



A Furukawa Company

Your Optical Fiber Solutions Partner™

EZ-Bend® InvisiLight® In-living Unit Solution

Installation Instructions with InvisiLight Drop Preparation

Revision 1.0

1.0 Overview

This document provides the instructions for installing 3.0 and 4.8mm EZ Bend® drops into a Single Family living Unit (SFU) and prepping the drop cordage down to the 900µm buffered InvisiLight® fiber. This document assumes that the technician is familiar with fiber handling and understands optimal placement of the ONT.

The fiber in EZ Bend cordage is fully compatible with standard ITU G.652D, G.657A, and G.657B fiber when any type of splicing or connectorization is required. The assemblies will most likely arrive with the grip removed for ease in installing through wall applications. If the grip isn't loose on the end of the assembly please note that there is a mark on the white body underneath the SC APC connector grip that should be matched to the key side of the grip. This mark is used when installing the grip on the connector to ensure that the angled end face is aligned properly to the key. This procedure is shown in detail in section 4.6 of this document. If the alignment isn't correct, a high loss condition (possibly up to or beyond 10 dB) will occur.

Unstripped EZ Bend 3.0 and 4.8mm ruggedized cordages can be installed with Arrow™ T-25 Round Crown Staples and be placed around tight bends. There is no limit on the number of staples used, nor a required distance between staples, although staples are commonly placed about 50cm (18 inches) apart. Additional staples may be used to maintain bends around corners as needed. For more information about EZ-Bend cordage, please refer to OFS Installation Practice IP-056.

The InvisiLight Solution provides a near invisible, fast, plug and play fiber installation into living units. The InvisiLight solution consists of a 900µm diameter EZ-Bend fiber with factory mounted SC APC connectors. The InvisiLight solution is installed in the interfaces of walls and ceilings, baseboards and walls, and vertical corners between walls, since they are easily accessed and naturally protected fiber pathways.

Examples of Installed EZ-Bend InvisiLight Solution



EZ-Bend and InvisiLight are registered trademarks of OFS Fitel, LLC. Arrow is a trademark of the Arrow Fastener Co., LLC.



2.0 Tools and Components

Installation Tool and adhesive tubes (sold separately)



**Dispensing
Tool**



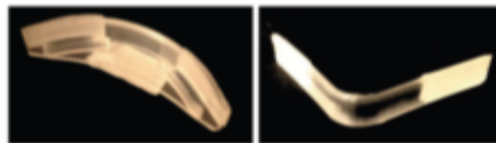
Adhesive tube, nozzles



Tool Loaded with Adhesive Tube

Solution Components

Inside and Outside Corners insure proper bend radius of InvisiLight fiber around corners



In rough wall tool



Inside Corner mounting tool



Straight hole plug and cap



Adhesive System Overview

The InvisiLight adhesive is a water-based indoor adhesive that is tested to be fully compatible with the InvisiLight fiber. It provides a water-resistant bond without chemical smells, is acid-free, dries clear, and cleans up immediately with soap and water. An MSDS of the adhesive is available from OFS upon request.

2.1 Recommended installation surfaces:

- 2.1.1 Most common construction materials including brick, wood, dry-wall, plaster, wall paper, fabrics and painted surfaces

2.2 Not recommended for use on or with:

- 2.2.1 Metals that will corrode, mirrors, natural marble (could stain), polyethylene, polypropylene, Nylon or Teflon®

