Permalock™ Fiber Optic Splicer Kit

User Guide

WARNING

Remove batteries before shipment or inactive storage of 30 days or more.

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Revision Record

Revision	Author	Date	Change Description
00	Victor Wu	2/2008	Initial Engineering Release
01	Jeanne Hladky	4/26/2010	Update
02	Jeanne Hladky	7/15/2011	Update – add new tools (sleeve assembly, braid pick, fiber inspection)
03	Jeanne Hladky	8/5//2011	New Figure 5
04	Jeanne Hladky	3/26/2013	Minor clean-up

Document Approval

Department	Name	Signature	Date
Project Engineer	Victor Wu		
QM	Jeanne Hladky		

1 Overview

The Agiltron ***Permalock™ Fiber Optic Splicing Kit*** contains the latest technology to connect two fibers together easily and reliably without the use of fusion splicing. It offers hazard-free splicing without sparks, high voltage or heat. Moreover the glass sealed splice offers low optical loss, wide-temperature operation, 25-year service life, and low cost of ownership. The patent pending design enables fiber self-alignment with high repeatability and a "light-bridging" material fills the fiber gap for a stable, ultra low loss splice. The kit includes a battery operated hand-held aligning and curing tool and the fiber preparation tools needed to complete a high reliability splice.

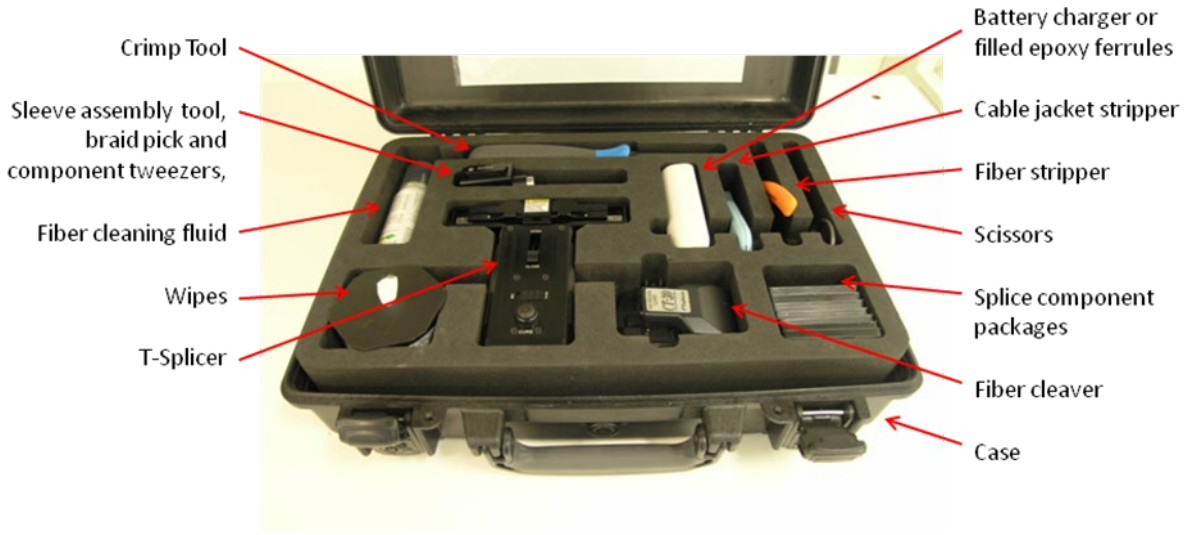


Figure 1. Permalock™ Splicing Kit (Batteries not included)

Permalock™ fiber optic splices have passed the most stringent aerospace qualification. The splice has several outer-jacket options suited for various applications. This product is well suited for applications in aerospace, shipboard/submarine, mining, and communication networks, as well as field optical fiber repair.

Figure 2. Permalock™ Splicing Tool

Figure 3. Fiber cleaving and preparation tools

2 Safety

The tool is equipped with an interlock system to prevent unintentional exposure to UV radiation. The UV light will not be activated when the UV Cure Cover is open. If the UV Cure Cover is opened during the cure period, the UV light will immediately shut off.

3 Getting started

The splicer is powered by 4 disposable alkaline AA batteries. Approximately 50 splices can be made before replacing batteries. Batteries are not included with the kit.

To load batteries into the Permalock™ splicing tool, undo the screw at the base of the handle and load the batteries into the handle with their polarity as shown in Figure 4. Polarity is also indicated on the inside of the battery compartment door. If batteries are correctly installed a flashing green light will show on the cure button when the power switch is turned on. If the light flashes red the battery power is low and batteries should be replaced.

