

# Optical Fiber Protection

## *Using Pushable Fiber and Ruggedized Microduct*



Reducing the labor cost of installing fiber from the access point (pedestal, aerial closure, below grade vault) to the home -- while improving the long-term reliability of that fiber is the promise of Clearfield's optical fiber protection system. In fact, by eliminating splicing, pushable fiber within a ruggedized microduct, can eliminate hundreds of dollars in labor costs at every connected fiber. In its simplest form, ruggedized microduct is either aerially or direct buried and the pushable fiber is either pushed by hand or machine to its desired end-point -- up to 1500 feet. The pathway can transition from outside plant (aerial or buried) to an inside plant environment with a simple airtight and watertight coupler that requires minimal tools to install -- allowing for a single and continuous pathway.

The actual distance will be dependent upon the number of turns along the path but is helped along with the minimal resistance properties of the specially developed liner technology placed inside the ruggedized microduct. The pushable fiber is available in bulk form, or terminated with a unique pushable-connector-- as a single drop or multi-fiber assembly.

### **Optimized for Integration with the Clearview Cassette and xPAK**

The Clearview Cassette and Clearview xPAK seamlessly integrate with the ruggedized microduct so that the fiber can be pushed directly into the Clearview device. This provides the ultimate in fiber protection and enables the field technician to splice inside a protected environment when using Clearview's splicing tray feature. When teamed with the FieldSmart Small Count Delivery (SCD) Case and SCD Panel, fibers are consolidated, protected and distributed in an end-to-end solution

### **CraftSmart Deployment**

Taking that protection a step further, Clearfield has designed the CraftSmart fiber enclosure line of vaults and pedestals as part of the optical fiber protection promise. Ruggedized microduct can be installed directed through the pedestals and vaults further protecting the laid fiber.

### **Application Environments**

- FTTH
- Cell-backhaul
- Business-class services
- Elimination of fiber exhaust

### Ruggedized Microduct

The velocity-conserving lining of this 10mm transport duct provides a smooth core that enables fiber to be pushed (not pulled) through it with minimal resistance. Serving as an optical fiber raceway, it is constructed in three tough polymer models:

- TuffDuct -- Direct Buried
- TuffDuct -- Aerial
- TuffDuct -- Riser

Each has been specifically designed to simplify deployment of fiber and cable in a specific environment. Full product details are found on the next page.



### Pushable Fiber

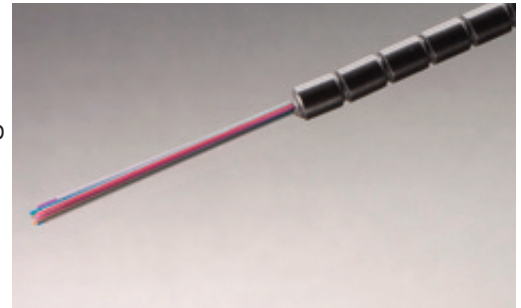
Our pushable fiber is simply the lightest hardened fiber cables in the industry. It is strong enough to be stapled to walls and offer a built-in, bend-limiting function to prevent damage to fiber during installation. Terminated with a QuikPush connector, the assembly is ready to be pushed (not pulled) through the microduct.

#### Unrivalled in Performance

- Safe -- built-in, bend-limiting top level protection
- Strong, yet light weight -- ruggedized and uncrushable polymer technologies
- Easy to install -- handle just like an electrical cable

#### Key Product Detail

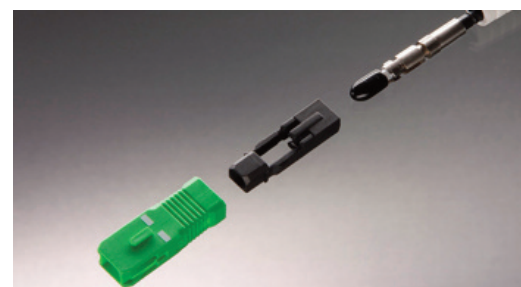
- 3mm (0.118 in) cable diameter range
- Extremely light weight -- max. 9 Kg/Km (6.08 lbs/Kft)
- Industry standard 250 micron fiber incorporated
- Self bend-limiting design to keep your fiber protected down to 10mm radius
- Cables can be deployed using attachments to walls and conduit using cable techniques
- Operate and install fiber at a small bend-radius without additional protection
- Inherent crush resistance (up to 7 times of a traditional drop cable) allows direct stapling to wall studs
- Pre-connectorized cables are compatible with industry standard SC/APC and SC/UPC






### QuikPush Connector

Mating a Miniflex patented QuikPush connector onto a 3mm pushable fiber cable allows it to be pushed (not pulled) through the microduct optical race way, providing the most cost-effective means of installing optical fiber -- without jeopardizing fiber protection.

After being pushed through the microduct, the outer housing is assembled in the field into a standard SC/APC or SC/UPC connector -- all in seconds, without mechanical or fusion splicing.



