F-CLX-8-3-2 Manual Angled Cleaver

User Manual - *Issue 1.0 Date September 2020*

Contents

Issue & Scope

This user manual will be updated from time-to-time to reflect technical changes to the product. This covers operation of the **F-CLX-8-3-2 Manual Angled Cleaver**.

Introduction

Angled Fiber Cleaver

The **F-CLX-8-3-2 Manual Angled Cleaver** is designed to angle cleave a single 125μm diameter singlemode optical fiber with the mirror-smooth, damage-free fiber core.

Cleaving a singlemode fiber with the core at 8º from the perpendicular ensures the back-reflection will not be guided back down the fiber, and hence the return loss will be -60 dB or greater. 8° angled cleaves are used in mechanical splices, for instance in FTTx applications.

The cleaver can be used as a field tool or on the benchtop. The fiber is clamped through its coating in a fiber holder. The stripped fiber passes between dowels for proper alignment.

The cleave is carried out by pressing down the green anvil. The two vertical polyurethane rubber rings trap and clamp the fiber, the anvil deflects the fiber so that it hits the diamond blade which scratches the fiber, causing it to cleave.

The offcut is left between the dowels on the offcut side. Remove the offcut and dispose of carefully.

Specifications

F-CLX-8-3-2 Manual Angled Cleaver

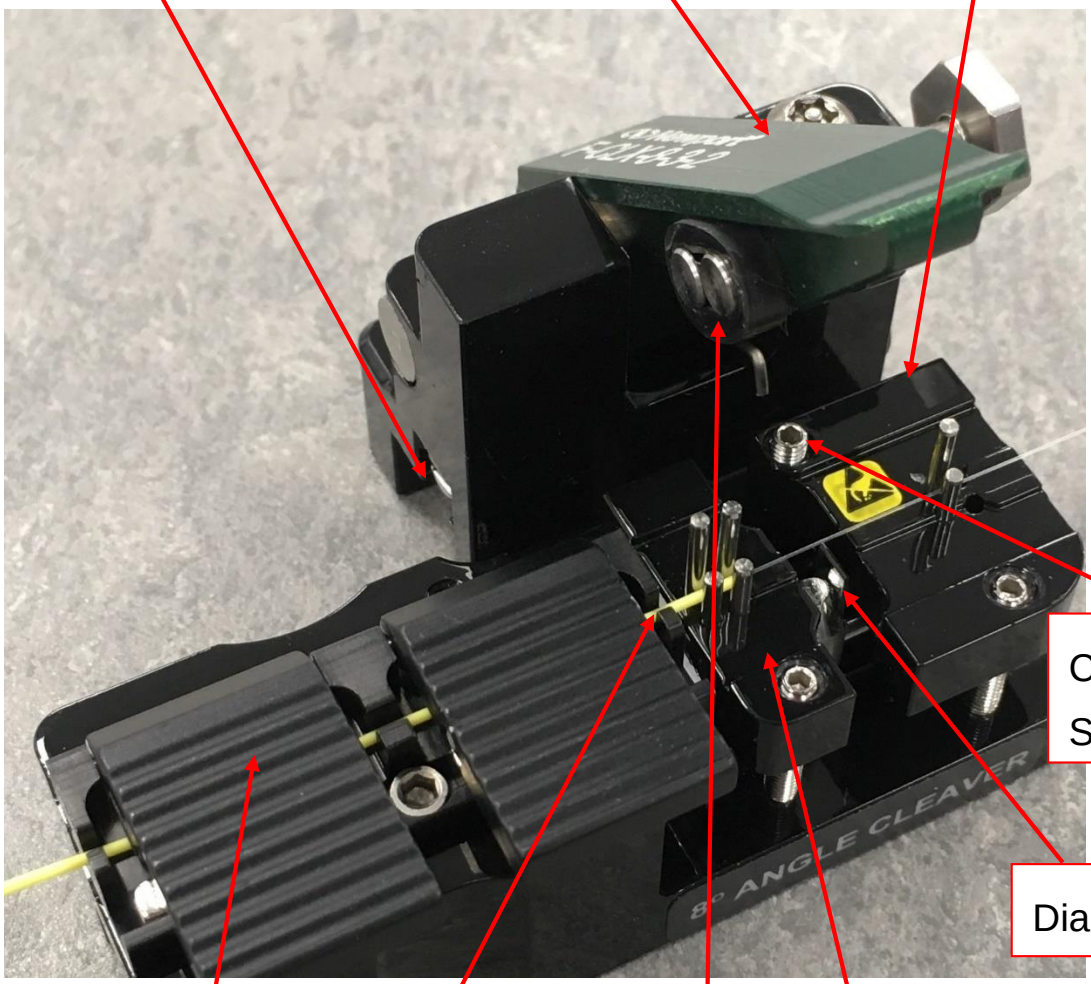
SM Fiber diameter:	125 µm
Coating diameter:	250 µm – 900 µm
Cleave position:	>3mm for 250µm coating
	>8mm for 900µm coating
Blade life (#cleaves):	> 10,000 (using 10 positions)
Dimensions:	79 mm x 68 mm x 40 mm
Weight:	160 g (0.4 lbs)
Typical end angle:	8° (+/-2°) (center of fiber)
Glass roll-off	<= 40µm

