

Metal-free Optical Drop Cable

1. INTRODUCTION

Recent years have seen rapid development of optical fiber networks and implementation of fiber-to-the-home (FTTH) in common homes, along with the increased demand for optical communications to support the proliferation of Internet as well as delivery of moving pictures.

Conventional method of optical fiber installation used drop cables for connection between distribution cables and subscribers' premises, and indoor cables for connection within subscribers' residences. See Figure 1 (a). In such a method it was necessary to joint the drop and indoor cables, giving rise to such additional costs as those of cable jointing and materials for joint box installed on the wall of subscriber's residence. In order to reduce such costs related with cable jointing, therefore, a new method of cable installation is becoming widespread where a drop cable is led directly into the residence without using an indoor cable. See Figure 1 (b).

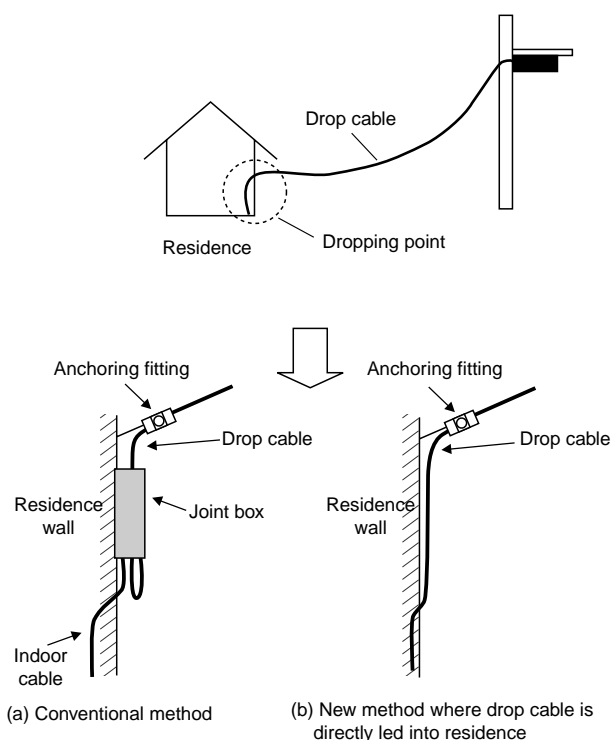


Figure 1 Dropping installation method of optical drop cables.

However, in such an installation method where a drop cable is led into the residence without segmentation, there is a danger that a surge current due to lightning would reach indoors, adversely influencing the communication equipment installed in the residence. To cope with this problem caused by lightning, we have developed an optical drop cable using a non-metal tension member of glass fiber reinforced plastic (G-FRP), which will be described in this report.

2. FEATURES

2.1 Structure

Figure 2 shows a cross section of the metal-free optical drop cable that has been developed. The structure has not completely eliminated metals from the entire cable; it uses a steel wire as conventionally for the suspension member while eliminating metals from the cable portion.

The cable main body is made metal-free, using a 0.4 ϕ G-FRP for its tension members, with provision made so that influences due to lightning does not reach inside the residence.

A steel wire is used for the suspension portion. Although this portion comprises metal members, the portion is severed by cable anchoring before entering the residence, so that lightning influences are also isolated posing no problems. The use of steel wire suppresses cost increase and maintains the favorable cable performance equivalent to that of conventional drop cables in terms of tensioning characteristics and ease of installation.

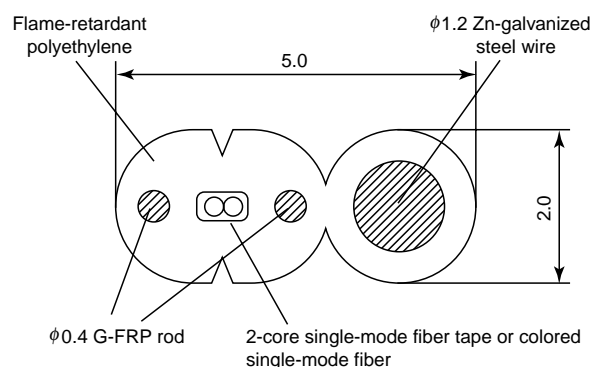


Figure 2 Structure of metal-free optical drop cable.

Table 1 Characteristics of metal-free optical drop cable.

Test item	Contents of test	Test results
Transmission loss	OTDR measurement	1.55 μm : 0.20 dB/km 1.31 μm : 0.33 dB/km
Temperature cycling	-30~70°C, 3 cycles	≤ 0.05 dB/km
Tensile	Load: 700 N Cable length: 10 m	≤ 0.05 dB
Bending	Bending radius: 30 mm	≤ 0.05 dB
Lateral force	Load: 1200 N 25-mm plate, 1 min	≤ 0.05 dB
Impact	Height of fall: 1 m Weight: 0.3 kg Radius of impact area: 10 mm	≤ 0.05 dB
Twist	Angle of twist: $\pm 180^\circ\text{C}/1\text{ m}$	≤ 0.05 dB
Flame retardance	Inclined burning test in JIS C 3005	Extinguished spontaneously

Note: Wavelength of measurement is 1.55 μm .

Halogen-free, flame-retardant polyethylene is used for the cable sheath, making the cable environmentally friendly compared to conventional drop cables which used PVC.

With such a structure described above, the developed drop cable permits direct installation indoors the residence from an electric pole, thus reducing costs of cable jointing as well as those of materials for joint boxes, etc.

2.2 Characteristics

Table 1 shows the characteristics of the metal-free optical drop cable. The cable is seen to be provided with satisfactory performance in terms of transmission loss besides thermal and mechanical characteristics. Although G-FRP has been introduced in the structure, the performance of the cable is equivalent to that of conventional drop cable using steel wires.

3. IN CONCLUSION

A metal-free optical drop cable has been introduced which is capable of not only reducing installation costs but also solving problems related with surge currents due to lightning. The cable also features full adaptability to a variety of network, installation and residential environments simply by changing the type and the number of contained fiber. Thus the cable can cope with diversified optical fiber configurations that are expected to develop in the future.

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