

This document is evidence to demonstrate scalability and capabilities of the proposed project's technology. This includes current technology levels, ability to upgrade, and latency levels. The information has been certified by the manufacture.

## TABLE OF CONTENTS

<b><u>PROPOSED TECHNOLOGY</u></b>	<b>1-36</b>
<b>SPECIFICATIONS FOR FIBER EQUIPMENT</b>	<b>1-12</b>
<b>SPECIFICATIONS FOR HANGING EQUIPMENT</b>	<b>13-26</b>
<b>SPECIFICATIONS FOR CABLE USED</b>	<b>27-36</b>



## Gigabit Passive Optical Network

GPON End-to-End Solution

High-Performance OLTs

Low-Cost, Robust ONU CPEs





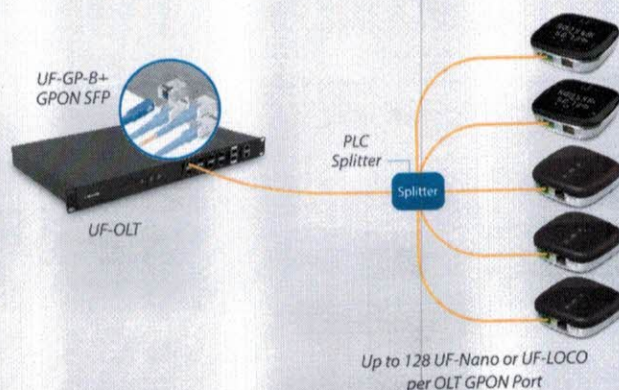


## High-Performance GPON

Configuring a fiber network just became as easy as setting up a smartphone. Say goodbye to command lines, manuals, and paid support licenses. Introducing U Fiber OLT – a fiber solution that anyone can deploy.

U Fiber offers internet and telecom service providers a cost-effective fiber optic delivery system for Triple Play Services (data, voice, IPTV/VoD) with speeds of up to 2.488 Gbps downstream and 1.244 Gbps upstream.

The U Fiber network is intelligently managed using the included UNMS™ (Ubiquiti® Network Management System) controller. U Fiber devices consist of the U Fiber OLT or OLT-4 (deployed at the provider premises) and the U Fiber Nano™ G, loco, or UF-WiFi clients, which function as ONU CPES (Customer Premises Equipment).



## Controller Software

Ubiquiti distinguishes itself with a library of powerful and intuitive management software that is included at no additional cost. UNMS is the latest addition to the library.

UNMS is a comprehensive management controller, featuring a graphical UI that is easy to learn and navigate. UNMS manages all of the registered U Fiber OLTs and all of their ONU clients.

### Features

- Intuitive, Graphical Web UI
- Quick Configuration and Deployment of U Fiber Devices
- Centralized Management of Multiple GPON Networks/Sites
- Visual Reports for Efficient Monitoring and Troubleshooting
- Linux-based Software Installation
- Bundled Software – No Licensing or Support Fees





## Optical Line Terminal

UFiber OLT supports up to 128 ONU CPEs per GPON port with physical links of up to 20 km in distance. It also features SFP+ connectivity for uplinking. The UFiber OLT can be mounted in a 1U rack, mounted on a wall, or placed on a desktop. Management options include the Gigabit Ethernet port (out-of-band), RJ45 serial console port (CLI), and uplink (in-band) – configured via the UFiber UI or UNMS.

### 8-Port GPON Optical Line Terminal

- (8) GPON SFP and (2) SFP+ Ports
- 1024 ONUs Total Concurrent Clients (128 Clients per Port)
- 40W Max. Power Consumption
- Hot-Swappable Power Module(s)
  - AC/DC Power Module (Included)
  - DC/DC Power Module (Optional)

### 4-Port GPON Optical Line Terminal

- (4) GPON SFP and (1) SFP+ Ports
- 512 ONUs Total Concurrent Clients (128 Clients per Port)
- 35W Max. Power Consumption
- 100-240VAC/50-60 Hz, Universal Power Input and Secondary Power Option: 24VDC

## Optical Network Unit

Ubiquiti offers a variety of GPON ONU models to suit any application. Each can be easily mounted on an indoor wall.

### UFiber Nano G

Featuring an informational LED display, the UFiber Nano G is a robust, high-performance GPON CPE housed in a sophisticated design. It is powered by 24V passive PoE.

- (1) GPON WAN Port and (1) Gigabit LAN Ethernet Port
- Digital Display LED for Status Reporting
- 7W Max. Power Consumption

### UFiber loco

The sleek UFiber loco is a robust, high-performance GPON CPE that features extremely low power consumption and the choice of 24V passive PoE or Micro-USB power.

- (1) GPON WAN Port and (1) Gigabit LAN Ethernet Port
- 3.5W Max. Power Consumption
- Powered by 24V Passive PoE or Micro-USB Power Adapter\*

### UFiber WiFi

UFiber WiFi is a robust, high-performance GPON CPE that offers routing, four LAN ports, and Wi-Fi. It is powered by 24V passive PoE or a 24V, 0.5A power adapter.

- (1) GPON WAN Port and (4) Gigabit Ethernet Ports
- 802.11n Wi-Fi
- 7W Max. Power Consumption

## GPON Performance

Detail	Downstream	Upstream
GPON Speeds	2.488 Gbps	1.244 Gbps
Wavelengths	1490 nm	1310 nm

## OLT Models



UF-OLT



UF-OLT-4

## ONU Models



UF-Nano



UF-loco



UF-WiFi

\* Included only in the single-pack



## Module Accessories

### GPON OLT SFP Modules

The UFiber OLT's GPON SFP ports are designed for use with the UF-GP-B+ and UF-GP-C+ SFP modules.

Each model, the UF-OLT or UF-OLT-4, includes one UF-GP-B+ module; additional modules can be purchased separately.

### Model Comparison



	UF-GP-B+	UF-GP-C+
Supported Media	Single-Mode Fiber	Single-Mode Fiber
Connector Type	(1) SC/UPC	(1) SC/UPC
TX Wavelength	1490 nm	1490 nm
RX Wavelength	1310 nm	1310 nm
TX Power Range	1.5 to 5 dBm	3 to 7 dBm
RX Power Range	-28 to -8 dBm	-30 to -12 dBm
Downstream Data Rate	2.5 Gbps	2.5 Gbps
Upstream Data Rate	1.25 Gbps	1.25 Gbps
Cable Distance	20 km	20 km
Pack Options	20-Pack	20-Pack

### Power Modules

The UF-OLT comes with one AC/DC power module pre-installed and features two modular power adapter bays for flexible power options:

**Backup Power** The second power bay can house a backup power module. If the UF-OLT detects failure of the primary power module, the backup module automatically activates to supply uninterrupted power.

**DC/DC Power** Both power bays can also house a DC/DC power module for use with DC power.

Available power modules are: RPS-AC-100W and RPS-DC-100W.

### Model Comparison



	RPS-AC-100W	RPS-DC-100W
Power Type	AC/DC	DC/DC
Input Voltage Range	90-264VAC	38-54VDC
Output Voltage Range	24-26VDC	23-25V
Operating Temp.	-10 to 45° C (14 to 104° F)	-10 to 50° C (14 to 122° F)
Operating Humidity	5 to 95% Noncondensing	5 to 95% Noncondensing



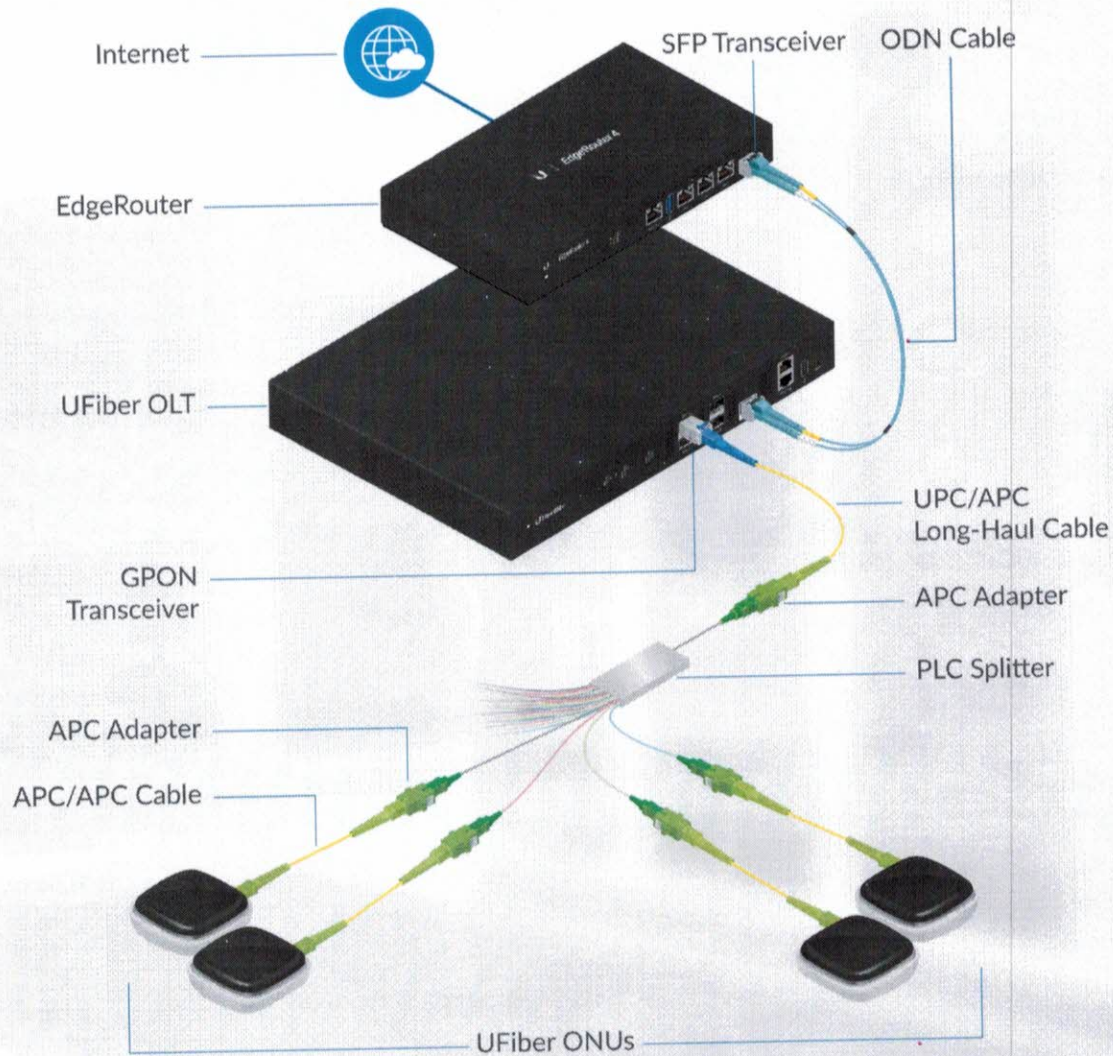
## GPON Network Accessories

To help you design and deploy your GPON networks, Ubiquiti offers the following accessories:

- SC/APC Adapters
- Patch Cables
- PLC Splitters

The diagram\* below illustrates the basic topology for a GPON network using U Fiber accessories with U Fiber OLT and ONU equipment. Each GPON port of the OLT supports up to 128 ONUs.

\* Cable lengths are not shown to scale for maximum clarity.



U Fiber GPON Network Topology Example



## Adapter

Ubiquiti also offers an adapter, model UF-ADAPTER-APC, to connect cables with SC/APC-type connectors. Available in 50-packs



UF-ADAPTER-APC

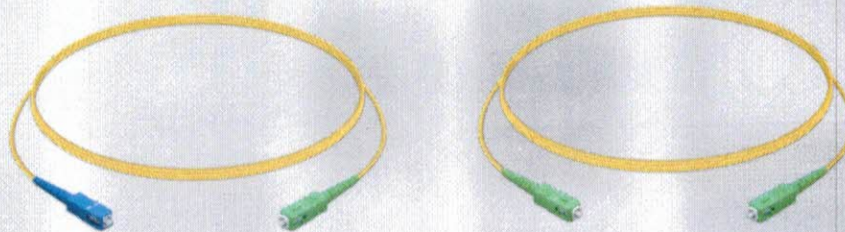
## Patch Cables

Ubiquiti offers two patch cables to help you build out your GPON networks:

- UF-SM-PATCH-UPC-APC
- UF-SM-PATCH-APC-APC

Each patch cable is available as a single-pack.

## Model Comparison



	UF-SM-PATCH-UPC-APC	UF-SM-PATCH-APC-APC
Connectors	(1) SC/UPC, (1) SC/APC	(2) SC/APC
Insertion Loss	$\leq 0.3$ dB	$\leq 0.3$ dB
Return Loss	UPC: $\geq 50$ dB APC: $\geq 60$ dB	$\geq 60$ dB
Cable Type	SM9/125 SX 2.0 mm, PVC Jacket, Yellow	SM9/125 SX 2.0 mm, PVC Jacket, Yellow
Connectors	(1) SC/UPC 2.0 mm SM SX Connector, Blue (1) SC/APC 2.0 mm SM SX Connector, Green	(2) SC/APC 2.0 mm SM SX Connector, Green
Total Length	1.5 m (59.1")	1.5 m (59.1")

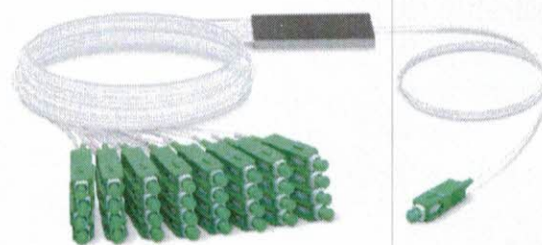


## PLC Splitters

Ubiquiti offers four PLC splitters that provide from 4 to 32 outputs.

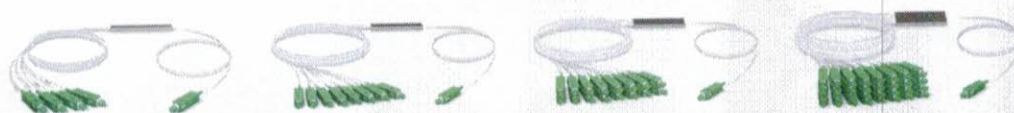
- UF-SPLITTER-4
- UF-SPLITTER-8
- UF-SPLITTER-16
- UF-SPLITTER-32

Each model is available as a single-pack.



UF-SPLITTER-32

## Model Comparison



	UF-SPLITTER-4	UF-SPLITTER-8	UF-SPLITTER-16	UF-SPLITTER-32
Input	(1) SC/APC	(1) SC/APC	(1) SC/APC	(1) SC/APC
Outputs	(4) SC/APC	(8) SC/APC	(16) SC/APC	(32) SC/APC
Insertion Loss with Connectors	7.4 dB	10.5 dB	13.7 dB	17.0 dB
Uniformity Loss	0.6 dB	0.8 dB	1.2 dB	1.5 dB
Polarization Dependent Loss	0.3 dB	0.3 dB	0.3 dB	0.3 dB
Wavelength Bandwidth	1260-1650 nm	1260-1650 nm	1260-1650 nm	1260-1650 nm
Return Loss (All Ports)	50 dB	50 dB	50 dB	50 dB
Directivity	55 dB	55 dB	55 dB	55 dB
Fiber Type	G657A1	G657A1	G657A1	G657A1
Operating Temperature	-40 to 85° C (-40 to 185° F)	-40 to 85° C (-40 to 185° F)	-40 to 85° C (-40 to 185° F)	-40 to 85° C (-40 to 185° F)
Total Length	4.06 m (13.32')	4.06 m (13.32')	4.06 m (13.32')	4.08 m (13.39')
Weight	58 g (2.0 oz)	62 g (2.2 oz)	110 g (3.9 oz)	160 g (5.6 oz)



8-Port GPON Optical Line Terminal (Model: UF-OLT)	
Dimensions	442.4 x 285.6 x 43.7 mm (17.42 x 11.24 x 1.72")
Weight (with Mount Brackets)	4.40 kg (9.70 lb) 4.495 kg (9.91 lb)
Networking Interfaces	(8) GPON OLT SFP (2) 1G/10G SFP+
Concurrent Clients	1024 Registered ONUs/ONTs (128 per GPON Port)
Management Interfaces	(1) Ethernet for Out-of-Band Management (1) RJ45 Serial Console Port (2) Uplink for In-Band Management
GPON Speeds	2.488 Gbps Downstream 1.244 Gbps Upstream
Operating Wavelengths	1490 nm TX 1310 nm RX
Normal Optical Power Range	TX (Class B+): 1.5 to 5 dBm RX: -28 to -8 dBm
Max. Fiber Distance	20 km*
Power Method	100-240VAC, 100W AC/DC Power Module (Included) 38-54VDC, 100W DC/DC Power Module (Optional)
Power Supply	(1) 25V, 100W AC/DC PSU Module (Included)
Max. Power Consumption	40W (Excluding SFP Modules)
Operating Mode	OLT GPON Core and Layer 2 Ethernet Switch
Advanced QoS	Supports 8 Priority Queues per User Port and Traffic Classification
Processor Specs	MIPS 1004kc, 880 MHz Dual Core
Memory Information	512 MB DDR3, 512 MB NAND
Operating Temperature	-10 to 45° C (14 to 113° F)
Operating Humidity	10 to 90% Noncondensing
Certifications	CE, FCC, IC

\* Distance varies according to your optical network design.  
For details, visit: [ubnt.link/Designing-a-GPON-Network](http://ubnt.link/Designing-a-GPON-Network)





4-Port GPON Optical Line Terminal (Model: UF-OLT-4)	
Dimensions	299.80 x 258.95 x 42.55 mm (11.80 x 10.19 x 1.68")
Weight (with Mount Brackets)	1.93 kg (4.25 lb) 2.13 kg (4.70 lb)
Networking Interfaces	(4) GPON OLT SFP (1) 1G/10G SFP+
Concurrent Clients	512 Registered ONUs/ONTs (128 per GPON Port)
Management Interfaces	(1) Ethernet for Out-of-Band Management (1) RJ45 Serial Console Port (1) Uplink for In-Band Management
GPON Speeds	2.488 Gbps Downstream 1.244 Gbps Upstream
Operating Wavelengths	1490 nm TX 1310 nm RX
Normal Optical Power Range	TX (Class B+): 1.5 to 5 dBm RX: -28 to -8 dBm
Max. Fiber Distance	20 km*
Power Method	100-240VAC/50-60 Hz, Universal Input 24VDC
Power Supply	AC/DC Internal 56W DC
Max. Power Consumption	35W (Excluding SFP Modules)
Operating Mode	OLT GPON Core and Layer 2 Ethernet Switch
Advanced QoS	Supports 8 Priority Queues per User Port and Traffic Classification
Processor Specs	MIPS 1004kc, 880 MHz Dual Core
Memory Information	512 MB DDR3, 512 MB NAND
Operating Temperature	-10 to 45° C (14 to 113° F)
Operating Humidity	10 to 90% Noncondensing
Certifications	CE, FCC, IC

\* Distance varies according to your optical network design.  
For details, visit: [ubnt.link/Designing-a-GPON-Network](http://ubnt.link/Designing-a-GPON-Network)