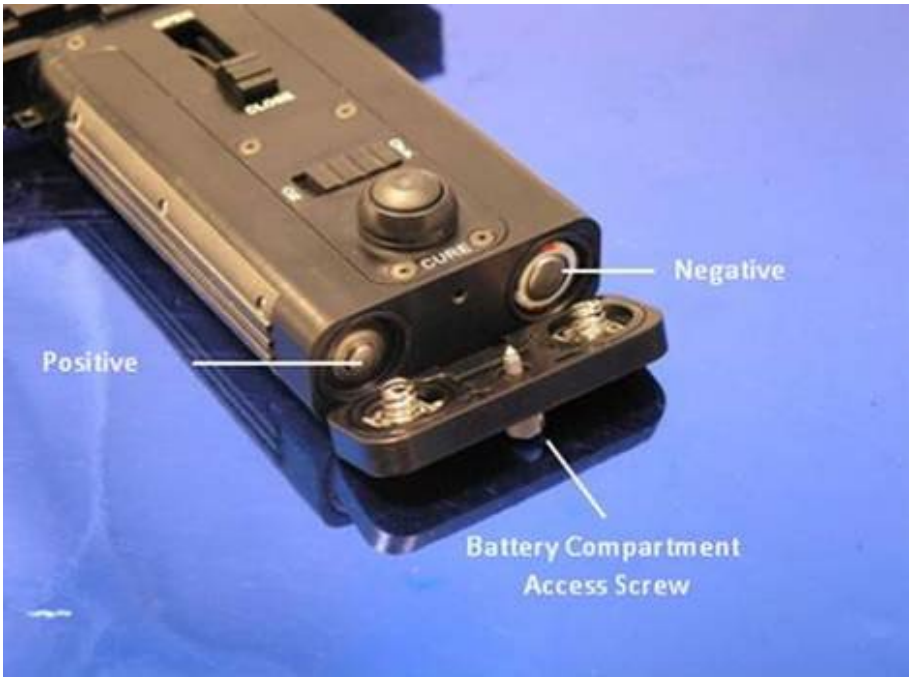


Figure 4. Battery compartment

4 Overview of the Splicing Process

A Permalock™ splice is created by inserting two cleaved fiber ends into a glass alignment ferrule containing an optical gap filler material. The index of the filler exactly matches the index of the fiber resulting in outstanding fiber coupling and low insertion loss even if the fiber cleaving operation is not perfect. The gap filler is then cured using ultra violet light which cements the fiber ends permanently into the glass ferrule creating an exceptionally strong splice and protecting the splice from contamination. Finally, an outer protection tube and shrink tube shield the splice from harsh environments.

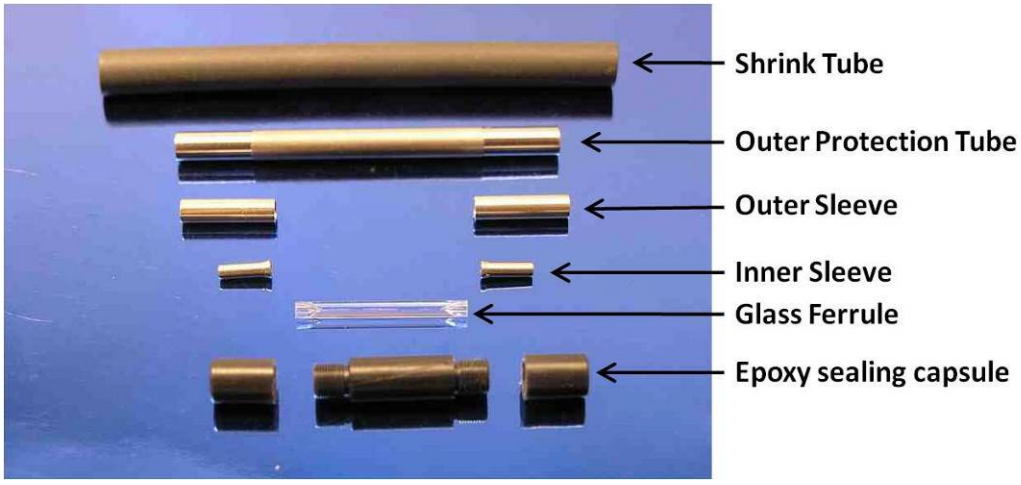


Figure 5. Components of a splice

The splicing process consists of the following steps.

1. Prepare the fiber ends
2. Load a glass joining ferrule and the prepared fibers into the Permalock™ splicing tool
3. Insert the fibers into the glass ferrule
4. Cure the optical gap filler with the built in curing lamps
5. Remove the splice from the Permalock™ splicing tool
6. Install and crimp the protection tube
7. Slide shrink tube over splice; heat to shrink.