2.3 Installation conditions:

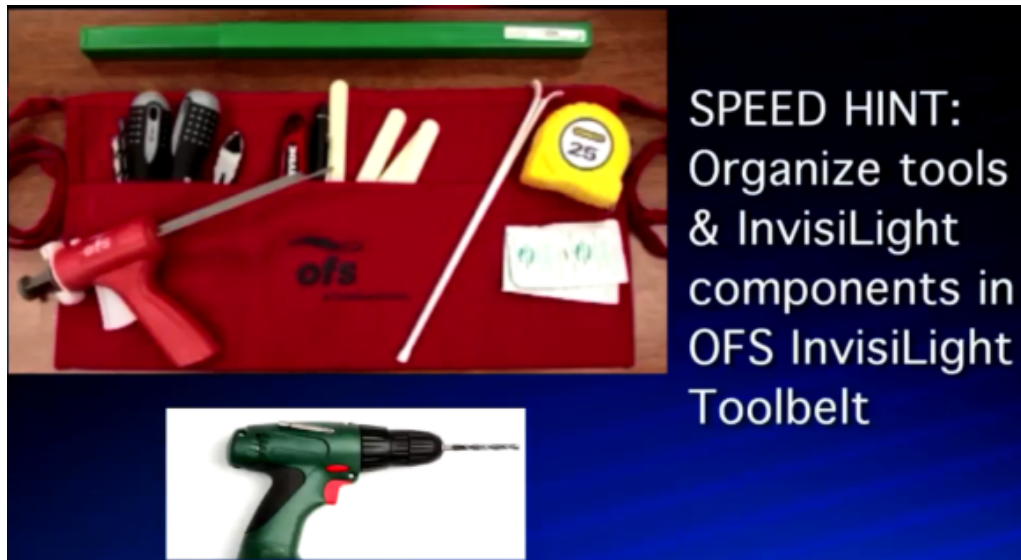
- 2.3.1 Store adhesive tubes above freezing
- 2.3.2 Surfaces should be clean and dry
- 2.3.3 Application temperature >10°C (50°F)
- 2.3.4 Set Time and repositioning: 10 minutes
- 2.3.5 Dry time: 1 to 24 hours (depending on thickness)
- 2.3.6 Dries clear within 1 – 3 hours, depending on thickness
- 2.3.7 Non-flammable, flexible solid, water resistant

2.4 Safety precautions

- 2.4.1 Wear gloves and or safety glasses with side shields while applying the adhesive.

3.0 Tool and Component Organization

- 3.1 The largest opening in the Jonard Tools Mid-span Slitter tool (model MS-6) may be used to open the 3.0 and the 4.8mm drop cordage. This tool is shown being used in 4.4.5 below.

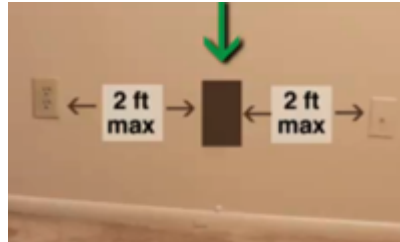


Teflon is a registered trademark of DuPont.

4.0 Installation Procedure

4.1 Determine ONT Location

- 4.1.1 Based on the unit layout and customer preference, identify the optimal location for the ONT. That location is within 2 feet of a power outlet and the residence coax outlet. Consult with the resident and obtain customer approval on the final location.



4.2 Determine Drop Entry Point

- 4.2.1 Survey the exterior wall, from both outside and inside, that the drop must pass through to enter the residence.
- 4.2.2 Outside the residence, the location of the entry point may be dictated by the placement of the cable from the terminal.
- 4.2.3 Inside the residence, try to locate the entry in a less visible area such as in a closet, laundry room, and as close to the ONT as possible.

4.3 Identify Fiber Path

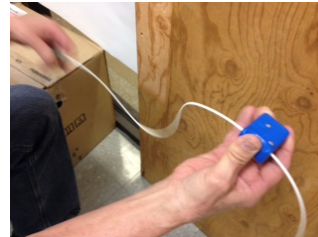
- 4.3.1 Identify and review the fiber path between the entry point and ONT location. Discuss the installation of the InvisiLight product with the home owner and obtain their consent. The best pathway for the fiber provides natural protection, like the interfaces of walls and ceilings, walls to crown molding, around window or door moldings, and at the baseboard of walls. A good location to transition from high to low is done in the corner of two walls. Routing the fiber high, adjacent to the ceiling or crown molding, may reduce the need to move furniture, where routing the fiber along baseboards usually requires furniture or other objects to be moved. Routing the fiber through interior walls enabling faster installation and shorter path lengths.



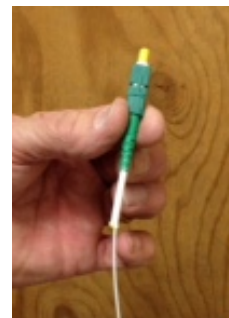
- 4.3.2 Determine the additional length needed to span the drop entry point to the ONT location within the home. Add this length to the outdoor length of drop cable to determine the total length of drop cable needed.

