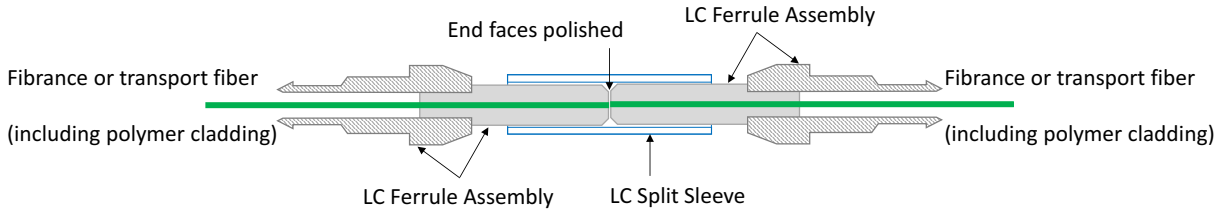
Using the Versalume LC Connectorization Kit

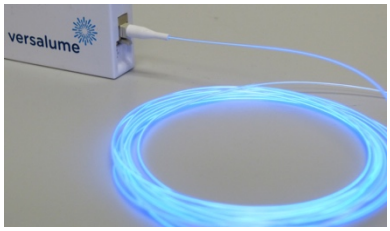
Version 1.0

Overview: This document provides a step-by-step simple process on how to terminate Corning® Fibrance® Light-Diffusing Fiber with an LC ferrule assembly or LC connector using the Versalume Connectorization Kit. A short video of this process can be found at versalume.com/pages/how-to-videos. A ferrule is a tube that the fiber can be threaded through that provides durability for the fiber tip. An LC connector is a keyed connector containing a similar ferrule at the tip. This kit has been designed to provide all the tools and materials necessary to strip the fiber buffer, glue the fiber into a ferrule or connector, scribe / cleave the fiber tip, and polish the fiber / ferrule or fiber / connector end-face.

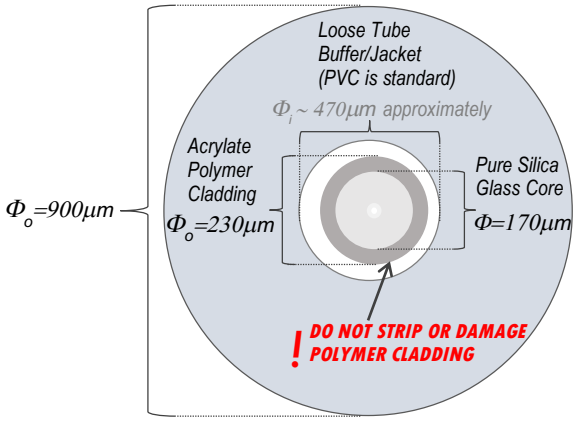
Polishing the ferrule and fiber tip ensures the fiber end face is flat and parallel to make good contact with a second fiber ferrule. A simple fiber to fiber connection can then be created with ferrules and a split sleeve. Such connections are useful for creating prototypes using Fibrance technology. Illustrated below is an example of a fiber to fiber connection using a pair of ferrules mated inside a split sleeve.



Fibrance fiber terminated in an LC connector is ready for attachment to a single-color or multi-color laser as pictured to the right.



Fibrance fiber has an all-silica glass core where the cladding consists of a soft polymer. To retain light guiding and diffusion properties, the cladding should never be stripped or damaged. To the right is a drawing of the cross section of the fiber including the dimensions.



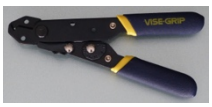
Versalume's Connectorization Kit Contents:

- (5) Ceramic LC Ferrule Assemblies - 1.25mm Outer Diameter (OD), 230 µm Inner Diameter (ID)

- (2) 1.25mm Ceramic Split Sleeves

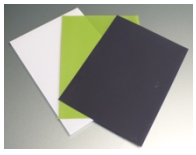
- (2) LC Connectors with Boots

- (1) Buffer Stripping Tool



- (1) Ruby Fiber Scribe

- (1) Set of Silicon Carbide Hand Polish Films (9" x 6.5")
  - 5 µm grit - Black color single sheet
  - 1 µm grit - Light Green color single sheet
  - 0.3 µm - White color single sheet



- (5) Packs of Isopropyl Alcohol Pre-Moistened Towelettes

- (1) 25 mL Quick-Setting Epoxy
  - 5-minute set time
  - 1 hour cure at room temperature

- (1) 6" x 9" Glass Polish Plate with rubber feet

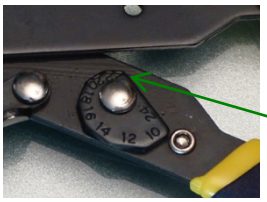
- (1) Polishing Puck for LC 1.25mm

Termination and Polishing Instructions

Eye protection should always be worn when working with optical fiber.