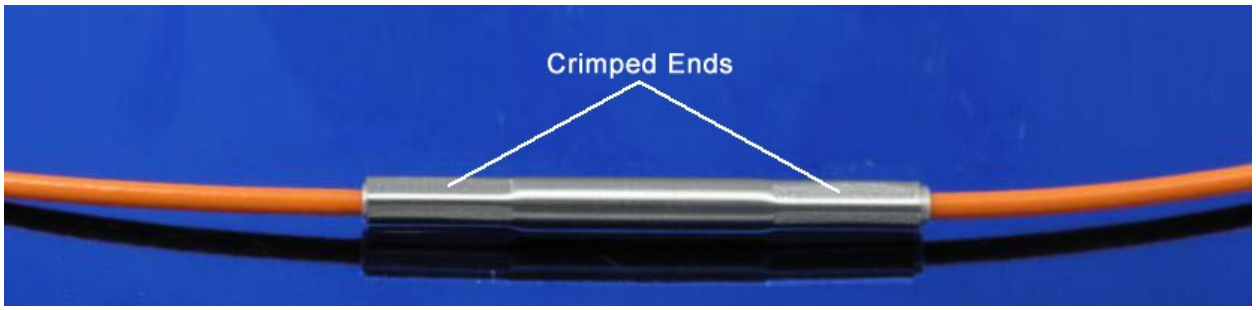


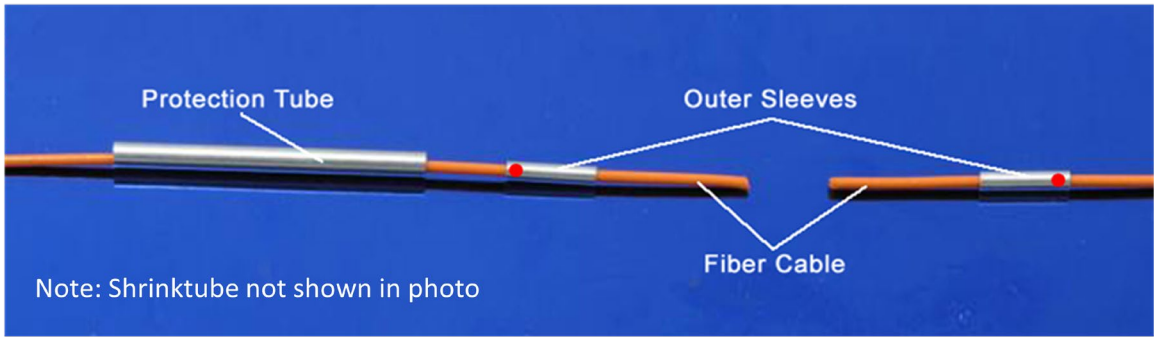
Figure 6. A finished splice (without shrink tube)

Figure 7. A finished splice (with shrink tube)

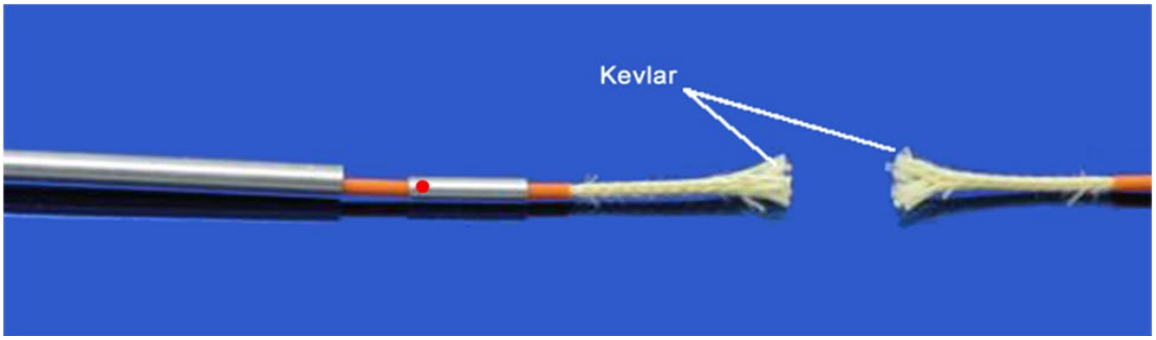
5 Step by Step Splicing Process

5.1 Preparing the fiber ends.

5.1.1 Slide one shrink tube, one protection tube and one outer sleeve over the end of one of the fibers to be spliced as shown in the figure below. The red mark on the outer sleeve should be oriented as in the photo. Slide a second outer sleeve (red mark first) over the end of the second of the two fibers with sleeve as shown:

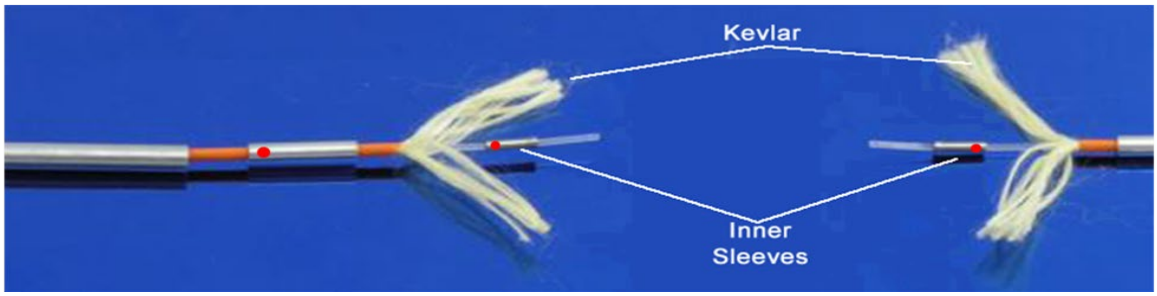


5.1.2 Use the jacket strippers to strip 35mm of the jacket from the fiber as shown below:

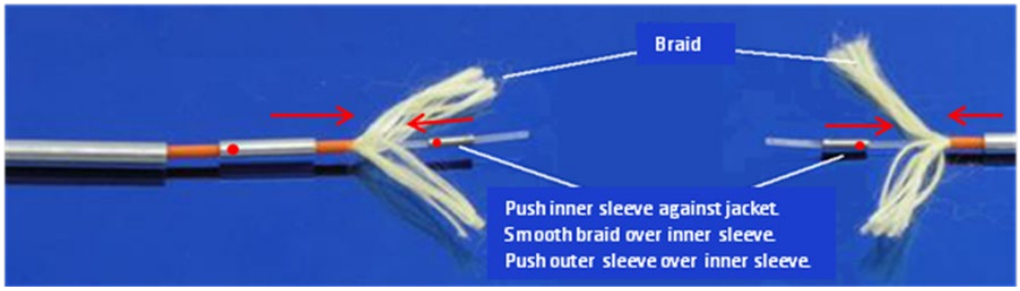


5.1.3 Use pick to unbraid the kevlar about half-way down. Trim with scissors.

5.1.4 Push braid back to expose the optical fiber (twisting the braid may help). Insert the optical fiber into the inner sleeve with sleeve oriented as shown in the photo. Repeat procedure on the second piece:

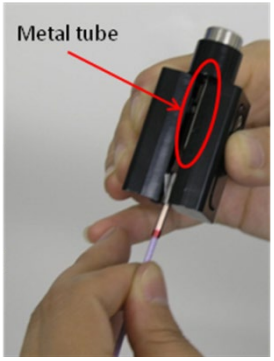


5.1.5 Push the inner sleeve back against the jacket as far as possible and pull the outer sleeve over it (approximately halfway)., smoothing the braid over the inner sleeve. Pull the outer sleeve over the inner sleeve so 50~75% of the inner sleeve is covered.



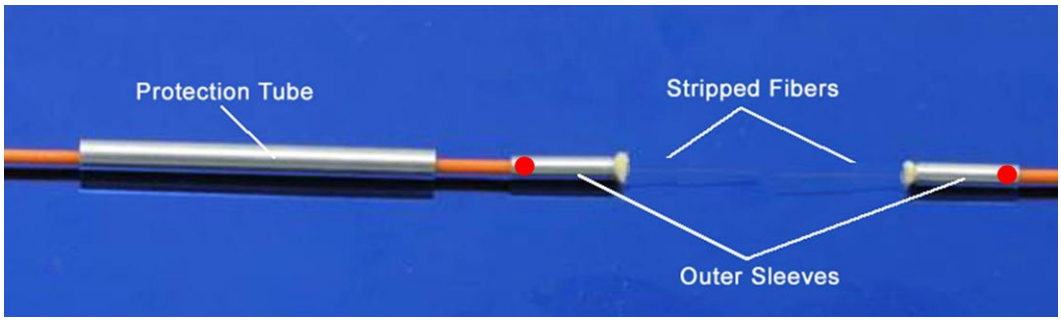
5.1.6 Use the sleeve assembly tool provided to insert the inner sleeve under the outer sleeve

- Squeeze tool on sides to open.
- Insert fiber into the small metal tube
- Release pressure on sides of tool to close
- Press button all the way in to push the inner sleeve under the outer sleeve.