<p><b>TuffDuct - Buried</b></p> 	<p><b>TuffDuct - Buried</b> is the microduct for use in the demanding outside plant environment. It is made from a tough polymer with a thicker wall to handle the rigors of plowing and direct bury applications. TuffDuct - Buried is specifically for applications requiring a heavy duty duct and can be direct buried using any traditional method, such as plowing and slot-trenching.</p>	<p><b>Unrivaled in Performance</b></p> <ul style="list-style-type: none"> <li>• High crush resistance to protect against installation damage</li> <li>• High install tension ensures suitability for plowing</li> <li>• Easy to install and suitable for all standard installation methods</li> </ul> <p><b>Key Product Detail</b></p> <ul style="list-style-type: none"> <li>• Industry leading crush resistance of 439N/112 lbf (10% compression)</li> <li>• Industry leading install tension of 518N/116lbf</li> <li>• Lowest friction co-efficient of any ducting product in the industry, courtesy of the unrivaled DVC lining</li> <li>• Available with 100 lb or toneable pull cord</li> </ul> <p><b>Specifications</b></p> <ul style="list-style-type: none"> <li>• ISO9001 Production</li> </ul>
<p><b>TuffDuct - Aerial</b></p> 	<p><b>TuffDuct - Aerial</b> is designed for successful aerial routing of fiber. It is designed with a copper-clad steel strength member to enable suspension with a standard messenger drop clamp. It can be joined to other standard size microduct once the messenger has been stripped back from the joint.</p>	<p><b>Unrivaled in Performance</b></p> <ul style="list-style-type: none"> <li>• Detachable strength member for ease of installation</li> <li>• Designed for self-supporting aerial routes</li> <li>• High crush and tension resistance</li> </ul> <p><b>Key Product Detail</b></p> <ul style="list-style-type: none"> <li>• Temperature range -40C to +80C</li> <li>• Max. wind speed 81 mph (130 km/hr)</li> <li>• Max. ice loading: 5mm (0.197 in) radial</li> <li>• Max. combined: 50 mph (80 km/hr) + 5mm (0.197 in) radial ice</li> <li>• Lowest friction co-efficient of any ducting product in the industry, courtesy of the unrivaled DVC lining</li> <li>• Available with 100lb pull cord</li> </ul> <p><b>Specifications</b></p> <ul style="list-style-type: none"> <li>• ISO9001 Production</li> <li>• UV Stable MDPE</li> </ul>
<p><b>TuffDuct - Riser</b></p> 	<p><b>TuffDuct - Riser</b> is the microduct optical fiber or cable routing solution to use indoors. It is riser rated on the Underwriters Laboratories (UL) scale, confirming that it adheres to standards for fire retardancy and safety. TuffDuct - Riser is a general purpose for cable burial in rendered walls and floors, stapling or clipping to walls, or used in risers, cable ducts and cable troughs.</p>	<p><b>Unrivaled in Performance</b></p> <ul style="list-style-type: none"> <li>• Grooved to allow bends as small as 150mm (5in)</li> <li>• Highest crush resistance levels amongst indoor microduct products available</li> <li>• Highest install tension levels available for indoor microduct</li> <li>• Easy to install and suitable for all standard installation method</li> </ul> <p><b>Key Product Detail</b></p> <ul style="list-style-type: none"> <li>• Industry leading crush resistance of 1645N/370lbf</li> <li>• Industry leading install tension of 220N/60lbf</li> <li>• Lowest friction co-efficient of any ducting product in the industry, courtesy of the unrivaled DVC lining</li> <li>• Available with 100 lb or toneable pull cord</li> </ul> <p><b>Specifications</b></p> <ul style="list-style-type: none"> <li>• ISO9001 Production</li> <li>• UL Riser Rated (UL 2024)</li> <li>• Low smoke zero halogen</li> </ul>

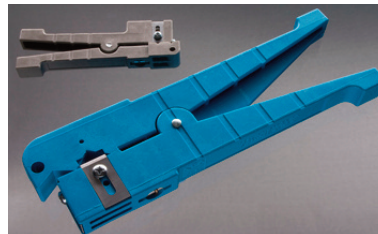
### Tube Cutter

Tube Cutter is the quickest, neatest way of cutting all standard tubes such as StiffFlex and microduct.



### Rotary Tube Cutter

Rotary Tube Cutter is designed to make cutting all standard cables in as simple as possible, without damaging the fiber inside.



### Microduct De-burring Tool

Microduct de-burring tool is designed to make chamfering the inside of microduct simple, helping to ensure joining and pushing are smooth operations.



### Airtight Coupler

Airtight Couplers are designed to provide simple, 2-click plug-and-play joining of microduct, enabling longer runs and safe pushing and blowing performance.



