Society of Cable Telecommunications Engineers

**ENGINEERING COMMITTEE**
**Interface Practices Subcommittee**

**AMERICAN NATIONAL STANDARD**

**ANSI/SCTE 122 2006**

# SCTE Recommended Optical Fiber Cable Types for Outside Plant Drop Applications

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140 Philips Road
Exton, PA 19341

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## 1.0 INTRODUCTION

Telecommunication service providers have begun to deploy optical fiber deeper into the network and closer to the subscriber residence. An appropriate optical cable design for these applications is necessary to achieve an appropriate level of service reliability. Ensuring the long term reliability of these assets is a key performance component to the service providers and network operators.

Optical cables are designed to protect the optical fibers from a variety of harmful effects that could degrade the ultimate service life of the network. The effects of mechanical stresses, such as those experienced during installation, must be considered. Environmental effects that typically manifest themselves post-installation, such as temperature changes and chemical exposure, should also be evaluated. In order to properly evaluate and compare different cable designs a test regime of standard performance requirements should be considered by network operators.

The purpose of this document is to provide guidance in selection of a suitable outside plant (OSP) optical drop cable with respect to different application environments.

## 2.0 NORMATIVE REFERENCES

The following documents contain provisions, which, through reference in this text, constitute provisions of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreement based on this standard are encouraged to investigate the possibility of applying the most recent editions of the documents listed below.

ANSI/ICEA S- S-110-717 "*Standard for Optical Fiber Drop Cable."*

## 3.0 TYPICAL INSTALLATION APPLICATIONS

The optical drop cable serves as the direct link from the service provider distribution network to the subscriber. The installation parameters and requirements for the drop cables will typically mirror those imposed on the distribution cable network serving these drops. Typically, if the distribution plant is an aerial installation; then, the drop cables are installed aerially. Conversely, if the distribution plant is underground; then, the drop cables are installed underground.

A more detailed discussion of these installation methods can be found in ANSI/SCTE 86 2003, *"SCTE Recommended Optical Fiber Cable Types for Outside Plant Trunk and Distribution Applications."*

### 3.1 Aerial

An aerial optical drop cable installation typically entails placement of an appropriate length of optical cable from pole to the residence. These cables are self supported and use of a separate, independent messenger wire is not used in normal practice.

### 3.2 Direct Buried

A direct-buried optical drop cable installation typically involves placement of an appropriate length of optical cable from a handhole or pedestal to the residence. The optical cable is inserted into the ground either manually or with a mechanized plow. These cables may include a metallic tracer wire for subsequent location purposes if desired.

### 3.3 Duct

While not commonly used, some deployments may place a duct run between the distribution network and the residence. If employed, the optical drop cable is pulled into place from one end of the duct. This type of installation may require a prime mover device (can be manual, a mechanized winch, or cable jetting equipment), a tension measuring device, and compatible lubricant to allow the cable to slide through the conduit with reduced frictional drag.

## 4.0 TYPICAL OPTICAL FIBER DESIGNS

Due to the typical short lengths of these applications (less than approximately 30 to 45 meters (100 to 150 feet)), dispersion-unshifted ("standard") single-mode optical fiber will provide acceptable levels of performance. Other single-mode optical fiber types may be considered on a case-by-case basis for special applications.

A more detailed discussion of these installation methods can be found in ANSI/SCTE 86 2003, *"SCTE Recommended Optical Fiber Cable Types for Outside Plant Trunk and Distribution Applications."*

## 5.0 TYPICAL OSP OPTICAL DROP CABLE DESIGNS

A number of different optical drop cable designs have been developed. These cables typically contain no more than 12 optical fibers, , located loosely in a buffer tube. Excess fiber length within the buffer tube allows the cable to stretch without inducing stresses on the fiber itself. The basic aim of each of these designs is similar – to protect the optical fibers from damage during installation and environmental conditions over their useful service lifetime. Different application and “handleability” considerations will determine specific preferences of one cable type over another. The cable designs presented in this document are the most commonly used in the telecommunication industry today.

**5.1** **All-dielectric optical drop** cables have the optical fibers placed in centrally located buffer tube. The all-dielectric design (shown in Figure 1) is the most commonly used optical drop type today.

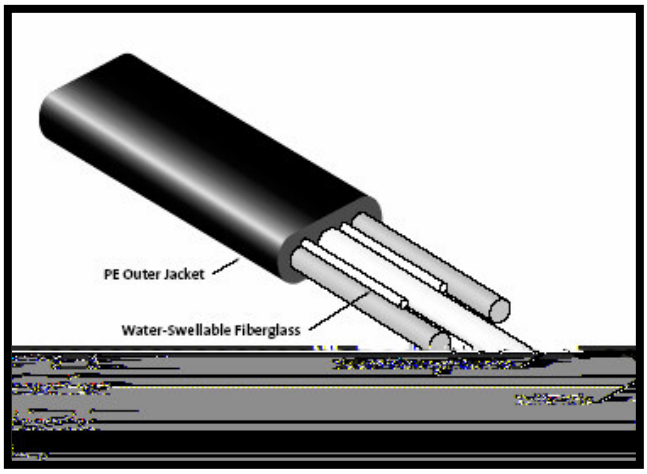


*Figure 1 – All-Dielectric Optical Drop Cable*

**5.2** **Armored optical drop** cables also have the optical fibers placed in centrally located buffer tube. A protective metallic foil surrounds the buffer tube and provides an additional protective barrier for the optical fibers. A representative design is shown in Figure 2.