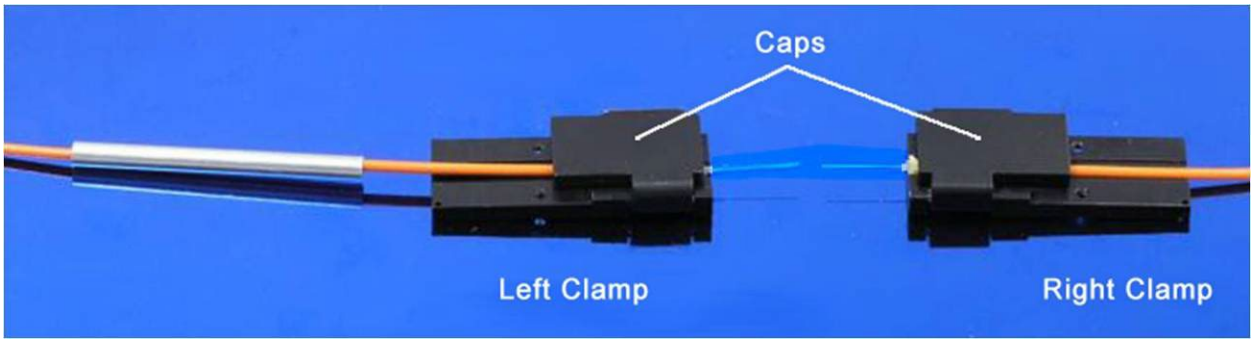
5.1.7 Cut off the protruding braid material with the ceramic scissors in the kit. Run your fingers along the fiber several times to straighten it out as much as possible.

- If the fiber is not straight you may not get a good cleave and the fiber might not insert properly into the ferrule.
- Be careful that you do not cut the fiber.
- The fibers from the untwisted braid must be spread evenly over the tubes.

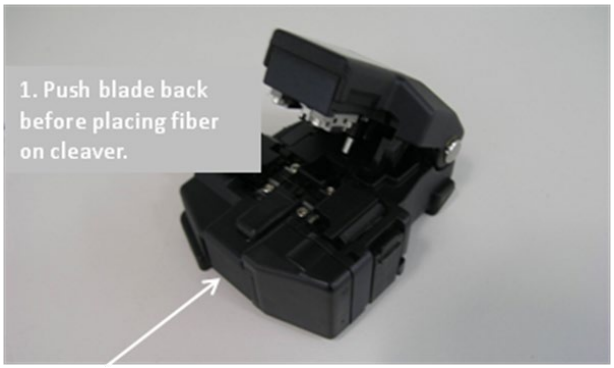


5.1.8 With Fiber Loading Lever switch set on "OPEN", remove the left and right fiber clamps from the Permalock™ splicing tool. Flip open the caps, insert sleeves into left and right fiber clamps then snap the caps down (see photo below). Strip the buffer using the loose tube strippers.

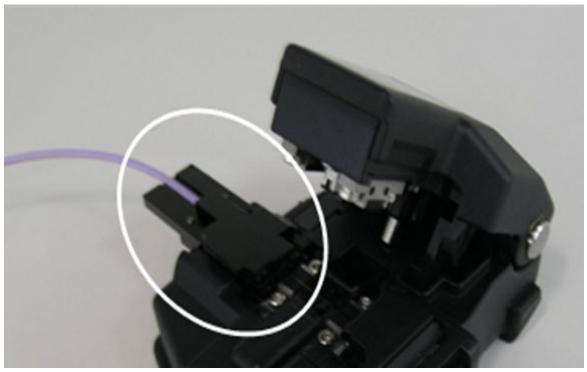
- Make sure the Fiber Loading Lever switch set on "OPEN" before removing clamps.
- Make sure stripped fiber is straight. You may need to reseat the sleeve in the clamp if the fiber comes out at an angle.



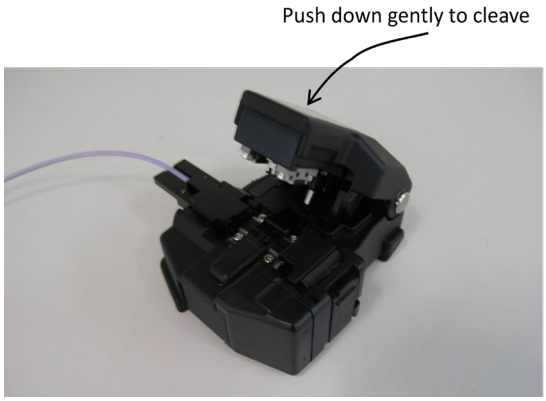
5.1.9 Clean the fiber: using a clean wipe dipped in fiber cleaning fluid, make a single swipe from base of fiber to tip. Insert the clamp into the cleaver as shown and cleave each fiber:



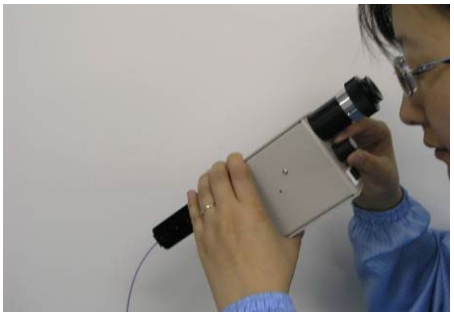
Push blade back.