### WAM (Wheel Assisted Module)

WAM (Wheel Assisted Module) Push Tool is a battery-powered, automatic push tool for use with our cable and microduct products. The WAM Push Tool is designed to protect against kinking, as the cable is fed at a constant and controlled speed which automatically adjusts to any resistance met while pushing.



# Optical Fiber Protection

## Pushable Fiber Assemblies & Bulk



<b>TuffNut QuikPush - 1 fiber</b>	<b>Clearfield Part Number</b>
TuffNut assembly, 3mm, 1 fiber, SC APC pushable connector to blunt	OFP-A1Q-001-BNN-ZZZ XXXXF
TuffNut assembly, 3mm, 1 fiber, SC UPC pushable connector to blunt	OFP-A1Q-001-DNN-ZZZ XXXXF

<b>TuffNut with HFOC - 1 fiber</b>	<b>Clearfield Part Number</b>
TuffNut assembly, 3mm, 1 fiber, SC APC HFOC to blunt	OFP-A1Q-001-WNN-ZZZ XXXXF
TuffNut assembly, 3mm, 1 fiber, SC UPC HFOC to blunt	OFP-A1Q-001-WNN-ZZZ XXXXF

<b>TuffNut with Standard Connectors - SC APC</b>	<b>Clearfield Part Number</b>
TuffNut assembly, 3mm, 1 fiber, SC APC to blunt	OFP-A1Q-001-CNN-ZZZ XXXXF
TuffNut assembly, 3mm, 2 fiber, SC APC to blunt, half meter breakout	OFP-A1Q-002-CMN-ZZZ XXXXF
TuffNut assembly, 3mm, 4 fiber, SC APC to blunt, half meter breakout	OFP-A1Q-004-CMN-ZZZ XXXXF
TuffNut assembly, 3mm, 6 fiber, SC APC to blunt, half meter breakout	OFP-A1Q-006-CMN-ZZZ XXXXF
TuffNut assembly, 3mm, 12 fiber, SC APC to blunt, half meter breakout	OFP-A1Q-012-CMN-ZZZ XXXXF

<b>TuffNut with Standard Connectors - SC UPC</b>	<b>Clearfield Part Number</b>
TuffNut assembly, 3mm, 1 fiber, SC UPC to blunt	OFP-A1Q-001-ANN-ZZZ XXXXF
TuffNut assembly, 3mm, 2 fiber, SC UPC to blunt, half meter breakout	OFP-A1Q-002-AMN-ZZZ XXXXF
TuffNut assembly, 3mm, 4 fiber, SC UPC to blunt, half meter breakout	OFP-A1Q-004-AMN-ZZZ XXXXF
TuffNut assembly, 3mm, 6 fiber, SC UPC to blunt, half meter breakout	OFP-A1Q-006-AMN-ZZZ XXXXF
TuffNut assembly, 3mm, 12 fiber, SC UPC to blunt, half meter breakout	OFP-A1Q-012-AMN-ZZZ XXXXF

<b>TuffNut Fiber - Bulk</b>	<b>Clearfield Part Number</b>
1-fiber, singlemode, 3mm, black, OFBT	OFP-TNCA-303-PB-BLK
6-fiber, singlemode, 3mm, black, OFBT	OFP-TNCA-03-PB-BLK
12-fiber, singlemode, 3mm, black, OFBT	OFP-TNCA-33-PB-BLK

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## Ruggedized Microduct and Accessories



Indoor LSZH Flame Retardant TuffDuct - Riser	Clearfield Part Number
10mm white LSZH TuffDuct-Riser with std. pull cord	OFP-10.0-6.7-WHT-LSZH-SP-2000F

OSP HDPE TuffDuct - Direct Buried	Clearfield Part Number
10mm orange TuffDuct - Buried with standard pull cord	OFP-10.0-6.0-ORG-SP-2000F
10mm orange Figure-of-Eight TuffDuct - Buried with standard pull cord	OFP-10.0-6.0-ORG-SP-2000F-TC

OSP HDPE TuffDuct - Aerial	Clearfield Part Number
8mm black TuffDuct - Aerial with toneable strength member	OFP-8.0-5.4-BLK-TSM-2000F-AER

Couplers	Clearfield Part Number
10mm to 10mm coupler	OFP-ATC-10-10-POM-CLR
8mm to 10mm coupler	OFP-ATC-8-10-POM-CLR

Rotary Tube Cutter	Clearfield Part Number
Rotary cutter for use with 3mm TuffNut	OFP-TRCUT-01
Rotary cutter for use with 8mm microduct	OFP-TRCUT-03

Tube Cutter	Clearfield Part Number
Cutting tool for ruggedized tubes & microduct leaving a clean edge	OFP-TCUT-01
Spare Blade for Tube Cutter	OFP-TCUT-SB

De-burring Tool	Clearfield Part Number
Deburring / chamfering tools for ruggedized microduct	OFP-DBUR-8.0-10.0-BLU