

Handling instructions for LIEKKI® fibers

Coating removal

The fastest and easiest approach for removing the fiber coating is by either using commercially available fiber strippers suitable for the required fiber diameter or by using acetone for the removal of the coating material (the coating material is not soluble in isopropanol alcohol.). Most mechanical and thermo-mechanical strippers are known to work.

During the coating removal process, special care should be taken to avoid any scratches on the fiber surface as these can degrade the mechanical reliability of the fiber. For best long-term reliability of spliced fibers it is therefore recommended to use thermal and chemical stripping methods over mechanical techniques. Also, instead of wiping residual coating parts by tissue soaked with solvent, ultrasonic cleaning should be the preferred approach.

Instructions for quick coating removal with acetone:

The fastest removal of the coating can be realized by keeping the fiber pressed between two cotton pads soaked in acetone for about 30s and then start gently to rub the fiber between the pads. Continue this operation until all the coating material is removed. This operation has to be done extremely carefully because too much force may break the fiber and hurt your fingers. Alternatively, you may simply immerse the fiber in an acetone container for about 5 minutes and then either the coating is totally dissolved or can be wiped out easily with cotton pads.

Care should be taken when using acetone because it may damage the plastic parts of fiber cleaver or splicer. We recommend using separate cotton pads or lint-free paper soaked in isopropanol alcohol to clean the fiber after using acetone. To achieve good coupling (splice or temporary coupling) the glass has to be very well cleaned.

Cleaving the fiber

Up to 250µm series fibers can be cut with any regular fiber cleaver that works with 250µm fibers. It is recommended to use special cleavers for larger fibers e.g.

- Vytran LDC- series
- 3SAE Liquid Clamp Cleaver

To achieve good quality fiber ends the cleaver has to be maintained according to its user instructions. The quality of the cutting blade can be checked regularly by inspecting the cleaved fiber end with a microscope.

Hints for cleaving non-circular cladding shape fibers:

- In general, close first the clamp which holds the fiber end that should be cleaved and then close the clamp for the fiber end that will be cut away. In this way twisting of the fiber is avoided and excess torsional stress minimized.
- In order to avoid twisting of the fiber due to octagonal cladding shape, one approach can be to not completely strip the coating from the fiber end, so that both clamps of the cleaver fix fiber with coating.

Recoating of double-clad fibers

Double-clad fibers require the use of matched recoating material to ensure low-loss transmission of cladding light through recoated fiber sections. This is particularly important at splice connections. Recoating material used with our double-clad fibers should have a cured refractive index of 1.369 at about 590nm. Suitable material can be obtained from multiple manufacturers. nLIGHT technical support can provide further information if needed.

Fiber coiling

The coiling diameter of large-mode-area fibers must be optimized in each laser design to balance efficient stripping of higher order modes and low-loss transmission of the fundamental LP01 mode. The optimal coiling diameter depends on the core size and NA of the fiber but also on other system design parameters, such as pump and signal properties. In systems with multiple amplifier stages also the coupling between each stage needs to be optimized for best beam quality performance.

Guidelines for the coiling diameter of different fiber types are listed in below table. Circular coiling with constant coiling diameter throughout the entire fiber length is assumed.

Fiber type	Recommended coiling diameter for best beam quality and low loss LP01 transmission[cm]	Long-term, mechanically safe coiling diameter [cm]
Passive/Ybxx-10/125DC(-PM)	8 - 10	3.3
Passive/Ybxx-12/125DC(-PM)	7 - 9	3.3
Passive/Yb1200-14/250DC	12 - 14	6.5
Passive/Ybxx-20/125DC(-PM)	6 - 9	3.3
Passive/Ybxx-20/400DC(-PM)	10 - 12	10
Passive/Ybxx-25/250DC(-PM)	8 - 10	6.5
Passive/Ybxx-30/250DC(-PM)	8 - 10	6.5

Other basic recommendations for the fiber handling

- ✓ Start the use of the fiber from the out end (marked with a sticker).
- ✓ Take care that the fiber is not scratched and does not contact anything sharp during handling.
- ✓ Avoid torsional stress during fiber unspooling and coiling.
- ✓ Keep the fibers in a dust free environment with the fiber spools in their protective covers.
- ✓ We recommend to store nLIGHT’s fibers between +10°C and +60°C and within humidity limits of 30% - 70% RH.
- ✓ Protect the fibers from UV.
- ✓ Use fiber only under non-condensing environment.
- ✓ Do not drop the reels.

