EZ-Bend Drop Cable
Description, Applications, and Jacket Removal

CONTENTS **Section**

GENERAL **1**
PRECAUTIONS..... **2**
GENERAL DESCRIPTION of EZ-BEND® CABLE **3**
EZ-BEND® FIBER TECHNOLOGY..... **4**
EZ-BEND® CABLE TECHNOLOGY..... **5**
APPLICATION INFORMATION INCLUDING SPLICING AND TESTING..... **6**
EZ-BEND™ CABLE STRIPPING PROCEDURE **7**

1. GENERAL

1.1 The following IP describes the various applications, installation guidelines, and the recommended methods for stripping OFS EZ-Bend® drop cables.

1.2 Standard fiber optic cordage is typically very sensitive to sharp bending and generally has a minimum bend diameter of 20 × cable OD. EZ-Bend® drop cable, however, can be bent to a very small bend diameter (10 mm) with minimal decibel loss. The minimum recommended bend diameter and maximum tensile rating of EZ-Bend® drop cables are listed in Tables 1 and 2.

1.3 The OFS EZ-Bend drop cables are available with both Type OFNR riser and Type OFNP plenum fire ratings. Actual choice of cable for a particular installation will depend on the installation pathways and local fire safety codes.

2. PRECAUTIONS

2.1 Safety glasses and gloves should always be worn when handling and stripping fiber cables. Pieces of glass fiber are very sharp and can injure the eye and puncture the skin.

Table 1. EZ-Bend Cable Properties: Type OFNR Riser-Rated Cables

Part Number	Cable OD	Maximum Tensile Rating	Minimum Bend Diameter	Nominal Weight	Minimum Order Quantity
9P48-001C-DRW-4 (Riser)	4.8 mm	440 N (100 lb)	10 mm (0.40 in.)	19.5 kg/km (1.31 lb/100 ft)	1500 ft
IO48-001C-DRK-4-PVC (Riser Indoor/Outdoor)	4.8 mm	440 N (100 lb)	10 mm (0.40 in.)	21.0 kg/km (1.40 lb/100 ft)	1500 ft
9P30-001C-DRW-4 (Riser)	3.0 mm	310 N (70 lb)	10 mm (0.40 in.)	7.45 kg/km (0.50 lb/100 ft)	1500 ft

Table 2. EZ-Bend Cable Properties: Type OFNP Plenum-Rated Cables

Part Number	Cable OD	Maximum Tensile Rating	Minimum Bend Diameter	Nominal Weight	Minimum Order Quantity
9P48-001C-DPW-4 (Plenum)	4.8 mm	440 N (100 lb)	10 mm (0.40 in.)	26.1 kg/km (1.75 lb/100 ft)	1500 ft
9P30-001C-DPW-4 (Plenum)	3.0 mm	310 N (70 lb)	10 mm (0.40 in.)	7.55 kg/km (0.51 lb/100 ft)	1500 ft

3. GENERAL DESCRIPTION OF EZ-BEND CABLES

3.1 EZ-Bend drop cable contains a single 250 µm (OD) optical fiber with a tight buffered outer jacket. The buffered fiber is protected with a layer of aramid yarn and is completed with a flame-retardant outer jacket (Figure 1). The EZ-Bend cable is 3.0 mm OD.

3.2 EZ-Bend rugged drop cable is similar to the standard cable except that it has a thicker outer cable jacket. The rugged drop cable is also available as an indoor-outdoor design, with waterswellable aramid yarns and a black, UV-resistant cable jacket. The EZ-Bend rugged drop cable is 4.8 mm OD.

4. EZ-BEND FIBER TECHNOLOGY

4.1 EZ-Bend fiber is based on a novel, patented "resonance-assisted" design that enables the fiber to have ultra-low macro-bend loss using a solid-core structure. This design produces a fiber whose properties are axially and radially uniform and compatible with standard fibers. This performance is achieved by designing the refractive index profile to suppress unwanted higher-order modes by resonant coupling.