UFiber Nano G (Model: UF-Nano)	
Dimensions	77 x 77 x 28 mm (3.03 x 3.03 x 1.1")
Weight	110 g (3.88 oz)
Networking Interfaces	(1) SC/APC, GPON WAN (1) Gigabit RJ45, Ethernet LAN
Networking Interface Speeds	
(1) GPON WAN, ITU G.984	2.488 Gbps Downstream 1.244 Gbps Upstream
(1) GbE LAN	10/100/1000 Mbps
Management Interface	In-Band Ethernet/PON
Normal Optical Power Range	TX (Class B+): 1.5 to 5 dBm RX: -28 to -8 dBm
Power Method	Passive PoE (Pins +4, 5; -7, 8) Dying Gasp Support
Power Supply	PoE Adapter: 24V, 0.3A (Included)
Max. Power Consumption	7W
Supported Voltage Range	20V to 28V
Processor Specs	MIPS32, 240 MHz
Memory Information	128 MB DDR3
Buttons	(1) Display Information (1) Reset
Operating Temperature	-10 to 45° C (14 to 113° F)
Operating Humidity	5 to 95% Noncondensing
Certifications	CE, FCC, IC





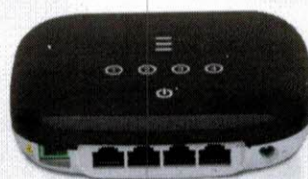
UFiber loco (Model: UF-LOCO)	
Dimensions	76.5 x 76.5 x 26.4 mm (3.01 x 3.01 x 1.04")
Weight	77 g (2.72 oz)
Networking Interfaces	(1) SC/APC, GPON WAN (1) Gigabit RJ45, Ethernet LAN
Networking Interface Speeds	2.488 Gbps Downstream
GPON WAN, ITU G.984	1.244 Gbps Upstream
GbE LAN	10/100/1000 Mbps
Management Interface	In-Band Ethernet/PON
Normal Optical Power Range	TX (Class B+): 1.5 to 5 dBm RX: -28 to -8 dBm
Power Method	Micro-USB: 5V, 1A 24V Passive PoE (Pins +4, 5; -7, 8)
Power Supply	Micro-USB Power Adapter*: 5V, 1A
Max. Power Consumption	3.5W
Supported Voltage Range	4.7 to 5.3V
Processor Specs	MIPS32, 240 MHz
Memory Information	128 MB DDR3
Buttons	(1) Reset
Operating Temperature	-10 to 45° C (14 to 113° F)
Operating Humidity	10 to 90% Noncondensing
Certifications	CE, FCC, IC

\* Included only in the single-pack of the UF-LOCO





UFiber WiFi (Model: UF-WIFI)	
Dimensions	126.34 x 126.09 x 31.65 mm (4.97 x 4.96 x 1.25")
Weight	190 g (6.70 oz)
Networking Interfaces	(1) SC/APC, GPON WAN (4) Gigabit RJ45, Ethernet LAN (1) Wi-Fi, 802.11n
Networking Interface Speeds	
GPON WAN, ITU G.984	2.488 Gbps Downstream 1.244 Gbps Upstream
GbE LAN	10/100/1000 Mbps
Wi-Fi	300 Mbps
Management Interface	In-Band Ethernet/PON
Normal Optical Power Range	TX (Class B+): 1.5 to 5 dBm RX: -28 to -8 dBm
Power Method	DC Jack, 24VDC 24V Passive PoE (Pins 4, 5+; 7, 8-)
Power Supply	100-240VAC / 50-60 Hz Universal AC/DC Power Adapter: 24V / 0.5A
Max. Power Consumption	7W
Supported Voltage Range	20 to 28V
Processor Specs	MIPS, 900 MHz
Memory Information	256 MB DDR
Buttons	(1) Reset
Operating Temperature	-10 to 45° C (14 to 113° F)
Operating Humidity	10 to 90% Noncondensing
Certifications	CE, FCC, IC





Bolts - Varying overall lengths depending on pole diameter

- Material: Hot Dip Galvanized
- Thread Length: 6"
- Tensile Strength: 13,550 lbs

Drop cable clamps

- Flat Fiber Optic Drop Wire Clamp
- Part Number: SI-0972SBL
- Used to strain relieve fiber drop wire
- Removable
- Stainless steel construction
- Black finish to easily distinguish from copper drop clamps
- Unique shim design firmly secures rigid fiber jacketsAccommodates fiber drop cross section of ~.310" W x .200" H, including Corning SST, Corning ROC, Superior Essex Series 6, Superior Essex Series W7 and TE fiber drop cable.

J Hook 7/16" x 4 3/4" J3316P.

- J hooks are used for supporting bail-type drop wire and deadend clamps from poles and crossarms. The J3316P drive hooks have rolled fether drive threads and a pilot point for easy starting.
- Material: Galvanized
- Size: 7/16" x 4 3/4"

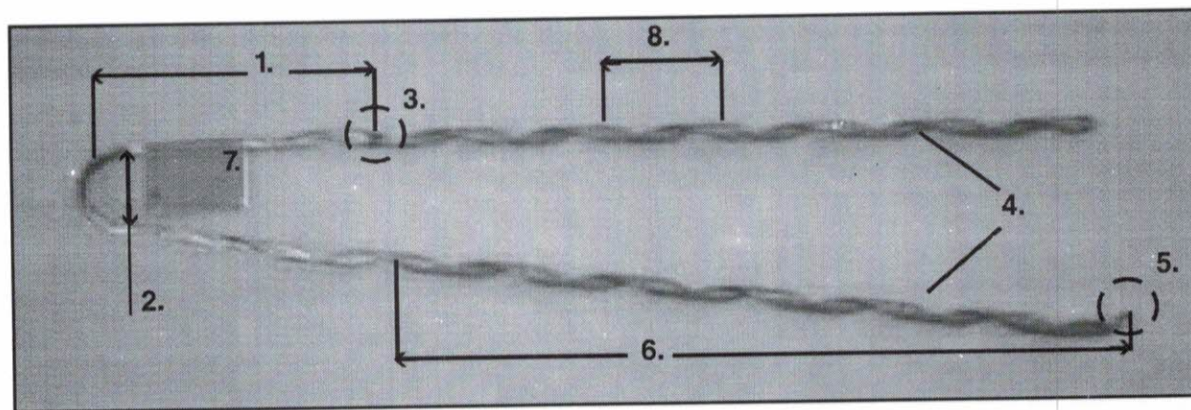




## FIBERLIGN® Lite Tension Dead-end

For use on All Dielectric Self-Supporting (ADSS) Fiber Optic Cable

Be sure to read and completely understand this procedure before applying product. Be sure to select the proper PREFORMED product before application.



FIBERLIGN® Lite Tension Dead-end Nomenclature

### NOMENCLATURE

- |                                    |  |
|------------------------------------|--|
| 1. Loop Length—minimum 8" (203 mm) | 6. Latex Coating<br>(length of coverage shown) |
| 2. Loop Diameter                   | 7. ID Tag                                      |
| 3. Color Code and Crossover Mark   | 8. Pitch Length                                |
| 4. Dead-end Legs                   |  |
| 5. Flared Rod Ends                 |  |

### DESCRIPTION

The FIBERLIGN® Lite Tension Dead-end (FLTDE) is designed to terminate short span, low tension ADSS fiber optic cables in low voltage environments. Consult PLP for suitability of the FLTDE unit for each application to determine whether it meets system load requirements. NOTE: If loads are too high, PLP will make an alternative hardware recommendation.

The FLTDE has a pliable latex coating and flared rod end treatment that helps prevent possible damage to the cable jacket during and after installation.

The loop diameter of the FLTDE will fit over a minimum diameter of 1-1/2" (38.1mm) and a maximum diameter of 2-1/4" (57.2 mm). The FLTDE is designed to accept common guy wire dead-end pole fittings like thimble eyes and guy hooks. The extended loop length reduces the need for an extension link, however, PLP can provide other FIBERLIGN® fittings including extension links (with thimble clevis) if desired.

### INSTALLATION ISSUES

FIBERLIGN® Dielectric Dead-ends are designed and manufactured for optimum performance. Removing wires, shortening the length, or deforming the product will affect product performance. WARNING: Do not alter the product in any way.

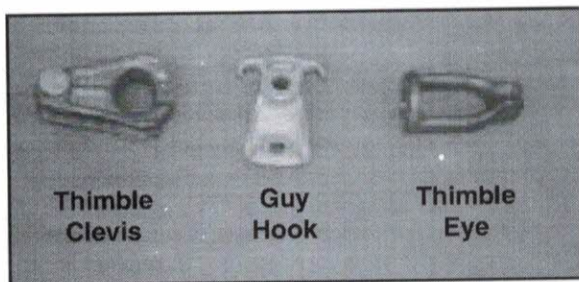
**STRINGING-IN Tension:** For initial stringing tension that can represent the long-term load condition, the FLTDE is rated for 585 (2.6 kN) pounds. Higher loads approaching 600 pounds (2.7 kN) may be achieved depending on the brand and construction of cable. Contact PLP® for further information.



**LOADED TENSION:** For NESC heavy loaded tension that represent the short term load in a cold temperature environment, the FLTDE is rated for 800 pounds (3.5 kN). Performance may vary depending on brand and construction. Contact PLP® for further information.

**CAUTION:** For warm temperature climates designated as NESC light or medium districts, cable manufacturers may expand the cable rating to higher stringing-in loads that approach the loaded tension levels in heavy districts. At high temperatures the cable jacket can soften and consequently prohibit higher holding strength for the FLTDE. Do not exceed the load levels referenced above without contacting PLP for more information.

To attach the dead-end to the structure, an appropriate fitting with proper groove dimensions must support the loop of the dead-end. The photo below shows acceptable fittings that may be used as long as the groove seat diameter falls in the range 1-1/2" through 2-1/4" (38.1 mm to 57.2 mm). Preformed Line Products offers the TC-5A Thimble Clevis, and the TE-5 Thimble Eye – both having proper groove seat dimensions.