4.4 Install Buried Drop into the Living Unit

- 4.4.1 Once the drop cable is buried to the house, clean the remaining length of drop from the outside of the house from where it exits the ground.
- 4.4.2 Drill a 3/8" (9mm) hole from the outside of the house (after checking the location of entry on the inside of the house). This will minimize the debris on the inside of the house.
- 4.4.3 With the SC APC green connector grip removed, insert the cable through the exterior wall into the living space, using local accepted practice.
- 4.4.4 Move to inside the residence and pull more than enough cable inside to cover the fiber path originally planned in step 4.3.
- 4.4.5 Using the cable jacket slitting tool, slit the cable from the connector end back to the point the cordage exits the interior wall.



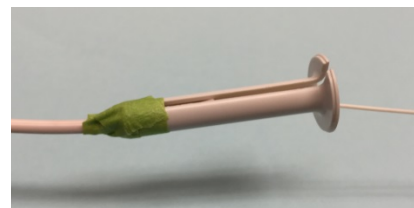
- 4.4.6 Remove the 900um buffered fiber and the aramid strength member in the cordage from the two halves of the outer jacket.
- 4.4.7 Carefully cut the halves of the outer jacket and strength member from each end of the exposed buffered fiber.



- 4.4.8 Place the wall plug at the end of the 900 um just slightly connected to the jacket of the drop cordage. A piece of tape maybe used to secure the out jacket to the wall plug.



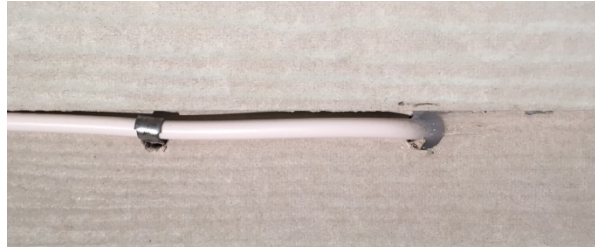
4.8mm Drop to 900um



3.0mm Drop to 900um

- 4.4.9 Apply InvisiLight adhesive to the back of the wall plug flange and place into the opening in the interior wall, while feeding the cordage back through the exterior of the wall, or coiling it inside the wall.

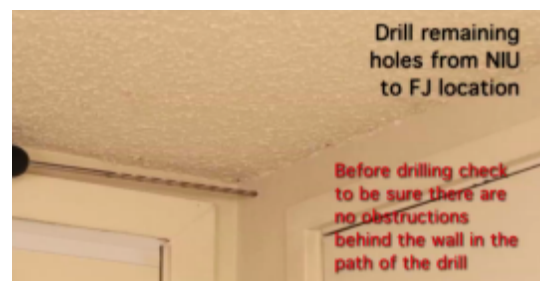
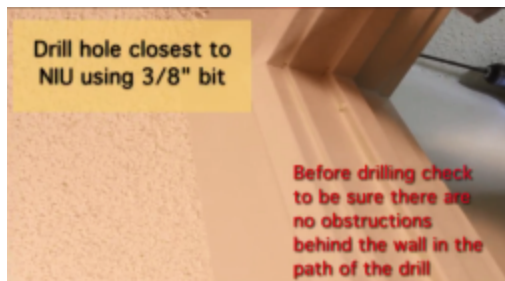
- 4.4.10 The exterior hole into the residence should be sealed with standard practice materials and methods. RTV sealant can be used to make water tight seal. Use a cable anchor within 3 inches of the entrance hole to strain relief the drop cable. Use additional anchors to secure the drop to the home.



- 4.4.11 Slack in the drop cordage outside the residence should be handled using standard practices. The cordage can be bundled with a tie wrap and buried next to the outside wall.