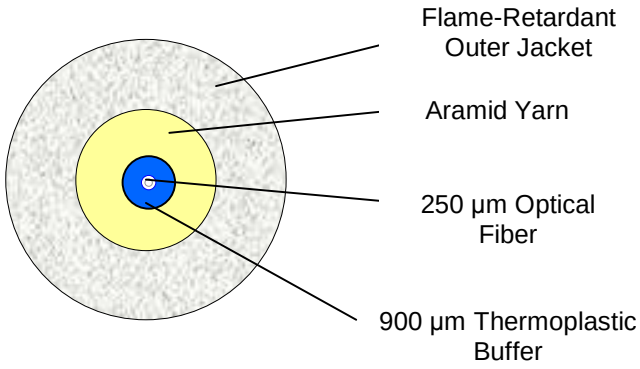


Figure 1 – EZ-Bend™ Rugged Drop Cable

5 EZ-BEND CABLE TECHNOLOGY

5.1 EZ-Bend drop and ruggedized drop cables use a buffer that enables minimum macro bending loss in EZ-Bend cables. The buffer uses a proprietary inner layer that allows the buffer coating to be stripped using standard mechanical tools without heated stripping.

5.2 4.8 mm EZ-Bend drop cables use a patent-pending construction that provides minimal macro bending loss while ensuring long-term mechanical reliability of the glass fiber when the cable is routed around sharp corners without use of bend limiters.

6. GENERAL APPLICATION INFORMATION

- EZ-Bend cables contain solid-core fiber with macro-bending performance beyond ITU G.657B requirements.
- EZ-Bend cables are ideal for in-residence wiring and difficult installation routes in MDU applications. The thick jacket construction naturally limits cable bending to control macro-bending attenuation and protect fiber reliability.
- EZ-Bend cable (3.0 mm) is intended for use in applications where the cable will be installed in micro-duct, raceways, or behind protective moldings. Bend limiters are not required for use with the cable in this situation.

Figure 2 - EZ Bend placed inside different raceway designs

- EZ-Bend rugged drop cable (4.8 mm) is intended for use in applications where mechanical protection ***will not*** be provided for the cable. The rugged drop cables can be stapled in place and routed around 90-degree corners without using bend limiters as shown below:

Figure 3 - Picture of EZ Bend stapled around a doorframe

Stapling and other installation information

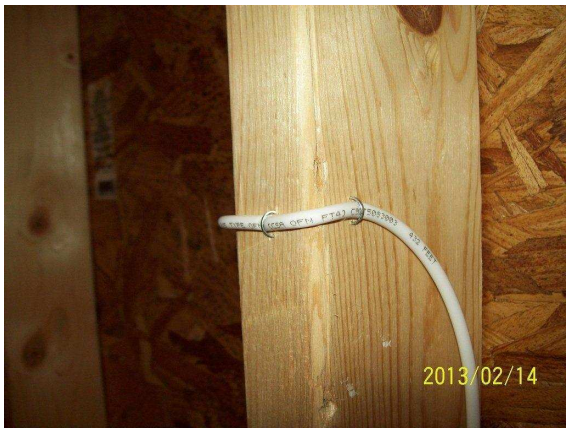
EZ-Bend cable, 4.8 mm only, can be stapled in place with a standard stapler and Arrow T25™ staples. T25 staples are recommended due to the rounded top profile, as shown in the circle below. The rounded top profile minimizes the crushing force placed on the cable.

OFS does not have a formal recommendation for the frequency or maximum number of staples in an installation, but staples are commonly placed roughly 18 inches (50 cm) apart.

Additional staples may be placed to maintain bends around corners as needed.

Like other wires, EZ Bend may be installed a drilled hole in the studs of a wall.

Pictures of various EZ Bend installations are shown below:



Note: OFS only recommends stapling of EZ Bend 4.8 mm cable. OFS does not recommend stapling EZ Bend 3.0 mm cable.

- EZ-Bend cables provide excellent attenuation performance with minimal bend restrictions. The cable is capable of 1 turn around 5 mm bend radius with less than 0.1 dB of added attenuation.