Appropriate Fittings

**Re-application:** The FLTDE may be used only once as a pulling-in grip, removed then reapplied only once more for permanent installation, for a total of two applications. **DO NOT** reuse after initial, permanent installation is completed.

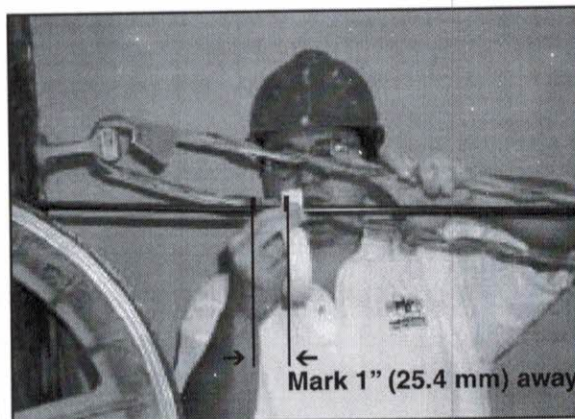
**CAUTION:** Most fiber failures occur during dead-ending. It is imperative to understand the above installation issues and the following application procedure before proceeding.

## APPLICATION

**Step #1** The FIBERLIGN® Lite Tension Dead-end (FLTDE) begins contact with the fiber optic cable at the dead-end crossover mark. Mount or connect the appropriate attachment fitting (thimble clevis, guy hook, etc.) to the structure and insert the dead-end loop into the groove of the fitting. Position the assembly parallel to the cable to place a reference mark on the cable.

With the cable near its final position (considering sag and tension if required), place a reference mark on the cable approximately one inch beyond the FLTDE crossover mark (away from the structure). Use a thin layer of tape or soft tip marker to mark the cable.

Carefully tension the cable enough to bring the reference mark on the cable in line with the color mark (crossover mark) of the FLTDE.



Place Mark on Cable to Locate Dead-end Application.

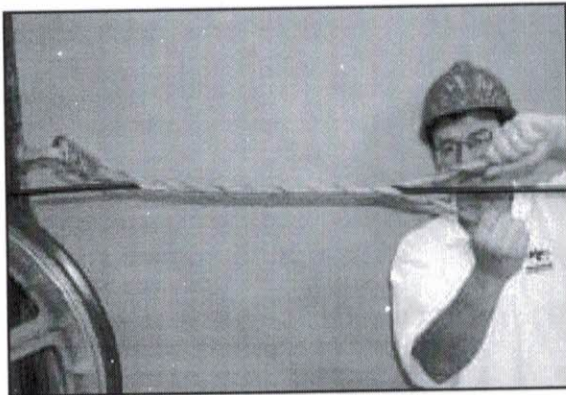


**Step #2** Begin application by wrapping the dead-end legs over the cable starting at the crossover marks as shown in the photo. It may be possible to wrap one leg at a time although even pressure on the cable is maintained by wrapping both legs simultaneously.



Begin wrapping at dead-end color mark.

**Step #3** Continue the installation by wrapping the leg(s) around the cable as shown in the photo. Whether you wrap one leg at a time or both simultaneously, make sure the gap between both legs is evenly spaced.



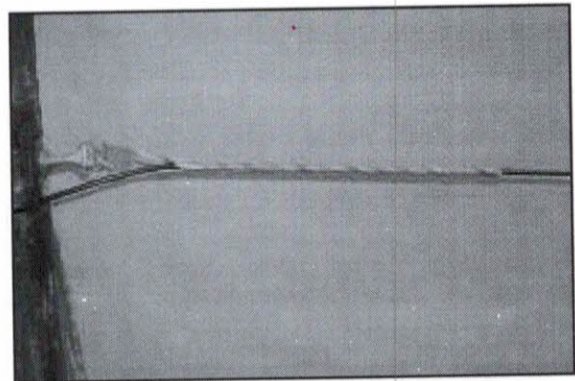
Continue to wrap both dead-end legs.

**Step #4** To ease final installation, the last two leg pitches of the dead-end can be split as shown in photo below



Split legs of last few pitch lengths.

Splitting the legs reduces the effort to overcome the stiffness of a full leg as it is wrapped over the cable. Wrap the legs completely onto the cable making sure that no rods are crossed and that all rod ends are snapped into place (See photo below).



Completed Installation and alternate tension removed.



## **SAFETY CONSIDERATIONS**

This application procedure is not intended to supersede any company construction or safety standards. This procedure is offered only to illustrate safe application for the individual. **FAILURE TO FOLLOW THESE PROCEDURES MAY RESULT IN PERSONAL INJURY OR DEATH.**

This product may be removed and reinstalled during the initial installation if it is in good condition. After extended service life, it is recommended the product not be reused once removed from service.

**Do not modify this product under any circumstances.**

This product is intended for use by trained technicians only. **This product should not be used by anyone who is not familiar with, and not trained to use it.**

When working in the area of energized lines, extra care should be taken to prevent accidental electrical contact.

For proper performance and personal safety, be sure to select the proper size PREFORMED product before application.

PREFORMED products are precision devices. To insure proper performance, they should be stored in cartons under cover and handled carefully.



# **PREFORMED** LINE PRODUCTS

P.O. Box 91129, Cleveland, Ohio 44101 • 440.461.5200 • [www.preformed.com](http://www.preformed.com) • e-mail: [inquiries@preformed.com](mailto:inquiries@preformed.com)  
SP2903-1





## FIBERLIGN® Lite Support

For use on all Dielectric Self-Supporting (ADSS) Fiber Optic Cable.

Be sure to read and completely understand this procedure before applying product. Be sure to select the proper PREFORMED™ product before application.

### 1.00 NOMENCLATURE (Figure 1)

1. Housing Halves (2)
- 2a. Small Cushion Insert (1)
- 2b. Large Cushion Insert (2)
3. Hardware Kit for Banding Applications (optional). Includes: 5/8"-11 x 4" long carriage bolt, 5/8" round washer, lock washer and 5/8"-11 nut.

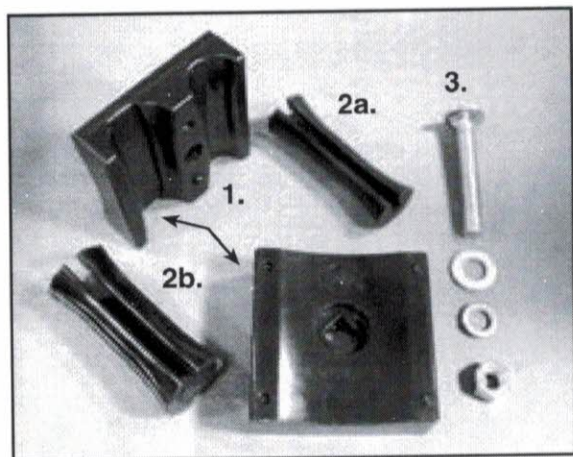


FIGURE 1: KIT CONTENTS & NOMENCLATURE

### 2.00 DESCRIPTION

- 2.01** The FIBERLIGN Lite Support (FLS) system is designed for low voltage environment, short span (300' [91.4 m]), low tension ADSS fiber optic applications. Consult PLP for suitability of the FLS unit for each application to determine whether it meets structural loading requirements. NOTE: If loads are too high, PLP has alternative hardware recommendations.

- 2.02** PLP developed special inserts to accommodate ADSS drop cables in round, flat and figure 8 styles. See the tables in Section 8 of this procedure for cable diameter ranges.

- 2.03** The FLS housing is made from high strength composite material that is extremely resistant to abrasion. It can be used as a replacement for a stringing traveler during stringing and sagging operations.

### 3.00 INSTALLATION ISSUES

- 3.01** The Cushion Insert of an FLS is molded for a specific cable OD range and should be used only on cables within that range. The numeric range is molded in the end of each insert for reference.
- 3.02** Unbalanced Loading: The FLS cushion inserts provide gentle gripping and low longitudinal holding strength depending upon the specific cable. CONSULT PLP FOR SPECIFICS. PLP can provide other products for increased capability including the FIBERLIGN Dielectric Support, FIBERLIGN MIDspan Support/Suspension, and FIBERLIGN Dielectric Suspension.
- 3.03** Through-bolt: For mounting the FLS, select a 5/8"-11 (M16) through-bolt of sufficient length and insert into the pole at a right angle to the line for tangent lines, or bisect the angle on angled structures. The FLS has a hole (see Figure 1) through the center of the housing. The assembly is captured with appropriate washers and nut against the pole.

Banding: A banding groove (see Figure 1) is molded in the large cavity of the FLS housing to mount one half of the FLS against the structure. The other housing half is retained with a 4" (100 mm) carriage bolt, round washer, lock washer and nut. Position the housing as described for the through-bolt, i.e., perpendicular to the tangent lines or bisect the angle on an angled structure.



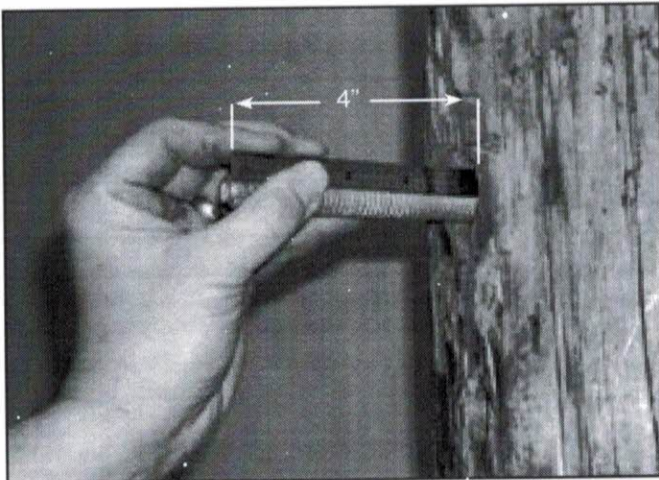
**3.04** Stringing Cable: The large molded cavity of the FLS can be used for stringing-in cable. This cavity (without the cushion insert) provides enough clearance for a pulling-in rope and swivel assembly typically used in field installations. The smooth surfaces of the FLS cause little friction, thus enabling use as a stringing device.