4.5 InvisiLight Fiber Installation

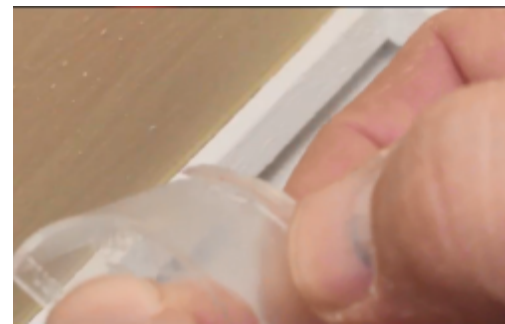
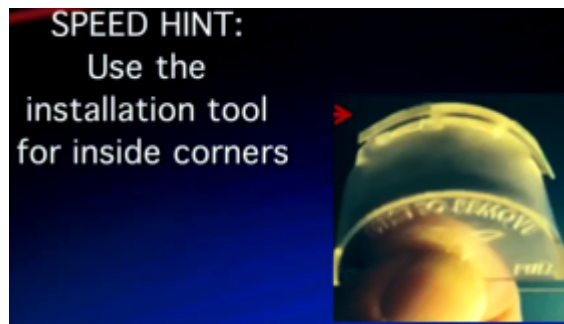
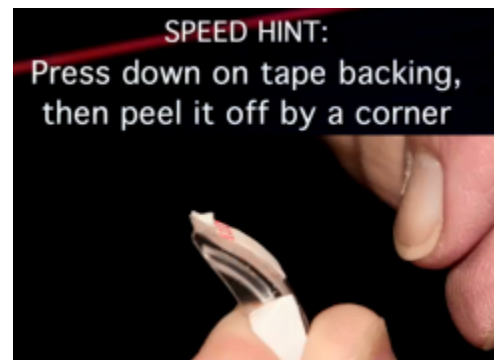
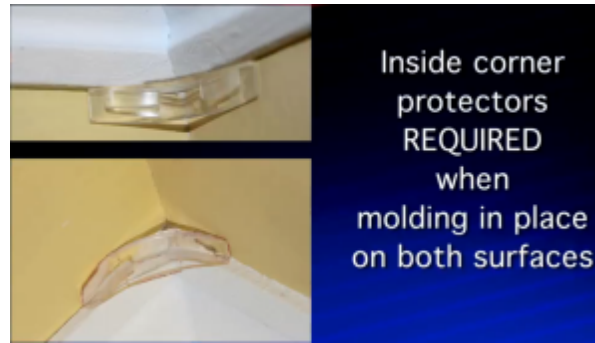
- 4.5.1 Wall Penetrations - If the entry point is located in different room from the ONT, interior wall penetrations may be required. **CAUTION: Prior to drilling check to be sure there are no electrical wires, pipes, or any other obstacles that may be in the path of the drill. If such obstacles are present, move the hole location to where no obstacles exist, or route the fiber around the wall.**



- 4.5.2 Utilizing a 3/8" (9mm) drill bit make the necessary penetrations as close as possible to the corners of the ceiling or walls. Clean up debris resulting from drilling.
- 4.5.3 Install the plastic outside and inside corner bend limiters provided with the InvisiLight kit, on the planned route. The corner anchor tool may be used to press on the inside corners in tight corners. The EZ-Bend fiber allows for up to 25 outside and 25 inside corners.



Remove adhesive backing then press on corner protectors

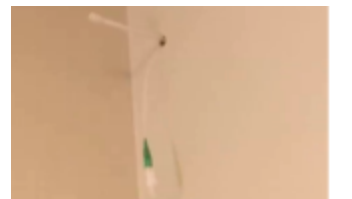


- 4.5.4 Remove the green grip shown below and save it for later placement onto the connector prior to plugging the connector into the ONT.

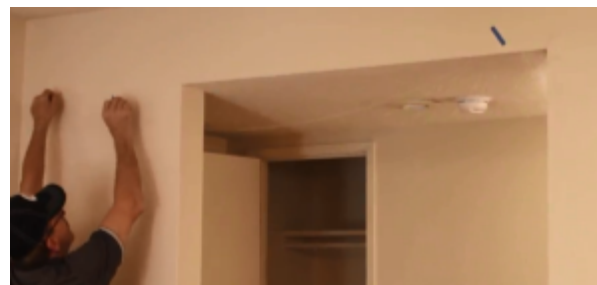
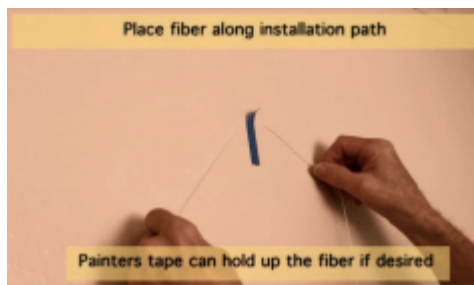


- 4.5.5 Place the 900 micron EZ-Bend InvisiLight fiber along the fiber path to the ONT location, passing through interior walls as required.