Place clamped fiber on cleaver as indicated



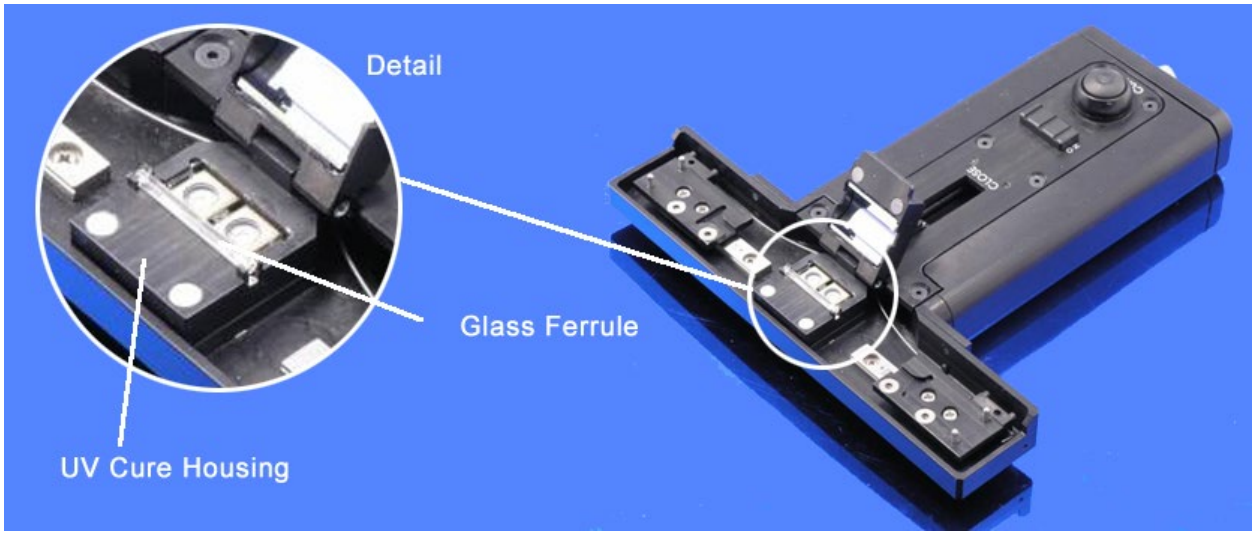
Push down gently to cleave. The cleaver will open when you release pressure.

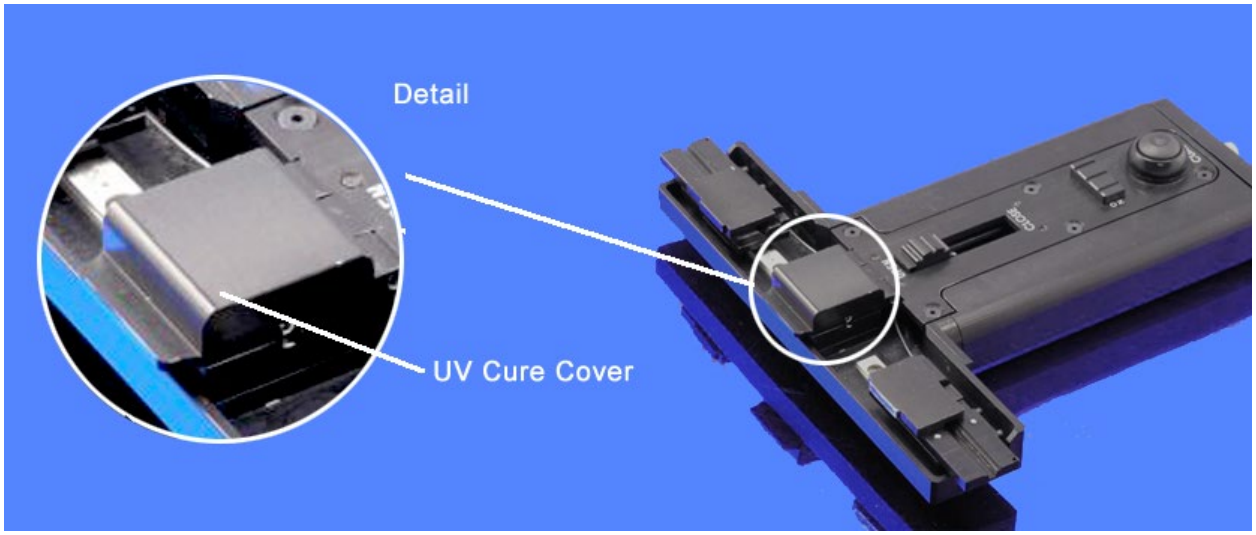


Use fiber inspection tool to inspect cleaved ends. If cleaved end passes inspection you are ready to splice. If cleaved end is dirty, clean using tissue and fiber cleaning fluid. If there are cracks propagating into the core, repeat fiber preparation instructions and recleave.