**3.05** Maximum Line Angle: When used as a stringing device, the maximum recommended sag or line angle of the FLS is approximately 10 degrees for most ADSS cables. When used as a permanent installation, the maximum recommended sag or line angle is approximately 20 degrees for most cables. These recommended sag and angle limits can be effected by cable size, brand, stringing tension and loading conditions. CONSULT PLP FOR EXCEPTIONS WHEN GREATER ANGLES ARE REQUIRED.

**3.06** For Safety Considerations please refer to the end of this application procedure.

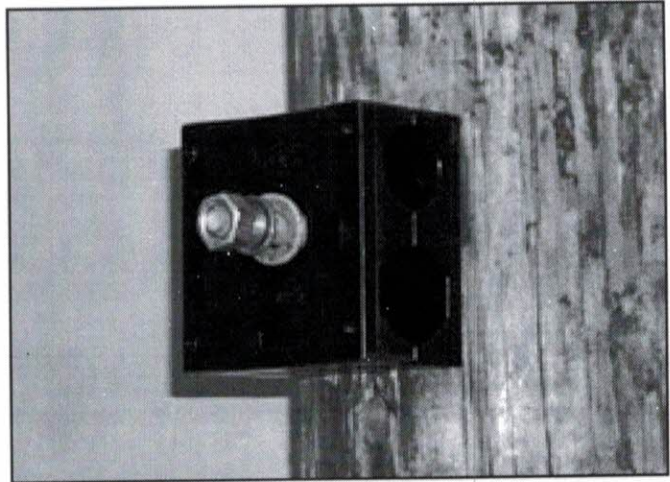
#### **4.00 APPLICATION: BOLTED INSTALLATION**

**4.01** Install a standard 5/8" (M16) through-bolt on the pole or structure. The bolt should be long enough to provide a minimum of 4" (100 mm) of exposed thread. (Figure 2)



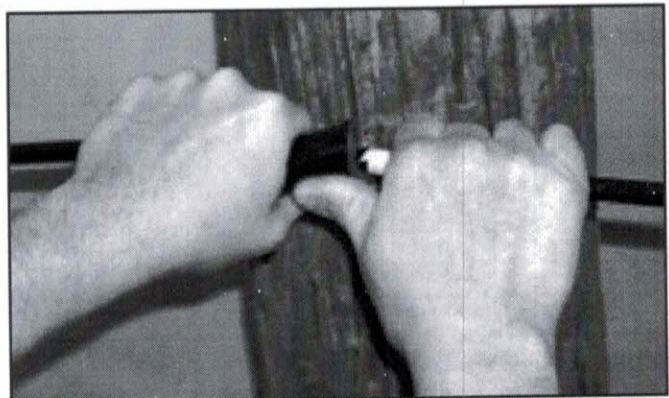
**FIGURE 2 - MINIMUM THROUGH-BOLT CLEARANCE**

**4.02** The FLS housing halves are identical each containing a molded slip-through mounting hole. Slip both housing halves onto the 5/8" (M16) through-bolt. Loosely capture the housing halves with a 5/8" (M16) flat washer, 5/8" (M16) lock washer and 5/8" (M16) nut. (Figure 3)



**FIGURE 3 - LEAVE HOUSING HALVES LOOSE**

**4.03** For permanent installations, align the cushion insert with the FLS housing and ADSS cable to determine the approximate insert location on the cable. The width of the open slot that runs the full length of the insert is slightly smaller than the cable diameter. Place the slot of the insert against the cable and carefully squeeze the insert into position with one hand while supporting the cable with your other hand. (Figure 4)

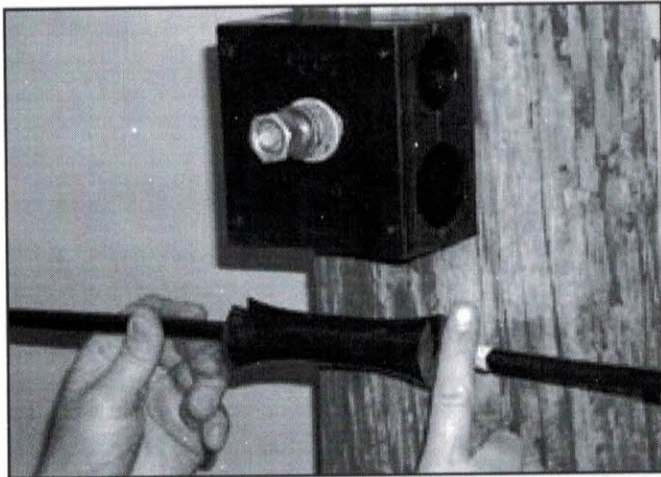


**FIGURE 4 - ONE HAND SQUEEZES CABLE INTO INSERT AND THE OTHER HAND SUPPORTS THE CABLE AND PRESSES INSERT WITH THUMB**



Orient the slot of the insert upward. (Figure 5)  
Once in place, the insert will hold its position on the cable.

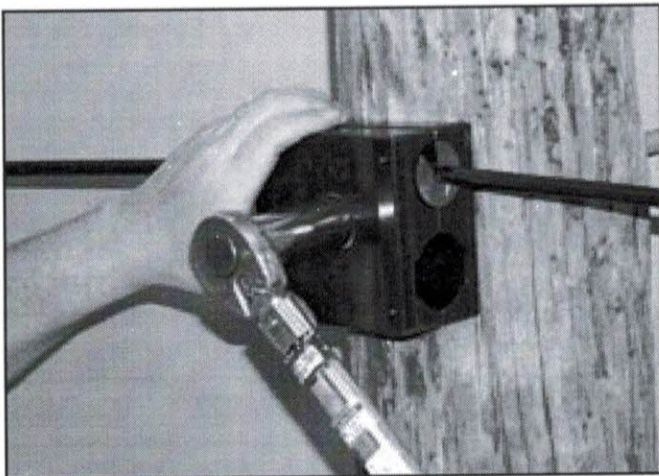
**CAUTION:** Orienting the slot of the cushion insert upward is designed to provide the proper support for the cable.



**FIGURE 5 - ORIENT AND INSERT WITH SLOT UPWARD**

- 4.04** Lift the cushion insert with the cable into the proper cavity of the FLS housing. The small cavity accepts cable diameters up to .699" (17.8 mm) and the large cavity accepts cable diameters up to 1.029" (26.1 mm). Slide the housing halves against the structure to keep the insert and cable in position, and then tighten the nut snug against the housing.

- 4.05** Torque the nut to 30 ft-lbs (41Nm) maximum against the housing to complete the installation. (Figure 6)

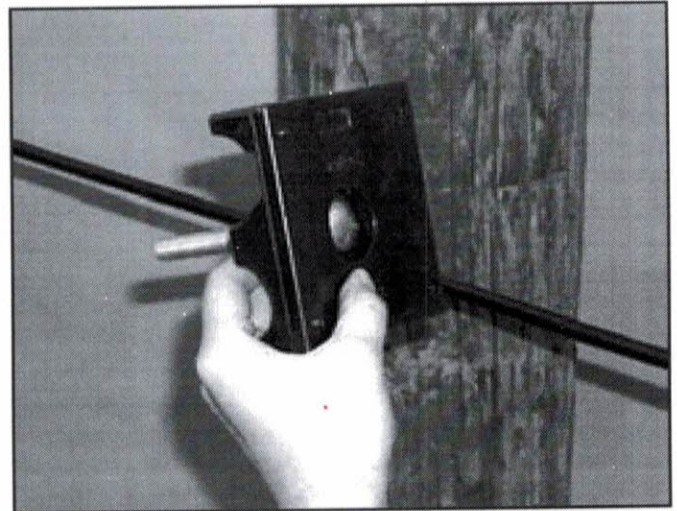


**FIGURE 6 - TORQUE TO 30 FT-LB**

## **5.00 APPLICATION: BANDED**

- 5.01** Each housing half has a molded groove (see Figure 1) in the large cavity that will accept a 3/4" (19 mm) metal band. Install the designated band loosely on the pole or structure and apply tape to hold position if necessary.

- 5.02** Install the carriage bolt into the housing half that will be banded against the structure. The housing hole is molded to accept a standard carriage bolt and prevent it from turning. You may tape over the carriage bolt-hole to keep it in place during assembly. (Figure 7)

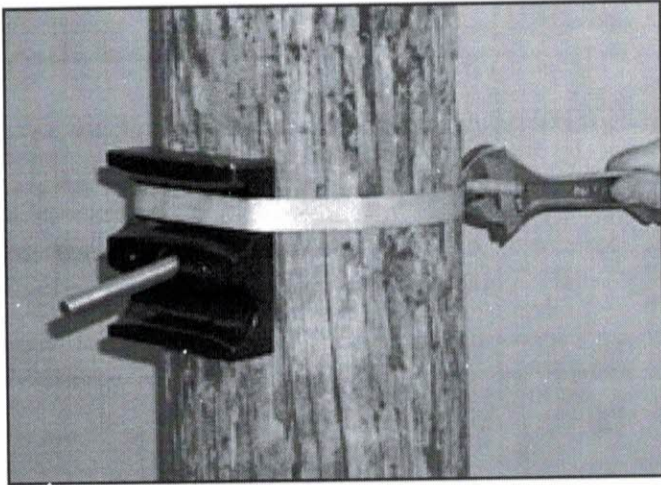


**FIGURE 7 - INSTALL CARRIAGE BOLT**



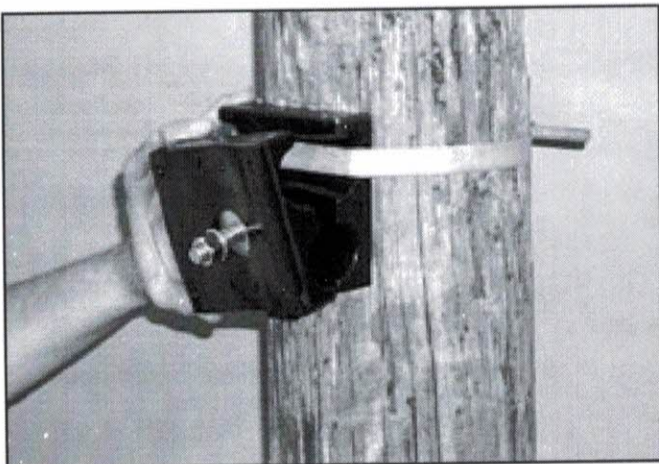
- 5.03** Capture the housing half against the structure with the band and tighten the band to the manufacturers' recommended torque level. Be sure that the band rests completely inside the molded groove. (Figure 8)

**PLP TIP:** You may temporarily tape the band against the housing half during this step, but be sure to remove the tape once the half is tight against the structure.