- 4.5.6 Use “through wall” tool as shown below to push or pull connector through interior wall holes as needed. For each wall hole, seat the connector in the tool, push through the wall, and rotate the tool ½ turn to release the connector. Remove the tool from the wall.



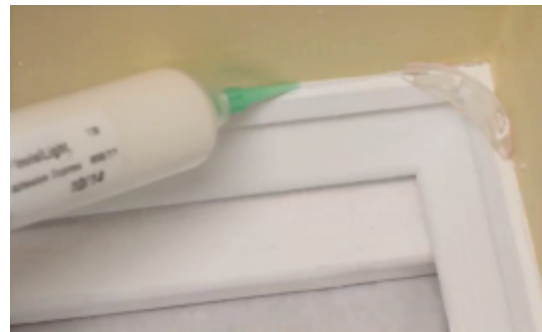
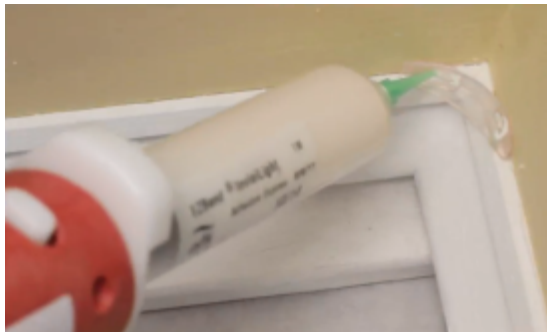
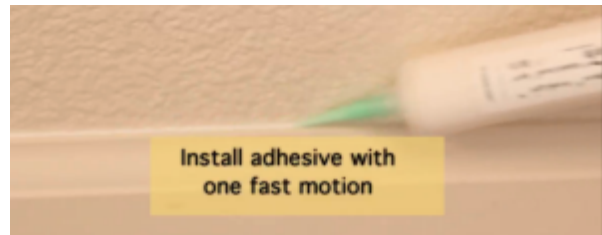
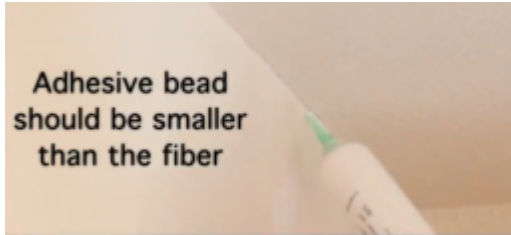
- 4.5.7 Use blue painter’s tape as needed to help keep the InvisiLight fiber off the floor. This is not required, but may help in some installations.



- 4.5.8 Once the fiber is run to the ONT location, the next step is to adhere it to the pathway. Attach adhesive tube to adhesive applicator. Remove cap from adhesive tube and screw on the green nozzle supplied.

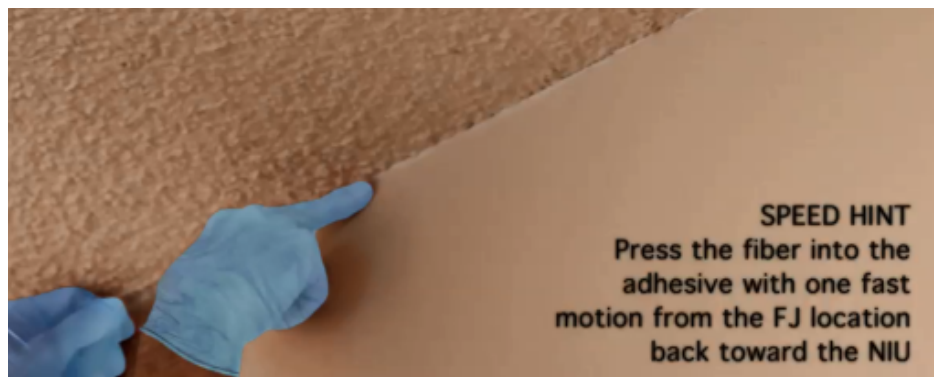


4.5.9 Working from the outside wall entry point toward the ONT, apply a very small 1 mm line of adhesive (about the same diameter as the fiber) along the entire pathway. Have a small wet towel to remove excess adhesive if needed. Apply adhesive to the corner protectors.