- EZ-Bend cables are available with riser, plenum, and low-smoke zero-halogen jacket designs. The cables are available in yellow, blue, black, and neutral colors including white and gray.

- EZ-Bend rugged drop cable (4.8 mm) is available with either indoor or indoor-outdoor jacket designs.

- EZ-Bend cables are free of heavy metals and RoHS-compliant.

Splicing Information

The fiber in EZ-Bend cables is fully compatible with standard ITU G.652D, G.657A, and G.657B fiber when any type of splicing is used: core-aligned, clad-aligned, or V-groove splicing. No special tools, software, or procedures are required for fusion splicing of EZ-Bend cables. If no specific EZ Bend splicer program or recipe is offered, the following simple guidelines should enable splice losses within expected levels.

Fusion Splicer Type	**Program and Settings**
Clad Alignment in V-Groove – passive alignment	Standard Single-mode
Clad Alignment – active alignment	Standard Single-mode
Core Alignment – active alignment	Multimode

Customers and contractors performing splicing should consult with the fusion splicer manufacturer for any specific programs that may be available for splicing EZ Bend® fiber or other fiber types. Contact OFS at 1-888-FIBER-HELP for specific information.

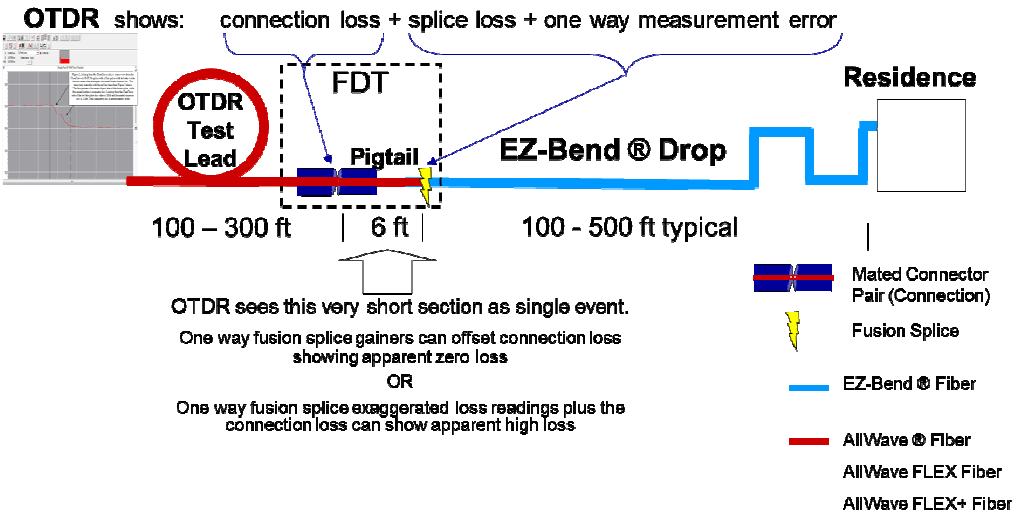
MDU Drop Splice Loss Measurement and Acceptance

OFS recognizes that bi-directional measurements in some applications such as MDU deployments may be difficult because access to the fiber inside the residence may be impractical. As a result, some technicians qualify optical loss using a one way (uni-directional) OTDR measurement. One way OTDR measurements inherently involve large errors and are not recommended. However, since there may be cases in which bi-directional OTDR measurements are not possible, the table below includes acceptance values for uni-directional OTDR measurements. Note that the uni-directional values shown below should not be used as an acceptance specification when measuring bi-directionally.