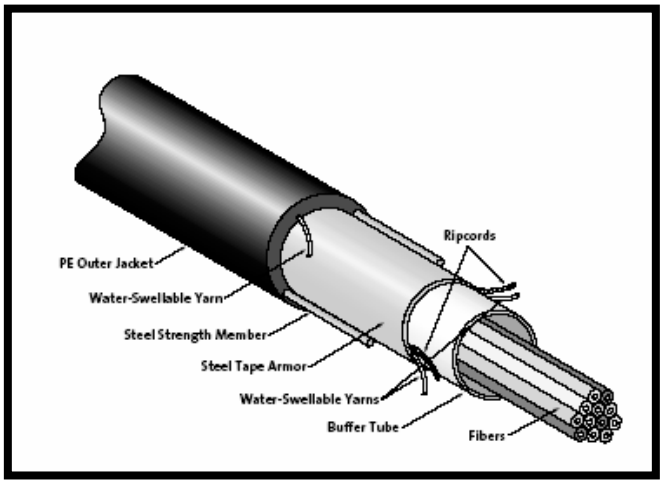


*Figure 2 – Armored Optical Drop Cable*

5.3 **Figure-8 optical drop** cables are composed of two distinct subcomponents. The first is an optical cable similar to the loose tube cables described previously. The second is a messenger wire connected to the cable by a plastic web. The cross section of this composite structure closely resembles the numeral “8”; hence, the source of the name. These cables are used in aerial applications. The intent of this cable design is to combine the installation of the messenger wire and optical cable into a single process. An example of this type of cable structure is shown in Figure 3.

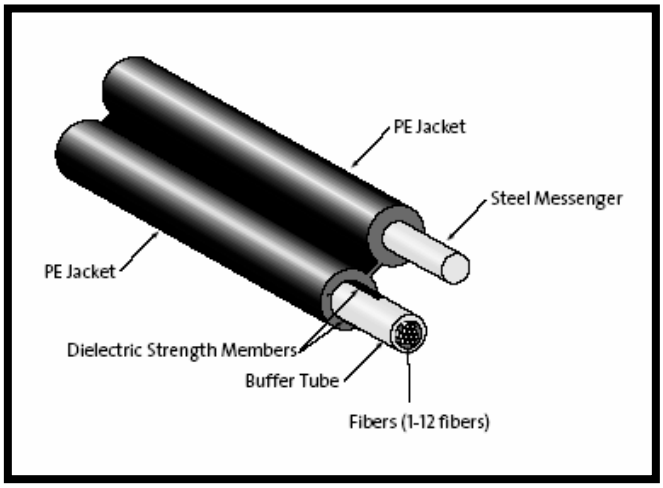


*Figure 3 – Figure-8 Optical Drop Cable*

**5.4** **Toneable optical drop** cables are similar in appearance to the Figure-8 design and composed of two distinct subcomponents. The first is an optical cable similar to the loose tube cables described previously. The second is a small gauge wire connected to the cable by a plastic web. The intent of this cable design is to combine an all dielectric cable for buried applications with location capability. An example of this type of cable structure is shown in Figure 4.

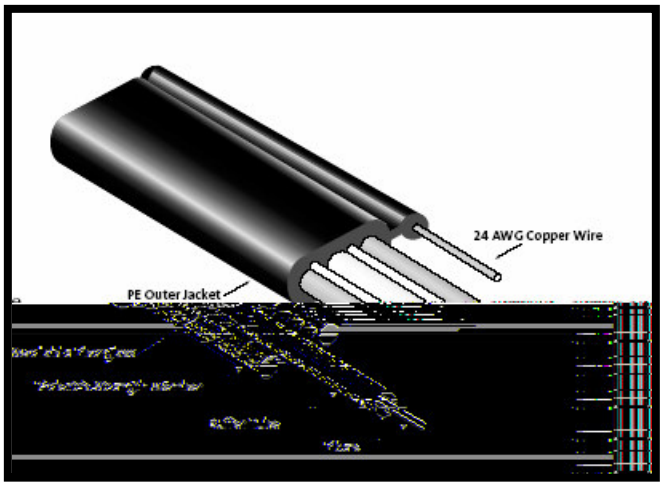


*Figure 4 – Toneable Optical Drop Cable*

## 6.0 PERFORMANCE REQUIREMENTS

OSP optical fiber cable shall meet the requirements of the ANSI/ICEA S-110-717 "*Standard for Optical Fiber Drop Cable."* The most current ANSI/ICEA S-110-717 revision level shall be used. Only optical fiber cable constructions specified in this document shall be used for outside plant applications.

## 7.0 SELECTION GUIDE & APPLICATION CONSIDERATIONS

Cable selection involves many factors. To optimize matching the specific optical fiber/optical cable for a specific application, evaluating the following list of general considerations is a good starting point.

### 7.1 Fiber type

- Compatibility with trunk and distribution cable plant
- Maximum transmission distance
- Intended data rate

### 7.2 Fiber count

- Requirements of active equipment

### 7.3 Installation method

- Aerial self-supported, figure-8 or concentric design
- Direct buried
- Pulled into duct

### 7.4 Cable Design

- Dielectric or armored

Proper determination of the scope of the application, with the assistance of the general guidance above, will assist in the cable selection process. Employing proper due diligence, the system operator can select the best cable independently or consult a manufacturer for assistance. In either case, the application considerations outlined in this section represent significant information necessary to make an informed decision.