**FIGURE 8 - BAND HOUSING HALF TO POLE**

- 5.04** Slip the second housing half onto the protruding carriage bolt and install the flat washer, lock washer and nut. Leave the nut loose near the end of the bolt for installation of the insert. (Figure 9)



**FIGURE 9 - INSTALL NUT AND LEAVE HOUSINGS LOOSE**

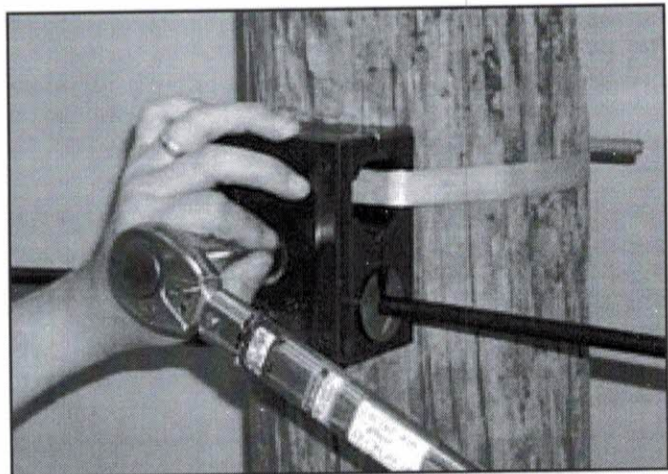
- 5.05** For permanent installations, align the cushion insert with the FLS housing and ADSS cable to determine the approximate insert location on the cable. The width of the open slot that runs the full length of the insert is slightly smaller than the cable diameter. Place the slot of the insert against the cable and carefully squeeze the insert into position with one hand while supporting the cable with your other hand. (Figure 4)

Orient the slot of the insert upward. (Figure 5)  
Once in place, the insert will stay on the cable.

**CAUTION:** Orienting the slot of the cushion insert upward is designed to provide the proper support for the cable.

- 5.06** Lift the cushion insert with the cable into the proper cavity of the FLS housing. The small cavity accepts cable diameters up to .699" (17.8 mm) and the large cavity accepts cable diameters .700" (17.9 mm) and above. Slide the second housing half against the banded housing half to keep the insert and cable in position and then tighten the nut snug against the housing.

- 5.07** Torque the nut to 30 ft-lbs (41 Nm) maximum against the housing to complete the installation. (Figure 10)

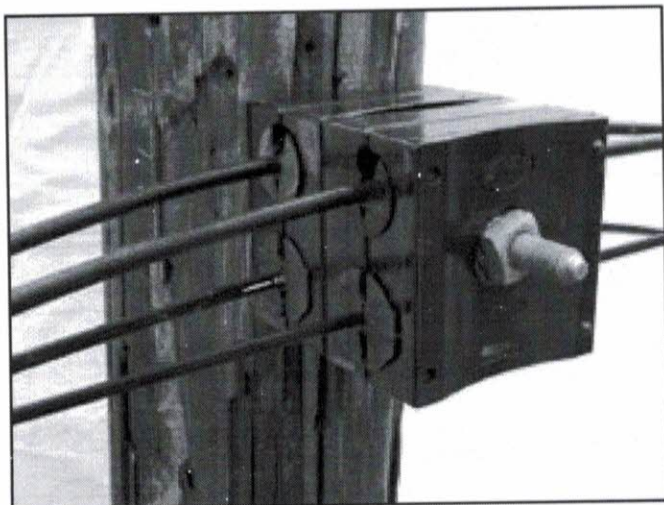


**FIGURE 10 - TORQUE TO 30 FT-LBS (41Nm)**



## 6.00 STACKING THE FLS

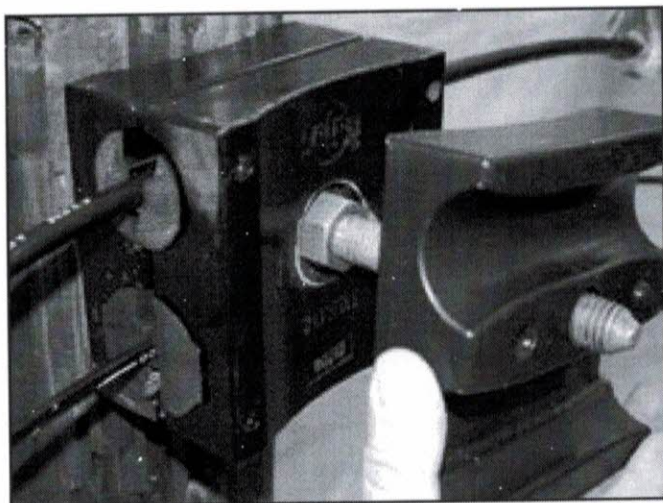
- 6.01** The construction of the FLS allows for another support to be "stacked" against the to hold additional cables. (Figure 11)



**FIGURE 11 - STACKED FLS**

- 6.02** For a stacked bolted configuration, a standard 5/8" (M16) through-bolt is also required. This bolt must provide 7" (178 mm) of exposed length (i.e. length beyond the pole diameter) to accommodate both FLS housings. To install the first FLS, follow the "Bolted" application in Section 4.0 using the longer through-bolt. Once the first FLS is installed and tightened to the pole, the second FLS can be "stacked" against the first and installed in the same manner.

**NOTE:** On the exterior face of each housing there are four alignment points near the corners of the housing - two are small bumps (nodules) and two are small holes (divots). After securing the first FLS to the pole, the second FLS is aligned by engaging the corner alignment points. (Figure 12)



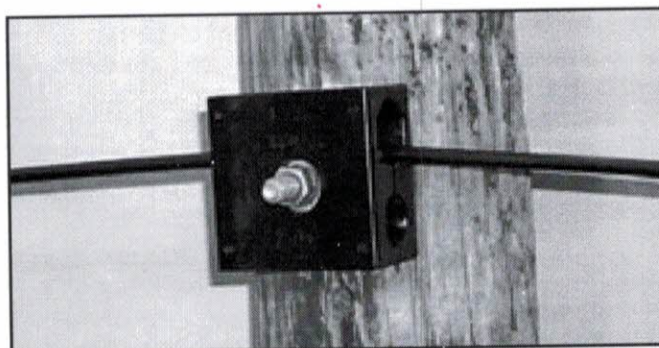
**FIGURE 12 - SECOND FLS INSTALLATION AGAINST THE FIRST**

- 6.03** For a stacked banded configuration, a longer carriage bolt 5/8"-11 x 7" (16 m x 178 mm) is required to attach the second FLS to the first. To install the first FLS, follow the "Banded" application in Section 5.0 using the longer carriage bolt. Once the first FLS is installed and tightened to the pole, the second FLS can be "stacked" against the first and installed according to the "Bolted" application in Section 4.0. See section 6.02 regarding four alignment points.

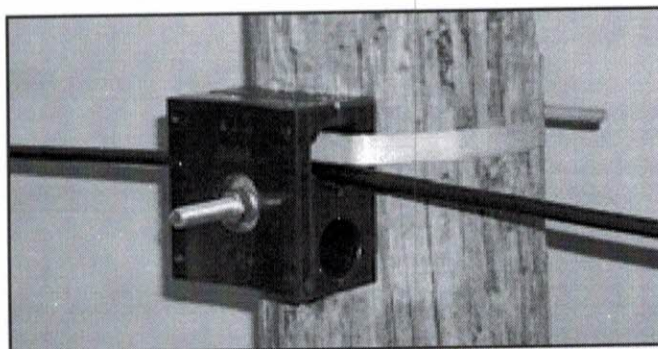
## 7.00 FLS USED AS A STRINGING DEVICE

**NOTE:** The maximum line or sag angle for stringing with the FLS is approximately 10 degrees for most ADSS cables.

- 7.01** After installing the housing halves onto the through-bolt or carriage bolt (for banded applications) lay or feed the cable or stringing rope into the empty housing cavity without the inserts. The housings must be tightened against the structure to keep the cable within the smooth surfaces of the insert cavity (20 ft-lbs is adequate for this step). The largest cable, rope, or pulling-in grip that will move freely through the cavity is approximately 1-1/4" diameter. (Figures 13a & 13b)



**FIGURE 13a - STRINGING THROUGH LARGE CAVITY**



**FIGURE 13b - STRINGING THROUGH LARGE CAVITY WITH BANDED FLS**



- 7.02** Once the cable stringing operation is completed, loosen the 5/8" - 11 (M16) nut to free the cable from the cavity and proceed with cushion insert "permanent installation" as described in Section 4.0 for bolted applications or 5.0 for banded applications

## **8.00 FLS CATALOG NUMBERS & CABLE RANGES**

- 8.01** FLS's have been designed for various types of ADSS and Fiber Optic Drop Cables. As referenced above, the FLS will support 300' (984 m) span lengths for ADSS Short Span cables. FLS catalog numbers for ADSS Short Span cables are shown in Table 1.