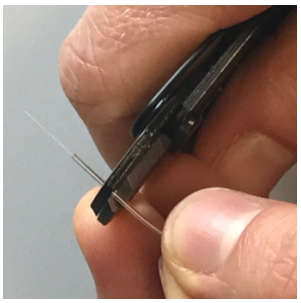
Step 1. Strip Buffer from Fiber Ends:

a. To remove the buffer from Fibrance fiber without damaging the cladding, the fiber stripper should be adjusted to the smallest setting.



Adjustment cam should be set as shown for smallest diameter

b. Holding the stripper perpendicular to the fiber, close the stripper jaws about 1 inch from the fiber end and pull away from the fiber to strip. Discard the buffer.
c. Repeat on each end of the fiber / multiple fibers that are to be terminated.
d. Wipe off the end of the fiber with a pre-moistened alcohol wipe.

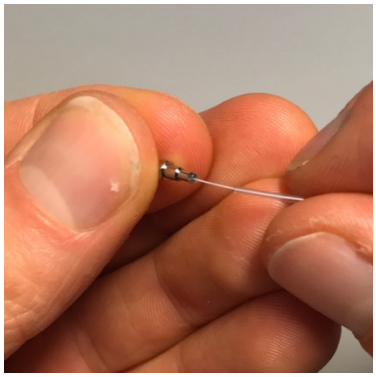


Step 2. Prepare Epoxy:

a. Remove the epoxy cap and dispense small and equal amounts of 2-part epoxy onto scratch paper.
b. Replace epoxy cap – *make sure that it is cleaned and put on in the same orientation that it came off so you don't glue the cap onto the dispenser*.
c. Mix the two components thoroughly together – *an unbent paperclip works well*.

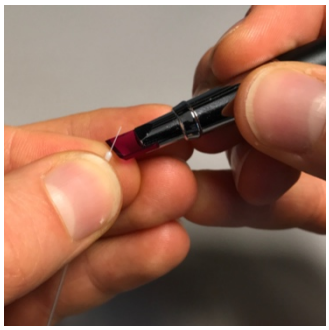
Step 3. Fiber to Ferrule Assembly Adhesion:

a. Coat the stripped fiber in the epoxy.
b. Insert the fiber through the large ID of the ferrule assembly until the fiber protrudes from the ferrule tip and cannot be advanced any further. At this point the fiber jacket will be butted up to the relief inside the ferrule. Pointing the ferrule assembly down will help epoxy run into the assembly for a strong bond.
c. While holding the fiber firmly within the assembly, wipe the fiber surface, assembly body and ferrule tip with a pre-moistened alcohol wipe to remove excess epoxy. This allows for easier polishing and smooth insertion of the ferrule assembly into a split sleeve later.
d. Set aside to cure for at least 1 hour.



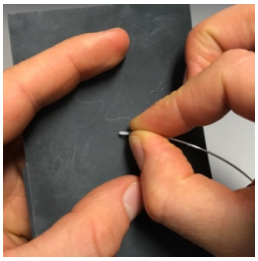
Step 4. Trim Excess Fiber:

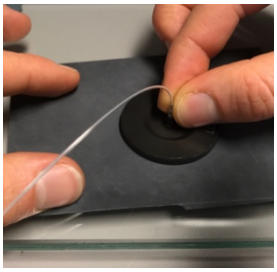
a. Scribe through the fiber coating and onto the glass core about 1mm from the ferrule tip.
b. Holding the scribe at an angle, spin the fiber against the scribe until the fiber breaks off.
c. Dispose of fiber fragment safely.



Step 5. Polishing Fiber / Ferrule End:

a. Cut all polishing papers into quarters with a box cutter since this may dull scissors.
b. Air polish fiber/ferrule end using black 5µm grit polishing paper by holding paper in the air, pressing ferrule tip onto the grit paper while making circular or figure-8 motions for ~30 seconds. Continue until the fiber is flush with the ferrule. This polishing step helps to prevent crumbling of the fiber tip from too much applied pressure.
c. Place 5µm grit paper on the Glass Polish Plate. De-ionized water droplets can be used to help adhere the paper to the glass plate.
d. Insert the ferrule assembly into the Polishing Puck to ensure the ferrule is flat and parallel to the polishing plate. Gently press and move the puck and ferrule against the plate, making circular or figure-8 motions for ~30 seconds. Repeat this process for each of the polish grits in order of decreasing grit size.