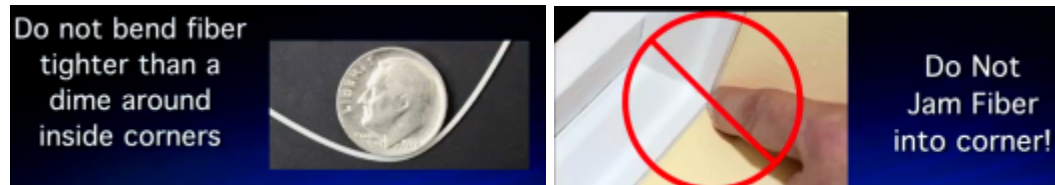
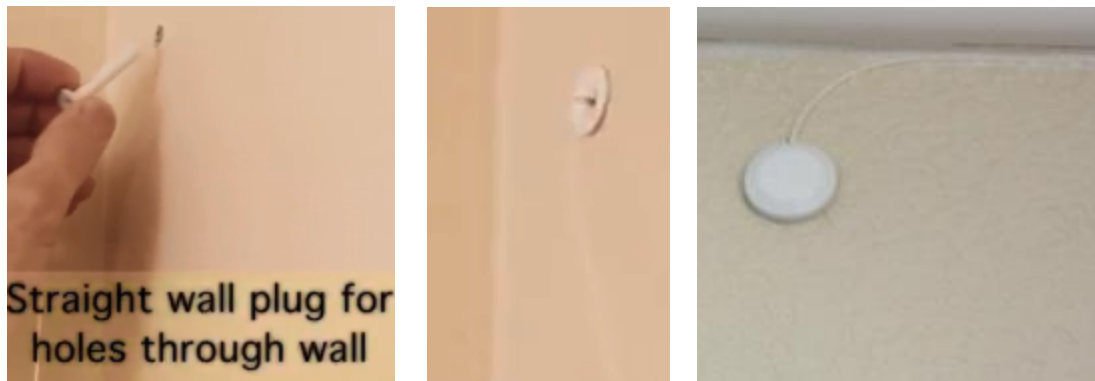
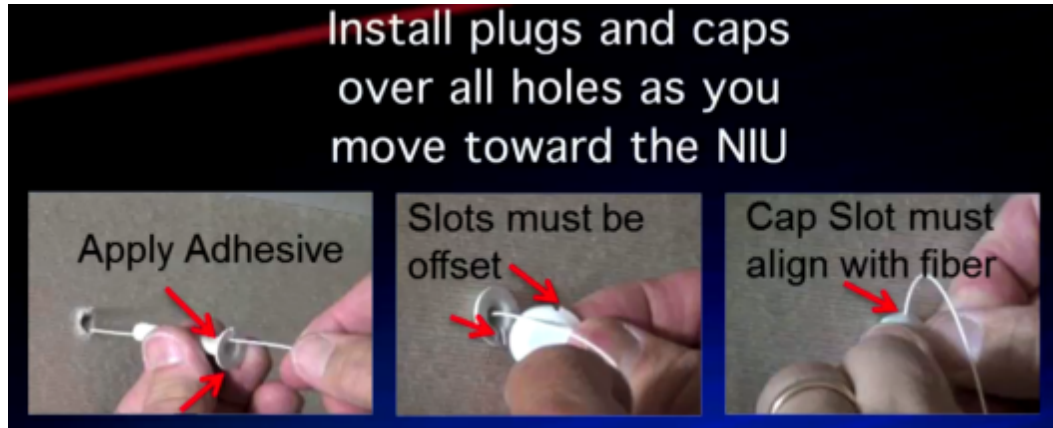


Fiber must be pressed into adhesive in less than 20 minutes. After adhesive is applied move immediately to the next step.

4.5.10 Press fiber into adhesive starting from the outside wall entry point, working the slack toward the ONT. Wear gloves while touching the adhesive.