**TABLE 1 - FIBERLIGN LITE SUPPORTS FOR ADSS SHORT SPAN CABLE**

Catalog Number	Insert	Size		Cable Diameter Range	
		Min (in)	Max (in)	Min (mm)	Max (mm)
4800110	S M A L L	.400	.429	10.2	10.8
4800111		.430	.459	10.9	11.6
4800112		.460	.489	11.7	12.4
4800113		.490	.519	12.5	13.1
4800114		.520	.549	13.2	13.9
4800115		.550	.579	14.0	14.7
4800116		.580	.609	14.8	15.4
4800117		.610	.639	15.5	16.2
4800118		.640	.669	16.3	16.9
4800119		.670	.699	17.0	17.8
4800120	L A R G E	.700	.723	17.9	18.3
4800122		.724	.779	18.4	19.7
4800124		.780	.834	19.8	21.1
4800126		.835	.889	21.2	22.5
4800128		.890	.944	22.6	23.9
4800130		.945	.999	24.0	25.4
4800132		1.00	1.054	25.5	26.8



**8.02** Aerial Fiber Optic Drop Cables are typically strung directly from the pole to the premise. There are areas however that require pole-to-pole distribution of drop cables. Span lengths are typically 150' maximum (45.7 m) in these areas. Aerial Fiber Optic Drop cables are available in various cross sections including round, flat, and figure 8 styles. Round and flat drops are typically made from all dielectric materials, and the figure 8 drop typically has a metallic strength member. Catalog numbers are listed in tables 2 - 4 according to cable cross section and diameter range.

TABLE 2 - FIBERLIGN LITE SUPPORTS FOR ROUND DROP CABLE					
Catalog Number	Insert Size	Cable Diameter Range			
		Min (in)	Max (in)	Min (mm)	Max (mm)
4800107	SMALL	.250	.280	6.35	7.12
4800108		.281	.304	7.13	7.73
4800109		.305	.375	7.74	9.53
480011817	LARGE	.250	.280	6.35	7.12
480011818		.281	.304	7.13	7.73
480011819		.305	.375	7.74	9.53
480011820	DUAL (Small & Large)	.250	.280	6.35	7.12
480011821		.281	.304	7.13	7.73
480011822		.305	.375	7.74	9.53

TABLE 3 - FIBERLIGN LITE SUPPORTS FOR FLAT DROP CABLE					
Catalog Number	Insert Size	Cable Diameter Range			
		Min L x W (in)	Max L x W (in)	Min L x W (mm)	Max L x W (mm)
4800107	SMALL	.14 x .28	.18 x .44	3.5 x 7.1	4.6 x 11.2

TABLE 4 - FIBERLIGN LITE SUPPORTS FOR FIGURE 8 DROP CABLE					
Catalog Number	Insert Size	Cable Diameter Range			
		Min L x W (in)	Max L x W (in)	Min L x W (mm)	Max L x W (mm)
4800107	SMALL	.3 x .16	.44 x .18	7.6 x 4.1	11.2 x 4.6
480011817	LARGE	.3 x .16	.44 x .18	7.6 x 4.1	11.2 x 4.6
480011820	DUAL (Small & Large)	.3 x .16	.44 x .18	7.6 x 4.1	11.2 x 4.6



### **SAFETY CONSIDERATIONS**

This application procedure is not intended to supersede any company construction or safety standards. This procedure is offered only to illustrate safe application for the individual.  
**FAILURE TO FOLLOW THESE PROCEDURES MAY RESULT IN PERSONAL INJURY OR DEATH.**

**Do not modify this product under any circumstances.**

This product is intended for use by trained technicians only. **This product should not be used by anyone who is not familiar with, and not trained to use it.**

When working in the area of energized lines, extra care should be taken to prevent accidental electrical contact.

For proper performance and personal safety, be sure to select the proper size PREFORMED™ product before application.

PREFORMED products are precision devices. To insure proper performance, they should be stored in cartons under cover and handled carefully.



# **PREFORMED** LINE PRODUCTS

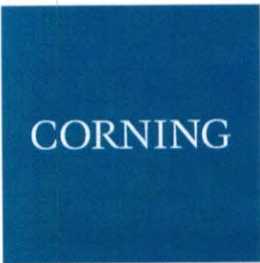
P.O. Box 91129, Cleveland, Ohio 44101 • 440.461.5200 • [www.preformed.com](http://www.preformed.com) • e-mail: [inquiries@preformed.com](mailto:inquiries@preformed.com)

**SP2902-1**



# SST-Drop™ Single-Tube, Gel-Filled Cable

2 F, Single-mode (OS2)



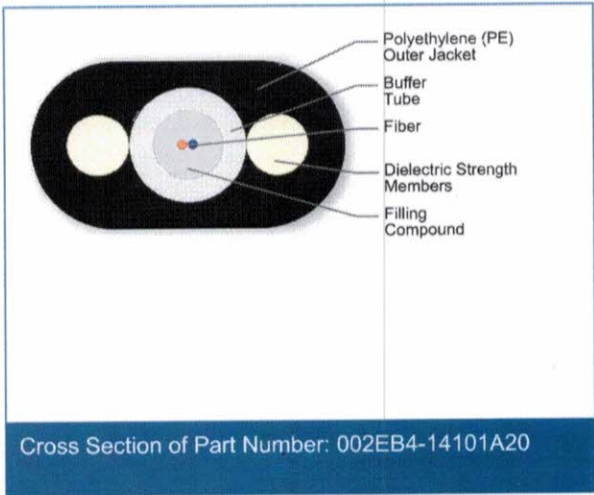
Corning SST-Drop™ dielectric cables offer the ease of installation of standard ALTOS cables in an easy-access, single-tube design. The dielectric version eliminates any bonding and grounding requirements. The cables are RDUP (RUS) listed and offer exceptional crush resistance.

## Features and Benefits

- Standard ALTOS® Cable tube design in single-tube design**  
Standard practices and hardware compatibility
- Crush resistance**  
Fiber protection and signal integrity
- RDUP (RUS) Listed**  
Material acceptability
- Dielectric**  
Eliminates bonding and grounding requirements

## Standards

- Approvals and Listings**      USDA Rural Development Programs



## Specifications

General Specifications	
Environment	Outdoor
Application	Self-Supporting
Cable Type	Drop





# SST-Drop™ Single-Tube, Gel-Filled Cable

2 F, Single-mode (OS2)

CORNING

## General Specifications

Product Type	Self-Supporting
Fiber Category	Single-mode (OS2)

## Temperature Range

Storage	-40 °C to 70 °C (-40 °F to 158 °F)
Installation	-30 °C to 70 °C (-22 °F to 158 °F)
Operation	-40 °C to 70 °C (-40 °F to 158 °F)

## Cable Design

Fiber Count	2
Fiber Coloring	Blue, Orange
Buffer Tube Color Coding	Natural
Buffer Tube Diameter	3 mm (0.12 in)
Tensile Strength Elements and/or Armoring - Layer 1	Dielectric strength members
Outer Jacket Material	Polyethylene (PE)
Outer Jacket Color	Black

## Mechanical Characteristics Cable

Max. Tensile Strength, Short-Term	1350 N (300 lbf)
Max. Tensile Strength, Long-Term	400 N (90 lbf)
Weight	30 kg/km (20 lb/1000 ft)
Nominal Outer Diameter	8.1 mm x 4.5 mm (0.32 in x 0.17 in)
Min. Bend Radius Operation	80 mm (3.15 in)

## Chemical Characteristics

RoHS	Free of hazardous substances according to RoHS 2011/65/EU
------	---

## Fiber Specifications

### Optical Characteristics (cabled)

Fiber Name	Single-mode (OS2)
Fiber Category	G.652.D

CORNING



# SST-Drop™ Single-Tube, Gel-Filled Cable

2 F, Single-mode (OS2)

CORNING

## Fiber Specifications

Optical Characteristics (cabled)	
Fiber Code	E
Performance Option Code	01
Wavelengths	1310 nm / 1383 nm / 1550 nm
Maximum Attenuation	0.4 dB/km / 0.4 dB/km / 0.3 dB/km

## Ordering Information

Part Number	002EB4-14101A20
Product Description	SST-Drop™ Single-Tube, Gel-Filled Cable, 2 F, Single-mode (OS2)
EAN Code	4056418191447

## Shipping Information

Convenient Contractor-sized Packaging Length	609.6 m gross weight 65 lbs; no specialized equipment needed (2,000 ft gross weight 65 lbs; no specialized equipment needed)
Traditional Bulk Packaging	up to 12100 m typically require reel payoff equipment; up to 40000 ft typically require reel payoff equipment



Corning Optical Communications LLC • PO Box 489 • Hickory, NC 28603-0489 USA

800-743-2675 • FAX: 828-325-5060 • International: +1-828-901-5000 • [www.corning.com/opcomm](http://www.corning.com/opcomm)

A complete listing of the trademarks of Corning Optical Communications is available at [www.corning.com/opcomm/trademarks](http://www.corning.com/opcomm/trademarks). All other trademarks are the properties of their respective owners. Corning Optical Communications is ISO 9001 certified.

© 2018 Corning Optical Communications. All rights reserved.