5.2 Load the fibers and a ferrule into the splice tool:

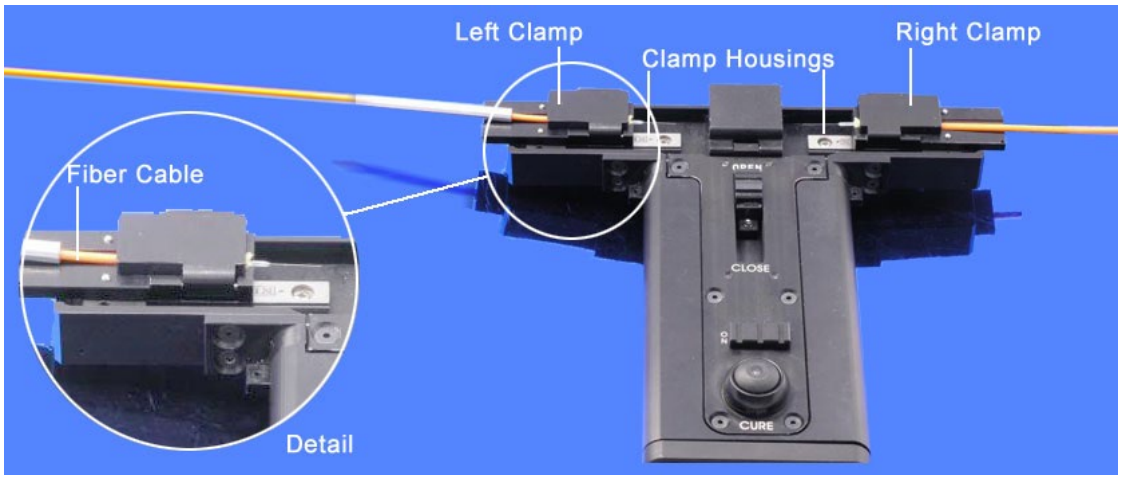
5.2.1 Insert pre-filled glass ferrule into UV cure housing of the Permalock™ splicing tool. Close the cover of the UV cure housing to clamp the ferrule in place. The UV light cannot be operated when the UV Cure housing is open.





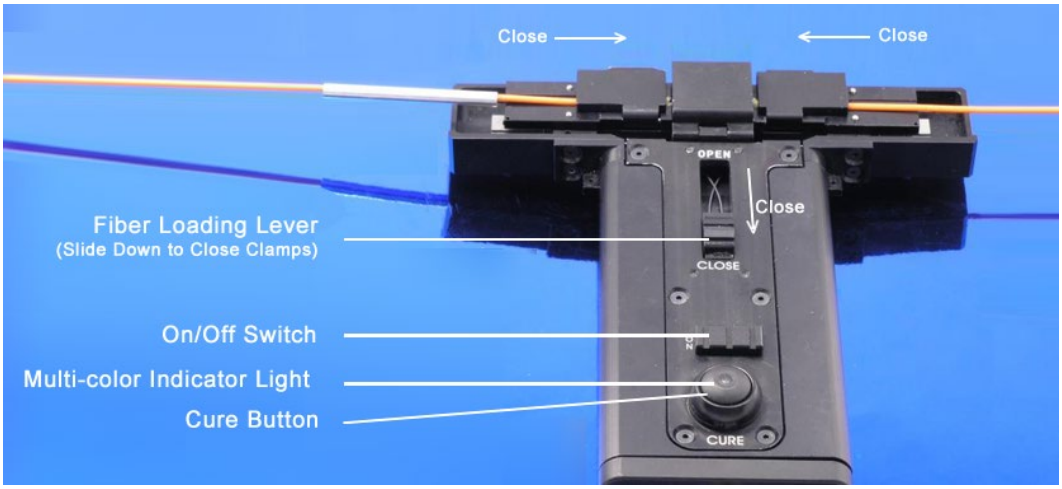
5.3 Inserting the fibers into the ferrule and curing the optical gap filler

5.3.1 Insert the left and right fiber clamps into the clamp housings of the splicing tool locating the clamps over the alignment pins (Note: cure tool must be "OPEN" to insert clamps)