Contents of Cleaving Kit & Unpacking

The cleaver is supplied along with the following items:

1. Carrying case
2. Quick Guide for Cleaving operation

Description of **F-CLX-8-3-2 Manual Angled Cleaver**



Using the Cleaver

1. Fiber Preparation

Strip back outer jacket, secondary and primary coatings, as required. Place fiber in fiber holder.

The bare fiber should be at least 35 mm long to ensure that the stripped fiber passes over the hole in the reference plane and through the dowels forming the fiber location channel on the offcut side of the hole

Clean fiber thoroughly using a lint-free wipe wetted with alcohol (IPA)

2 Fiber insertion and setting cleave length

- Strip the coating off the fiber to the required length.
- Load fiber in holder.
- Adjust position of end of coating to achieve correct.cleave length.
- For 900μm coating, rotate the fiber so that it curls **downwards** towards the polyurethane-coated clamping planes. Avoid upward curl because this makes the fiber difficult to pass throught the dowel channels. Avoid sideways curl because the fiber is not straight across the cleaving hole and might miss the clamping ridges
- The stripped end of the fiber passes across the hole in the clamping plane and through the pair of dowels on the offcut side of the tool

3. Cleaving the Fiber

The fiber is cleaved by pressing down the anvil.

- The vertical polyurethane rings trap and clamp the fiber
- The anvil deflects the fiber downward on to a diamond blade which scratches the fiber, causing it to cleave.
- After cleaving, release the anvil and open the tool

4. Remove Cleaved Fiber

Remove the cleaved fiber and the fiber holder.

Take care that the cleaved fiber end does not touch the tool surface as this may cause dirt to attach to the cleaved end face.

5. Remove Fiber Off-Cut

The offcut is left between the dowels after cleaving. Remove the offcut and dispose of carefully.

Offcuts may be placed in sliding tube at back of cleaver.

Please Note: The cleaver may not work properly if the offcut from previous cleaves remains in the tool

HAZARD

The fiber off-cut is a sharp hazard which should be removed. Periodically empty the offcut bin and dispose of fiber offcuts safely using a "cin"-bin.

