for this cable design can be

Multimode Optical Fiber Selection & Specification

IEC/CEI 60793-2-10: "Product specifications – Sectional specification for category A1a.1 multimode fibres" ITU-T Recommendation

The Fiber Optic Association

Other groups may have fiber optic standards also: ANSI is the governing bodies for standards in the US, NIST provides primary

Fibre Optic Cable Specification

Fibre Optic Cable Specification Light-Guiding Threads, a term that encompasses a range of technologies, are pivotal in the realm of

Fiber Optic Cables

Prysmian has a built-in multi-step quality assurance program, covering the production process from cable design and raw material

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