CORNING





LightScope ZWP® All-Dielectric Self-Supporting Outdoor Cable, 6-144 fiber Arid Core construction, stranded loose tube

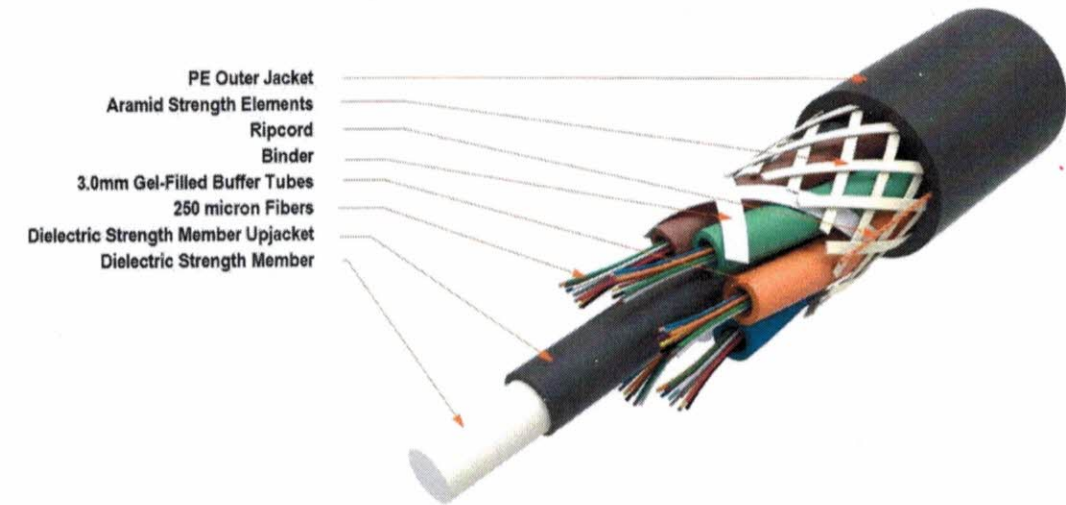
Product Classification

Portfolio	CommScope®
Product Type	Fiber OSP cable
Regional Availability	Asia   Australia/New Zealand   EMEA   Latin America   North America

Standards And Qualifications

Cable Qualification Standards	ANSI/ICEA S-87-640   Telcordia GR-20
-------------------------------	--------------------------------------

Representative Image



General Specifications

Cable Type	Stranded loose tube
Construction Type	Non-armored
Subunit Type	Gel-filled

Construction Materials

Fiber Type Solution	G.652.D and G.657.A1
---------------------	----------------------



Bolts - Varying overall lengths depending on pole diameter

- Material: Hot Dip Galvanized
- Thread Length: 6"
- Tensile Strength: 13,550 lbs

Drop cable clamps

- Flat Fiber Optic Drop Wire Clamp
- Part Number: SI-0972SBL
- Used to strain relieve fiber drop wire
- Removable
- Stainless steel construction
- Black finish to easily distinguish from copper drop clamps
- Unique shim design firmly secures rigid fiber jacketsAccommodates fiber drop cross section of ~.310" W x .200" H, including Corning SST, Corning ROC, Superior Essex Series 6, Superior Essex Series W7 and TE fiber drop cable.

J Hook 7/16" x 4 3/4" J3316P.

- J hooks are used for supporting bail-type drop wire and deadend clamps from poles and crossarms. The J3316P drive hooks have rolled fether drive threads and a pilot point for easy starting.
- Material: Galvanized
- Size: 7/16" x 4 3/4"

Jacket Material	PE
Total Fiber Count	144
Fiber Type	G.652.D and G.657.A1
Fiber Type, quantity	144
Fibers per Subunit, quantity	12
Jacket Color	Black
Jacket UV Resistance	UV stabilized

## Dimensions

Buffer Tube/Subunit Diameter	3.00 mm   0.12 in
Cable Weight	262.0 kg/km   176.0 lb/kft
Diameter Over Jacket	18.50 mm   0.73 in
Filler, quantity	0
Subunit, quantity	12

## Physical Specifications

Minimum Bend Radius, loaded	27.8 cm   10.9 in
Minimum Bend Radius, unloaded	18.5 cm   7.3 in
Tensile Load, long and short term	See Sag and Tension tables in Product Documentation section

## Environmental Specifications

Environmental Space	Aerial, self-support
Installation Temperature	-30 °C to +70 °C (-22 °F to +158 °F)
Operating Temperature	-40 °C to +70 °C (-40 °F to +158 °F)
Storage Temperature	-40 °C to +75 °C (-40 °F to +167 °F)

## Mechanical Test Specifications

Compression	22 N/mm   125 lb/in
Compression Test Method	FOTP-41   IEC 60794-1 E3
Flex	35 cycles
Flex Test Method	FOTP-104   IEC 60794-1 E6
Impact	2.94 N-m   2.17 ft lb
Impact Test Method	FOTP-25   IEC 60794-1 E4
Strain	See long and short term tensile loads
Strain Test Method	FOTP-33   IEC 60794-1 E1
Twist	10 cycles
Twist Test Method	FOTP-85   IEC 60794-1 E7
Water Penetration	24 h
Water Penetration Test Method	FOTP-82   IEC 60794-1 F5



Environmental Test Specifications

Cable Freeze	-2 °C   28 °F
Cable Freeze Test Method	FOTP-98   IEC 60794-1 F15
Drip	80 °C   176 °F
Drip Test Method	FOTP-81   IEC 60794-1 E14
Heat Age	-40 °C to +85 °C (-40 °F to +185 °F)
Heat Age Test Method	IEC 60794-1 F9
Low High Bend	-30 °C to +60 °C (-22 °F to +140 °F)
Low High Bend Test Method	FOTP-37   IEC 60794-1 E11
Temperature Cycle	-40 °C to +70 °C (-40 °F to +158 °F)
Temperature Cycle Test Method	FOTP-3   IEC 60794-1 F1

Regulatory Compliance/Certifications

Agency	Classification
ISO 9001:2015	Designed, manufactured and/or distributed under this quality management system



Included Products

DB-8W-LT (Product Component—not orderable) — LightScope ZWP® Singlemode Fiber

\* Footnotes

**Operating Temperature** Specification applicable to non-terminated bulk fiber cable



## Product Classification

## Portfolio

CommScope®

## Product Type

Optical fiber

## Regional Availability

Asia | Australia/New Zealand | EMEA | Latin America | North America

## Optical Specifications, Wavelength Specific

## Standards Compliance

ITU-T G.652.D | ITU-T G.657.A1 | TIA-492CAAB (OS2)

## Attenuation, maximum

0.22 dB/km @ 1,550 nm | 0.23 dB/km @ 1,575 nm | 0.25 dB/km @ 1,490 nm | 0.25 dB/km @ 1,625 nm | 0.31 dB/km @ 1,385 nm | 0.35 dB/km @ 1,650 nm

## Dispersion, maximum

18 ps(nm-km) at 1550 nm | 3.5 ps(nm-km) from 1285 nm to 1330 nm at 1310 nm

## Mode Field Diameter

10.4  $\mu$ m @ 1,550 nm | 9.2  $\mu$ m @ 1,310 nm | 9.6  $\mu$ m @ 1,385 nm

## Mode Field Diameter Tolerance

 $\pm 0.3$   $\mu$ m @ 1310 nm |  $\pm 0.5$   $\mu$ m @ 1550 nm |  $\pm 0.6$   $\mu$ m @ 1385 nm

## Index of Refraction

1.467 @ 1,310 nm | 1.468 @ 1,385 nm | 1.468 @ 1,550 nm

## Polarization Mode Dispersion Link Design Value, maximum

0.04 ps/sqrt(km)

## Backscatter Coefficient

-79.6 dB @ 1,310 nm | -82.1 dB @ 1,550 nm

## Physical Specifications

## Cladding Diameter

125.0  $\mu$ m

## Cladding Diameter Tolerance

 $\pm 0.7$   $\mu$ m

## Cladding Non-Circularity, maximum

0.7 %

## Coating Diameter (Colored)

253  $\mu$ m

## Coating Diameter (Uncolored)

240  $\mu$ m

## Coating Diameter Tolerance (Colored)

 $\pm 7$   $\mu$ m

## Coating Diameter Tolerance (Uncolored)

 $\pm 5$   $\mu$ m

## Coating/Cladding Concentricity Error, maximum

12  $\mu$ m

## Core/Clad Offset, maximum

0.5  $\mu$ m

## Optical Specifications, General

## Cabled Cutoff Wavelength, maximum

1260 nm

## Point Defects, maximum

0.10 dB

## Zero Dispersion Slope, maximum

0.090 ps/[km-nm-nm]

## Zero Dispersion Wavelength, maximum

1322 nm

## Zero Dispersion Wavelength, minimum

1302 nm

## Mechanical Specifications



Coating Strip Force, maximum	8.9 N   2.0 lbf
Coating Strip Force, minimum	1.3 N   0.3 lbf
Dynamic Fatigue Parameter, minimum	20
Fiber Curl, minimum	4.0 m   13.1 ft
Macrobanding, 20 mm mandrel, 1 turn	0.75 dB @ 1,550 nm   1.50 dB @ 1,625 nm
Macrobanding, 30 mm mandrel, 10 turns	0.25 dB @ 1,550 nm   1.00 dB @ 1,625 nm
Macrobanding, 50 mm mandrel, 100 turns	0.03 dB @ 1,550 nm   0.03 dB @ 1,625 nm
Proof Test	689.48 N/mm <sup>2</sup>   100000.00 psi

Environmental Specifications

Heat Aging, maximum	0.05 dB/km @ 85 °C
Temperature Dependence, maximum	0.05 dB/km
Temperature Humidity Cycling, maximum	0.05 dB/km
Water Immersion, maximum	0.05 dB/km @ 23 °C

Regulatory Compliance/Certifications

Agency	Classification
ISO 9001:2015	Designed, manufactured and/or distributed under this quality management system



\* Footnotes

Temperature Dependence, maximum	Temperature dependence is conducted at -60 °C to +85 °C (-76 °F to +185 °F)
Temperature Humidity Cycling, maximum	Temperature humidity cycling is conducted at -10 °C to +85 °C (+14 °F to +185 °F) up to 95% relative humidity