Splicing Dissimilar Fibers[1] – OTDR Values[3]	**AllWave to EZ Bend[2] Average/Max(dB)**		**AllWave FLEX to EZ Bend[2] Average/Max (dB)**	
	1310 nm	**1550 nm**	**1310 nm**	**1550 nm**
Bi-directional Splice loss	0.06/0.15	0.09/0.2	0.05/0.2	0.06/0.2
Uni-directional from AllWave to BI fiber	0.2/0.5	0/0.3	0.3/0.6	0.1/0.3
Uni-directional from BI Fiber to AllWave	-0.1/0.2	0.2/0.5	-0.2/0.1	0/0.2
Splicing "Like" Fibers	**EZ Bend to EZ Bend Average/Max (dB)**			
	1310 nm	**1550 nm**		
Bi-directional Splice loss	0.04/0.15	0.04/0.15		
Unidirectional Splice loss	0.04/0.3	0.04 /0.3		

Notes:
1) Similar results seen when splicing G.652D compliant fibers other than AllWave® ZWP Single-mode fiber.
2) Because of the unique waveguide structure of EZ Bend® Ultra Bend Insensitive fiber, it does not exhibit typical "gainer" performance like AllWave® FLEX or AllWave® FLEX+.
3) The values given are intended as rough guidelines to use to determine when troubleshooting needs to occur. Expected values have been rounded upward to account for differences in splicer technology.

If one-way OTDR testing of a splice includes measuring through a mated connector pair, pass-fail criteria will need to include the maximum value acceptable for a mated connector pair plus one-way OTDR measurement error. Such a configuration might occur in a drop cable link such as what is shown below.



If the total loss is outside acceptance limits and cannot be resolved with a re-splice, the mated connector loss and splice loss will need to be measured separately using a higher resolution OTDR to determine if the problem exists with the optical fusion splice loss or the connector loss. Alternatively, the technician could perform an OTDR test from the opposite direction and then average the values of the two tests. If the average is less than the maximum allowable connection loss plus the maximum allowable splice loss (for example 0.5 max connection loss + 0.15 max splice loss = 0.65 dB), the combination of connection loss plus splice loss would be considered acceptable.

Mechanical Splicing Guidelines

OFS AllWave ® *FLEX* fiber, AllWave ® *FLEX*+ fiber, and EZ-Bend ® Fiber are fully compatible with mechanical splicing and mechanical splice based connectors. There are no special procedures required for the use of mechanical splicing and mechanical splice based connectors with AllWave ® *FLEX* fiber, AllWave ® *FLEX*+ fiber, or EZ-Bend ® Fiber

Termination Guidelines

EZ-Bend cables can be terminated using any type of standard optical connector, with standard polishing techniques. This includes factory-mounted connectors, splice-on field-mounted connectors, and mechanical field-mounted connectors,

Fiber Identifier Compatibility

After a fiber is installed it is occasionally useful to detect the presence of a signal on the fiber without disconnecting the link. So called fiber identifiers work by bending the cable in a way that causes a controlled amount of light to escape the core and cladding and be captured by a detector without disrupting service on the link. OFS Fitel Fiber identifiers compatible with EZ-Bend ® Fiber are under development and will be available in 2013.

7. EZ-BEND CABLE STRIPPING PROCEDURE

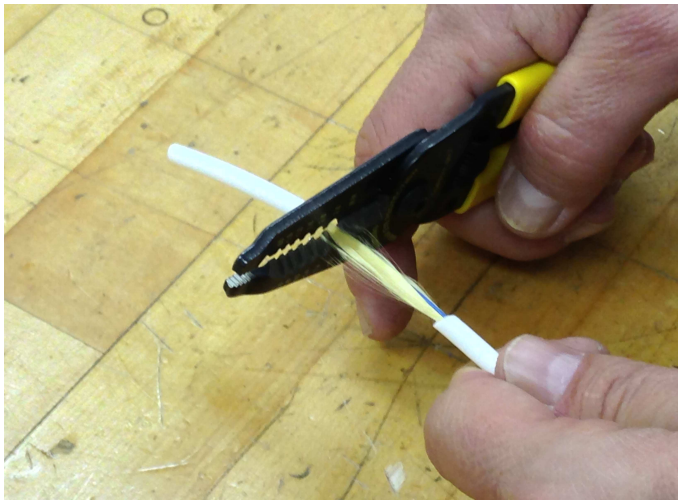
7.1 Required tools:

- Conventional "T" Strippers
- Sidecutters
- Electricians Scissors or Snips
- Clauss No-Nik® Fiber Strippers