5.3.2 Curing

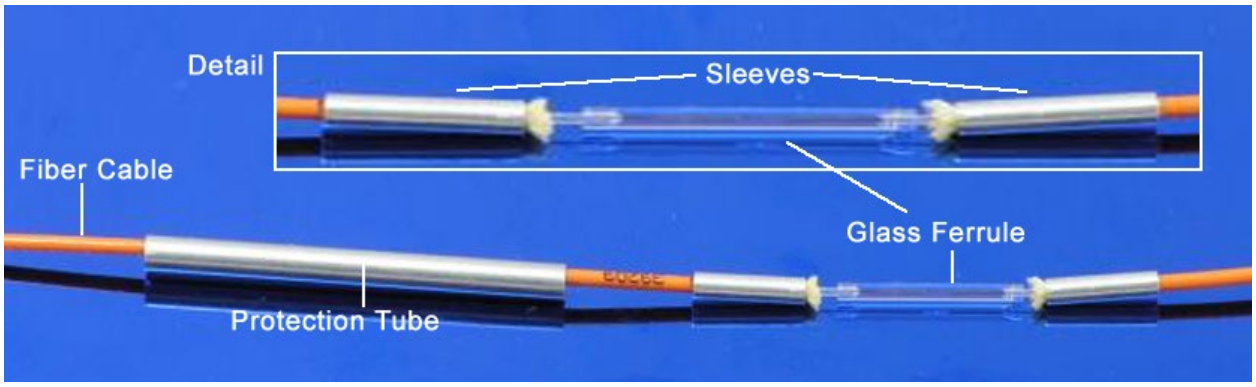
- Gently slide down the fiber loading lever from the "OPEN" to "CLOSE" position. This will insert the fibers into the ferrule.
- Turn the battery switch ON. The cure button should show solid green indicating the system is ready to perform a cure.
- Push the cure button, hold for one second and release. The solid green should change to flashing green indicating the UV light is on and curing.
- When the cure button stops flashing and is solid green the UV curing is finished. This takes approximately 5 minutes for OC1260.
- If at any time during the cure the light changes to red, the cure may not be complete.
- LEAVE FIBER LOADING SWITCH in the CLOSED POSITION until the CURED SPLICE has been removed. Opening the T-Splicer will put stress on the fibers splice and may damage the splice.



5.4 Removing the Cured Splice from the Tool and Assembling the Protection Tube

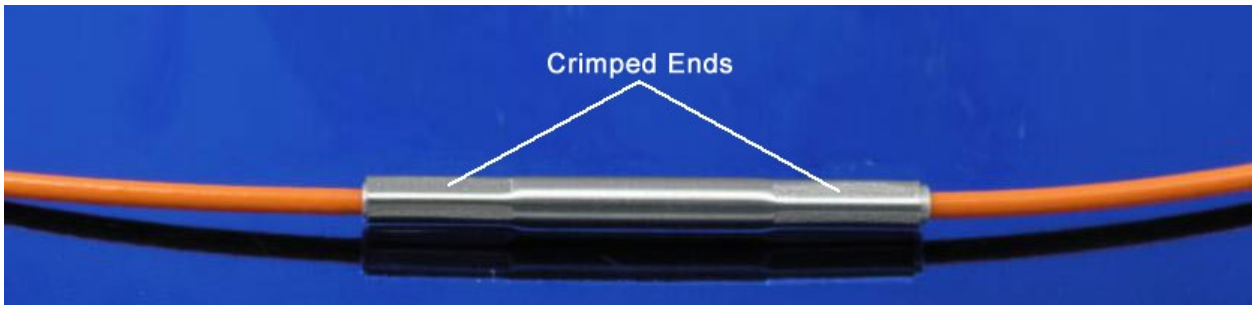
5.4.1 With Permalock™ splicing tool still in the CLOSED position, open the UV cure cover lid and flip open the clamp caps. Lift the splice out. The cured assembly should be as shown below.

- Note - Shrink tube not shown in photo



5.4.2 Slide the protection tube over the sleeves and ferrule and center it between the two sleeves as shown below:

5.4.3 Crimp down the tube at each end using the crimping tool supplied in the kit.



5.4.4 Position shrink tube so it is centered over splice and heat with hot air gun. The splice is now completed and ready for use.

6 Maintenance

- To maintain the tool in good operating condition make sure that no excess gap filler has contacted any surfaces in the curing housing. If any is evident, remove it with a clean dry cloth.
- If the mirror becomes dirty, wipe it off with a clean dry cloth.
- If the curing light changes to red after the curing button is pressed, install 4 fresh AA batteries.
- Remove batteries before shipment or inactive storage of 30 days or more.

7 Troubleshooting Tips

Problem	Cause	Action
Flashing green light doesn't turn on when you slide switch to "ON" position.	No batteries, low battery power or batteries installed incorrectly	Open battery compartment to check for batteries. Replace with fresh batteries. Check battery polarity
Flashing light is red.	Battery power is low.	Replace with fresh batteries.
UV light doesn't turn on when you push the cure button.	A safety interlock prevents the light from turning on if the UV cure cover is open.	Make sure the UV Cure cover is completely closed.
Light turned solid red during cure.	UV Cure cover was opened.	Close UV Cure cover securely and push the cure button to start a new cure cycle.

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