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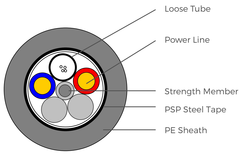
Applying Photoelectric Composite Cables in Enterprise Parks

Photoelectric composite cable (or "hybrid optical and electrical cable") is a new method for interconnection with communication networks. It integrates copper wire with optical fibre transmission, simultaneously solving several problems related to broadband access, equipment electricity supply and signal transmission, and attracting great attention from telecommunications operators.

In the world of Internet of Everything, increasing numbers of 4G/5G base stations, Wi-Fi devices, security devices, traffic monitoring devices, climate sensors, etc., are coming into use in enterprise parks, creating attendant electricity supply needs. Photoelectric composite networking solutions adopt a "photoelectric composite cable + outdoor optical network unit (ONU) + network patch cord + terminal equipment" mode of networking. Remote transmission to multi-function smart poles can be achieved using photoelectric composite cable, with the cable and outdoor ONUs providing both signal transmission and electricity supply for various types of terminal device. This solution fulfills high bandwidth requirements using fewer cables, which is sure to lead to its increasing popularity in enterprise park cabling and urban infrastructure construction.



Photoelectric composite cable's strengths:

(1) Small outer diameter, lightweight and low volume.

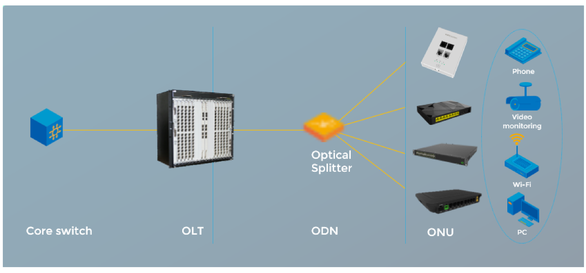
(2) Excellent bend resistance and good lateral pressure resistance performance for convenient construction and maintenance, and long-term stable network operation.

(3) Provide multiple transmission technologies, for high adaptability and scalability, applicable to a wide range of products. Photoelectric composite cables can be categorized by usage into pipe, overhead, direct-burial, indoor, and special-purpose types. Generally, pipe, overhead, direct-burial and indoor type photoelectric composite cables are used outdoors, providing power and signal transmission capabilities for outdoor communication metrocells. Other indoor-type cables are mainly used indoors, providing power and signal transmission for indoor communication distribution stations.

(4) Solve problems relating to supply of electricity to devices in network construction (eliminating the need to lay numerous power supply lines), since photoelectric composite cables combine optical fibre and electric cores, typically with 2-144 fibre cores, and the cable voltages from 48-110 kV. For indoor uses, 48 V photoelectric composite cables are generally used. For connecting outdoor remote stations or metrocells, 280-750 V photoelectric composite cables are generally used.

01 Application Requirements and Prospects for Photoelectric Composite Cables in POL All-optical Networking

The Passive Optical LAN (POL) is a park network solution that has emerged in recent years, taking single-mode fibre, with higher-capacity bandwidth capacity, longer transmission range, and lower volume/weight as its medium, thus lowering usage and maintenance costs, while adopting the PON technology widely-used in telecom operators' FTTH broadband access markets. Apart from overcoming the transmission range limitations of traditional Ethernet, the POL solution, by virtue of PON technology's passive splitting characteristics, requires less active equipment in the convergence layer, saving expenses in terms of equipment room space, power distribution and heat dissipation in comparison with traditional Ethernet switching schemes.



POL all-optical networking is mainly characterized by separate placement of ONU and optical line terminal (OLT) network devices at the device end and in the core equipment room, respectively. A long transmission range makes active devices between ONU and OLT unnecessary, allowing dispersed distribution of active ONU devices. The material, construction, management and maintenance costs of traditional, separately-laid optical data plus copper power-supply cables are far higher than those of integrated photoelectric composite cable. POL all-optical networks can be considered as such provided only short-lengths of copper-cable patch cord are added at device ends. The synchronous laying of indoor ONU data cable and power-supply copper cable and cabling design simplified must also be considered, making photoelectric composite cable and its management system an ideal choice. Currently, photoelectric composite cables have been widely adopted in fields including enterprise park public security, wireless communication, guard patrols, and vehicle management systems.

02 Smart Light Poles' Need for Photoelectric Composite Cables in Application

Smart light poles are a kind of public infrastructure that integrates various functions, including Wi-Fi, 4G/5G base stations, broadcasting, information screens and charging piles. Smart light poles are currently attracting increasing attention in network infrastructure construction.

During the construction of smart light poles, a large number of devices are installed, each requiring at least 1-2 cable(s) for electricity supply and signal transmission. The poles' small interior space limits the outer diameter of these cables, and creates a need for integrated cable bundles, imposing two new requirements on the cable industry. In addition, the cables providing electricity supply and signal transmission capabilities for smart light poles may include power lines, network cables and cables; providing reasonable photoelectric composite cables for this usage represents a new opportunity for the industry.

03 Enterprise Park Monitoring Systems' Need for Photoelectric Composite Cables in Application

Enterprise park monitoring systems are made up of five components: cameras, transmission, control, display and recording subsystems. Specifically, cameras transmit video images to a control host via optical fibre. The control host distributes these video signals to various monitors and recording devices, while synchronously transmitting audio signals. Traditional cabling faces problems relating to transmission range length, widely-distributed active equipment, and tight routing, making for difficulties in construction and maintenance. The excellent characteristics of photoelectric composite cables overcome these, leading to their wide application in enterprise park monitoring systems.

Photoelectric composite cables are actually optical cable capable of transmitting both electrical and optical signals, thus eliminating the need to lay optical fibre and electrical wiring separately during network construction, and requiring only a single conduit, which can obviously reduce costs. Photoelectric composite cable is quite suitable for network systems in large enterprise parks. The new mode of connectivity that it offers, integrating optical fibre and copper wire, can solve problems relating to simultaneous supply of electricity and transmission of signals to equipment.

But despite its advantages in the above application scenarios, during practical application of photoelectric composite cables, some problems may occur.

(1) Existing standards stipulate that optical cables are laid based on principles of "nonelectric" or "weak electricity". But do photoelectric composite cables suit laying in "weak electricity" conduits? This must be carefully considered and clarified during routing design and formulation of construction specifications.

(2) Photoelectric composite cables are electrically live, creating a risk of electric shock during construction and maintenance that does not exist with traditional optical cables.

(3) "Copper-free laying" does not work for photoelectric composite cables; and if these cables are used in the same manner as normal optical cables, they could risk being stolen.

Photoelectric technology's wide application has delivered substantial benefits in terms of production and peoples' daily lives. And methods for transmitting electrical and light energy are different, so these two energies do not interfere with one another. By integrating electricity supply and signal transmission, photoelectric composite cables can solve issues related to broadband access, electricity supply to equipment, and signal transmission in an effective way, saving space, cutting costs, and improving transmission efficiency; strengths which make them an ideal mode of fibre connectivity.