Main Materials for Direct-Buried Optical Cables



Overview

Recommended technical requirements are detailed by reference to IEC 60794-3-11 on outdoor optical fibre cables for duct, directly buried, and lashed aerial applications.

Key Takeaways

Direct-buried optical cables are constructed with multiple protective layers including rugged outer jackets, armoring, water-blocking elements, and tensile strength members to ensure durability and performance underground.

Outer Jacket Materials

The outer sheath of direct-buried optical cables is typically made from high-density polyethylene (HDPE) or linear low-density polyethylene (LLDPE), providing excellent resistance to moisture, UV radiation, chemicals, and soil abrasion. In some cases, low-smoke zero-halogen (LSZH) materials are used for enhanced fire safety and environmental compliance.

Armoring

To protect against crush, rodent damage, and mechanical stress, direct-buried cables often include metallic or non-metallic armor. Common armoring materials include corrugated steel tape (CST), steel wire, or fiber-reinforced plastic (FRP). Armored cables are particularly recommended in areas with high soil compaction or rodent activity.

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Water-

Blocking ElementsDirect-buried cables incorporate water-blocking components to prevent moisture ingress along the cable length. These can include waterproof gels, water-absorbing yarns, or expansion tapes, which maintain fiber performance even in wet soil conditions.

Tensile Strength Members

To protect the optical fibers from tension during installation and handling, cables include tensile strength members such as Kevlar yarns or glass-reinforced plastic rods. These members provide structural support without adding excessive weight. Fiber ArrangementDirect-buried cables may use loose tube or ribbon fiber constructions.

Loose tube designs contain multiple buffer tubes with 12–24 fibers each, while ribbon cables allow high-density fiber counts and facilitate mass-fusion splicing for faster installation.

Additional Considerations

Central strength members (steel wire or FRP) provide core support.

S-

Z stranded or central tube structures accommodate different fiber counts, from 12 up to 624 fibers. Compliance with IEC, ITU, and EIA standards ensures mechanical, environmental, and optical performance suitable for direct burial. These materials and structural features collectively ensure that direct-buried optical cables can withstand soil pressure, moisture, temperature fluctuations, and accidental mechanical impacts, making them suitable for FTTH networks, backbone infrastructure, and industrial communication systems.

Article Content

Recommendation ITU-T L.101 (08/2024)

Recommended technical requirements are detailed by reference to IEC 60794-3-11 on outdoor optical fibre cables for duct, directly buried, and lashed aerial applications. Changes and

Fiber Direct Burial Cable: The Ultimate Guide to Underground High

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Common sheath materials include polyethylene and other outdoor-rated compounds. The sheath should resist cracking, environmental aging, and mechanical wear during pulling, laying, and

direct-burial-fiber-cable-installation-types-best-practices

This guide explains the common cable constructions, when to choose direct-burial, a practical installation workflow, and the best practices that minimize downtime

Recommendation ITU-T L.101 (08/2024)

This document outlines the standards and recommendations for the use and testing of single-mode optical fibre cables intended for telecommunication networks, specifically for directly buried installations.

Underground Fiber Optic Cable: The Complete Guide (2026)

This guide examines structural design, installation methods, material selection, protection strategies, cost variables, and long-distance deployment considerations for underground fiber optic cable systems.

Direct Burial Fiber Optic Cable: Depth, Methods, and Standards

Direct burial fiber optic cable standards: NEC depth requirements, trench bedding, tracer wire, warning tape, road crossings, and as-built documentation.

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Recommendation ITU-T L.100 (01/2024)

This document provides comprehensive guidelines for single-mode optical fiber cables installed via the pulling method in ducts and tunnels, primarily for telecommunication networks. It outlines the

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Armoured Cable: Types, Uses, SWA vs STA & Construction

We use steel tape armoured cable (STA) for direct buried cable or pipe laying, common ground, tunnel, etc. STA cables are less expensive than SWA cables. Steel wire armoured (SWA)

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