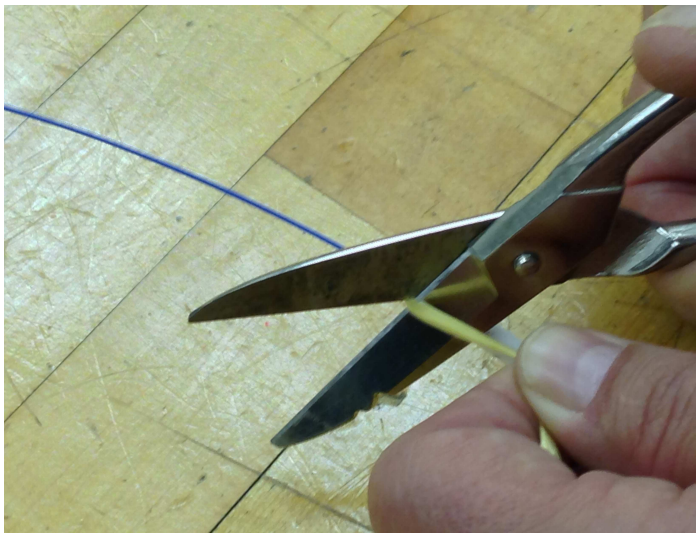
- Ceramic Scissors (Optional)
- Seam Ripper (Optional)

7.2 The length of exposed tight buffer and bare fiber will vary depending on the application. Consult termination specifications for the required cable and fiber stripping lengths. Mark the PVC jacket at the desired stripping length.

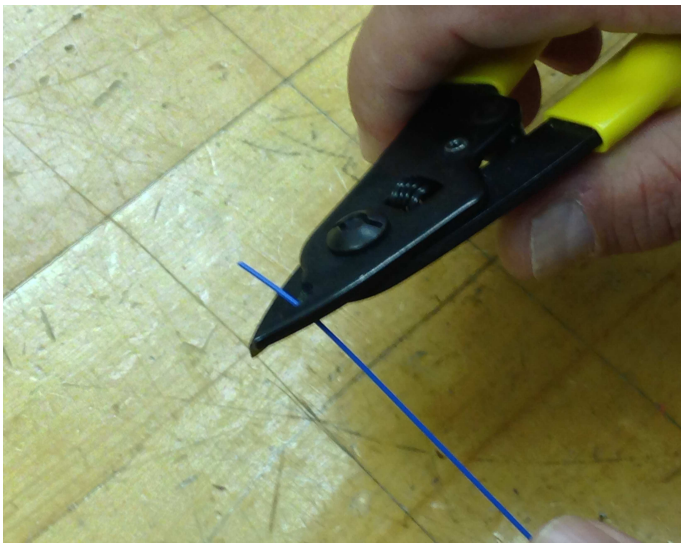
7.3 Using the appropriate gauge on the "T" Strippers carefully cut the PVC jacket at the mark and pull the jacket away to expose the aramid yarn. The correct gauge for 3.0 mm jacket is 16 AWG and the correct gauge for 4.8 mm is 10 AWG. The correct gauge can also be determined by starting with the larger hole and proceed to a smaller hole until the PVC jacket is cut and stripped without cutting into the aramid yarn.



7.4 Using either the ceramic scissors or the electricians' snips, cut the aramid yarn off at the predetermined length.



7.5 The tight buffer is now ready to be stripped from the fiber. The correct Clauss No-Nik fiber stripper must be determined. Please note that alternative fiber strippers such as Miller strippers are also acceptable for use during this process.



(a) If it is desired to strip the 900 um tight buffer to the 125 um glass, it should be stripped using the No-Nik NN200 tool (red handle).

(b) Alternately, it may be desirable to take one coating off at a time. Use the No-Nik NN300 tool (white handle) to strip the tight-buffered coating off the 250 um fiber. Next, use the NN200 tool (red handle) to remove the fiber coating and expose the 125 um bare fiber.

For additional information please contact your sales representative. You can also visit our website at www.ofsoptics.com or call 1-888-FIBERHELP (1-888-342-3743) from inside the USA or 1-770-798-5555 from outside the USA.