

Applications for Fiber Optic Cables

Because fiber optic cables can be exposed to many different types of potential damage, contractors and system designers must consider a variety of factors when planning an installation:

- tensile strength
- ruggedness
- durability
- flexibility
- size
- resistance to the environment
- flammability
- temperature range

In addition to time and cost, these considerations play a large part in determining what type of fiber optic cable should be installed.

Traditional cabling methods require the use of specific cable constructions in the indoor and outdoor environments: Loose-tube, outside plant (OSP) cables for outdoor installations and tight buffer fire-rated cables for use inside the building. A third construction called indoor/outdoor cable combines the durability of outdoor cable with the fire rating of indoor cable.

A Review of Flame Ratings

All cable that is to be used in risers, plenums, conduits, an assortment of ducts, and modular furniture must meet certain fire retardant standards. A cable installer or network planner must be aware of the flame ratings of the cables to be installed in these areas, and the National Electrical Code (NEC) specifies the listing requirement for cables for a particular installation.

- The term plenum refers to any space used as part of an air-handling system. This includes heating/air-conditioning ducts and air returns.
- The term riser refers to a vertical pathway or space between floors. Cables within risers must have adequate fire and smoke resistance in order to prevent the spread of fire between floors.
- A third category, called general-use, refers to cables that may be installed on a single floor (general-use cables cannot be used in riser or plenum applications).

Outdoor Fiber Cabling (OSP)

Outdoor optical cable is typically a loose-tube cable construction. In this cable, the black jacketing material provides UV protection and color-coded plastic buffer tubes protect the optical fibers from weather damage. Dry water-blocking elements impede water penetration. The cable core typically uses aramid yarn for tensile strength and may or may not have a central fiberglass rod for anti-buckling resistance at low temperatures.

If armoring is required for additional protection against rodents or termites or for maximum security, a corrugated steel tape is wrapped around the cable core before the final outside jacketing is applied. Multiple armor and jacket layers can be applied to further beef up the cable.

Loose-tube cables typically are used for outside-plant installation in aerial, duct and direct-buried applications. OSP cables usually do not carry a riser or plenum rating since they are used outdoors. This allows them to use less expensive materials in their construction.

Indoor Fiber Cabling

Indoor cabling (sometimes called premises or building cabling) is of course cabling installed inside a building. It involves cabling that is shorter in length than outdoor cable and 2 to 48 fibers per cable. Indoor cables are categorized as distribution cables or interconnect cordage. Interconnect cordage is for lighter duty and used for patch cords or similar applications.

Distribution cables are more rugged and durable since the application space includes building risers, above ceiling spaces, and inside walls. For additional protection, interlocking armor can be applied over the base cable, providing an economical and space-saving alternative to cable-in-conduit.

Indoor/Outdoor Fiber Cabling

Indoor/outdoor loose tube cables are designed to meet all the rigors of the outside plant environment and have the necessary fire ratings to be installed inside the building. Indoor/outdoor cables can be placed anywhere in the network, bypassing transition points from outdoor to indoor. These cables can be used between buildings in campus backbone cabling, in riser or plenum rated environments (depending on their flame rating), and in outside plant applications.

It should be noted that indoor/outdoor cables must have an operating temperature of -40°C to $+85^{\circ}\text{C}$ with minimal shift in attenuation to comply with TIA-455-3A and TIA-455-71 standards.

Summary (Specific Uses for Fiber Optic Cable)

The following chart summarizes the fiber requirements for various applications.

Application	Outdoor Fiber Cable	Indoor/Outdoor Fiber Cable	Indoor Fiber Cable
FDDI	X	X	X
Ethernet		X	X
Token Ring		X	X
Channel Extension	X	X	
CCTV Security	X	X	X
Interactive Video		X	X
Voice	X	X	X
Telemetry	X	X	
Patch Cords		X	X
Interconnect		X	X



Corporate Office

1100 CommScope Place SE P.O. Box 1729

Hickory, North Carolina (USA) 28603-1729

Tel 828.459.5000 800.544.1948 Fax 828.459.5099

www.uniprisesolutions.com

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