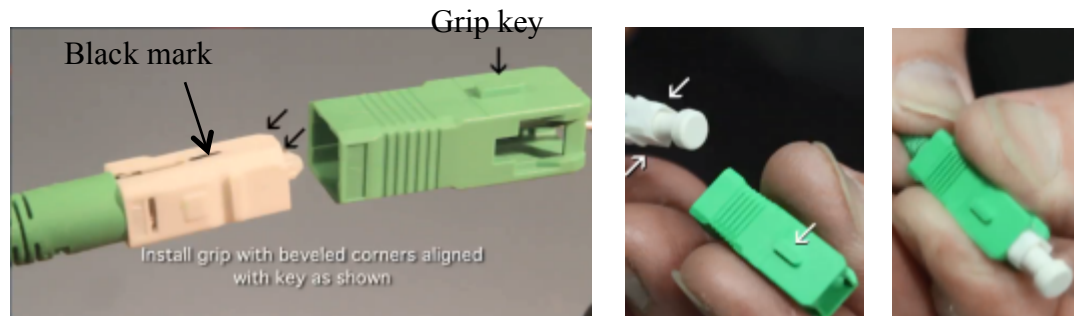


4.5.11 Install wall plugs and caps as you reach them, working the slack toward the ONT.



4.6 Dress Fiber and Mount the ONT

- 4.6.1 Spool up excess slack on the back of the ONT. Mount the ONT on the wall. Be careful not to pinch fiber. Use adhesive on the final section of InvisiLight fiber leading into the ONT.
- 4.6.2 Install the connector grip on the InvisiLight fiber. **VERY IMPORTANT!** The grip key and beveled corners of white connector body should be facing up. **There is a black dot on the correct side facing up.** An audible click will be heard as grip is fully seated. Grip should slide back and forth after placement onto the connector.



If the alignment isn't correct, a high loss condition (possibly up to or beyond 10 dB) will occur.

- 4.6.3 Remove dust caps from connectors, clean the fiber connector ends with Cletop cleaner, and plug in connectors. Make the final connections to the ONT, power and back feed to the coax system.



- 4.6.4 Power test for proper light levels at the ONT.

5.0 Troubleshooting and Repair

- 5.1 Troubleshooting: If test results show excessive loss or no light, inject a “red light” into the connector on either end of the fiber and the red light will visibly leak at any point where excessive loss or a fiber break exists.
- 5.2 Repair procedures depending on location of fiber break. (NOTE: Fiber breaks are very rare and will not occur if the InvisiLight is installed in accordance with instructions.)
- 5.2.1 Fiber is broken just behind the connector on either end
- 5.2.1.1 Remove the connector from the adapter
 - 5.2.1.2 Cut off the connector behind the break.
 - 5.2.1.3 Replace it with a company approved fusion splice-on connector or splice on pigtail.
 - 5.2.1.4 Plug in the new connector into the adapter.

5.2.2 Fiber is broken near the ONT

5.2.2.1 Cut off the fiber past the fiber break, and replace it with a company approved fusion splice-on SC-APC pigtail or connector with length sufficient to reach the ONT.

5.2.2.2 If a pigtail is used attach the fusion splice protector to the wall or molding with tape or adhesive.

5.2.2.3 Attach loose fiber to the wall or molding with adhesive as needed.

5.2.3 Fiber broken more than a few feet from either end

5.2.3.1 Unplug and cut-off the connectors and install InvisiLight™ fiber pigtail over the same path as the existing fiber.

6.0 Confidentiality

The Instruction is OFS Fitel, LLC (“OFS”) proprietary and confidential, the information in this instruction is furnished to ATT Fiber, Inc. for its use.

ATT shall keep the instruction confidential and not disclose it to a third party, except to its employees, agents and subcontractors with a “need to know”. The information in this instruction will be used to install product for ATT’s use. The written agreement to keep the information confidential has been approved by both companies.

7.0 Safety

Make sure to comply with your employer or contractor training and safety procedures and all government safety regulations.

The adhesive used with the InvisiLight™ Solution may cause allergic skin reaction.

Wear protective gloves and safety goggles and avoid breathing vapors.

Do not look into any fiber optic connector as eye damage may result.

8.0 Disclaimer

This installation instruction is furnished on an “as is, where is” basis. OFS disclaims any and all liability, representation or implied, regarding this instruction, its content and use to the fullest extent permitted by law.