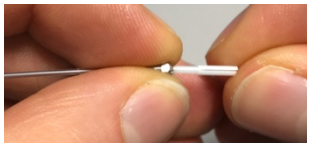


Note:

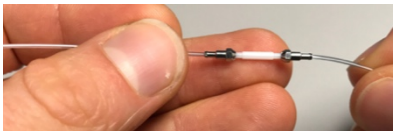
- *Applying even, downward pressure on the puck will ensure the ferrule is polished flat and parallel.*
- *Wetting the surface of the polish paper with de-ionized water helps the polishing debris float away during the polishing process.*
- *Cleaning the puck and ferrule tip with an alcohol wipe in between paper / grit changes will prevent cross contamination and remove polish residue.*

Step 6. Connecting Two Ferrules with a Split Sleeve:

a. Insert fiber with ferrule assembly into one side of the split sleeve until the tip reaches the middle of the split sleeve.



b. Insert second fiber with ferrule assembly into other side of split sleeve. Push until the two ferrules are gently butted together.
c. Illuminate other end of fiber to see results.

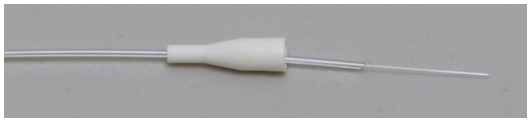


<u>For an LC Connector:</u>

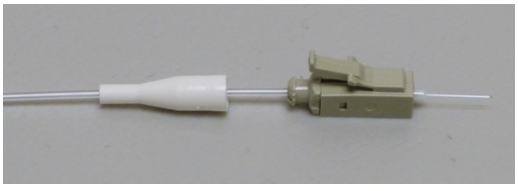
To terminate the fiber in an LC connector instead of a ferrule, follow **Steps 1 & 2** exactly as outlined above.

Step 3. Fiber to LC Connector Adhesion:

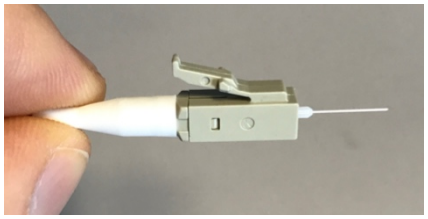
a. Slide the white boot over the stripped fiber, making sure the larger ID end of the boot is facing the fiber end.



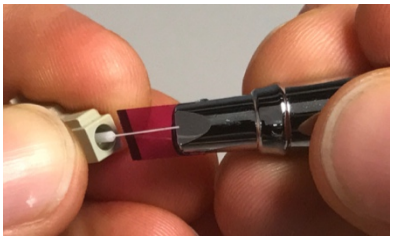
b. Coat the stripped fiber in the epoxy.
c. Insert the fiber through the large ID of the LC connector until the fiber protrudes from the ferrule tip and cannot be advanced any further. At this point the fiber jacket will be butted up to the relief inside the connector. Pointing the connector down will help epoxy run into the connector for a strong bond.

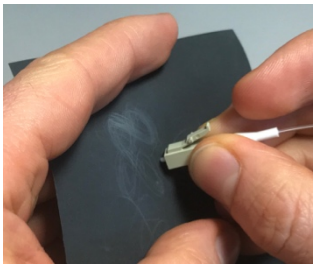


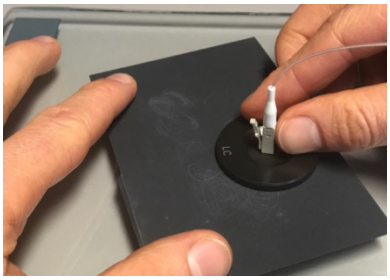
d. While holding the fiber firmly within the LC connector, wipe the fiber surface, connector body and connector tip with a pre-moistened alcohol wipe to remove excess epoxy.
e. Set aside to cure for at least 1 hour. After epoxy is cured, slide the boot up to mate it with the LC connector.

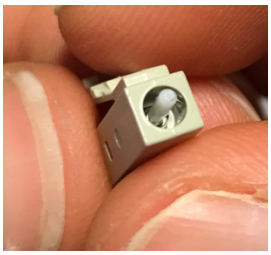


Follow **Steps 4 & 5** as outlined above, treating the connector tip or end as the ferrule tip or end. The LC connector is sized to also fit into the polishing puck. When polishing is complete, your connectorized Fibrance fiber is ready to be plugged into an LC connector compatible laser source, such as the Smart Module that Versalume offers.









We hope you enjoy using the Versalume Connectorization Kit. Additional replacements piece parts are available to order. For a short video illustrating this process, please go to versalume.com/pages/how-to-videos.