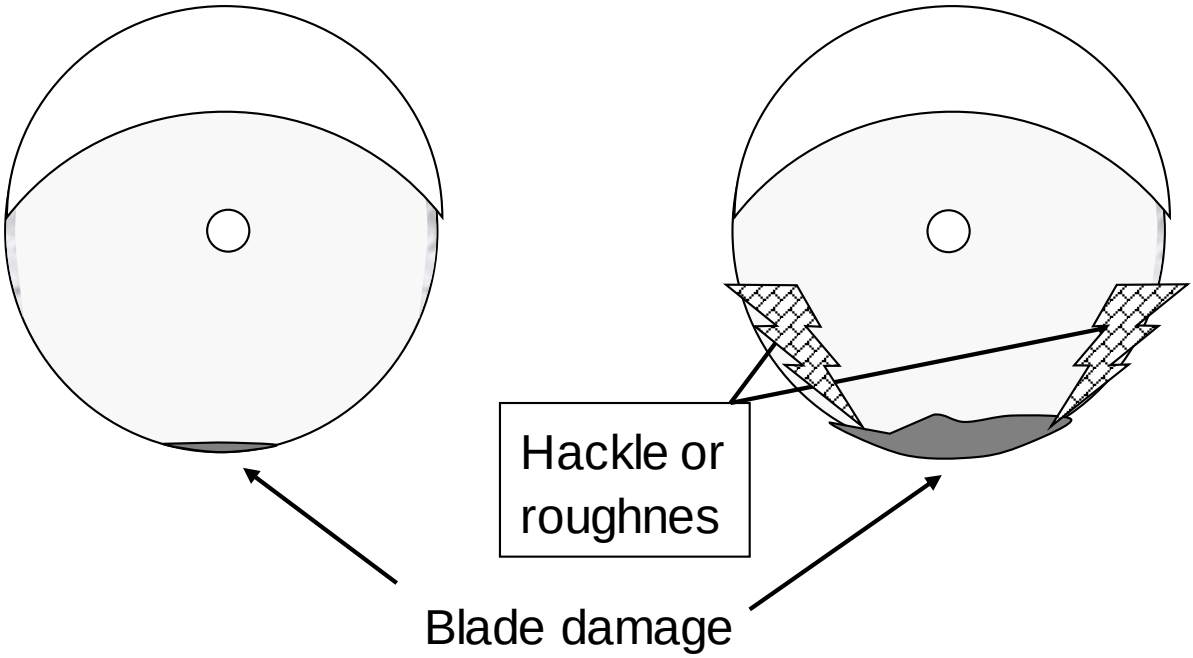
The tool is ready to cleave the next fiber.

Cleaving Problems

- *Offcut fiber in channel.* Remove with finger or by turning tool on side and shaking out. Dispose of offcut
- *Offcut fiber in other part of tool*. Remove using wipe or air. Dispose of offcut.
- *Will not cleave.* Blade damaged - advance blade by turning end screw **clockwise** by 1 full turn.
- *Measuring End Angle*: It is not possible to measure the end angle from a side projection (e.g. in a fusion splicer). The angle must be measured from above the cleaved surface using a surface profiler or interference technique.
- *Blade damage. - a large chip is seen in the cleaved end face* Advance blade by turning screw 1 turn clockwise.
- *Excess hackle or poor surface quality:* Can occur if the end angle too high. However, cleave is usable if core of fiber end face is smooth.
- *High back-reflection:*

(1) Angle cleave is dirty with dirt increasing back-reflection. Thoroughly clean tool.

Blade damage:



Good cleave

Excess blade damage or excess hackle

1. Blade dirty: Clean blade with alcohol wetted cotton bud or lint-free tissue.
2. Blade chipped: Advance blade by turning screw 1 turn clockwise. With proper use, each blade position should achieve more than 1,000 cleaves before needing to be advanced.

Cleaver Maintenance

The cleavers should be kept clean and free of dust with no fiber offcuts present. The cleaver should be transported in its carrying case.

Stripped fibers should be cleaned with an alcohol wipe prior to insertion into the cleaver to prevent dirt under the clamping surfaces which may break fibers.

The diamond blade wears with time. A maintenance schedule should be agreed with the operators in advance and the diamond blade should be advanced after a certain number of cleaves have been carried out or a certain amount of time has elapsed. (See Blade Advance Adjustment below.)

Cleaning the clamping surfaces

The "O"-rings and the clamping surface in the area of the rectangular hole in the reference plane should be kept clean and free from dust. They should be wiped regularly with an alcohol-wetted cloth.

This will remove dust particles and fiber debris, which will prevent clamping of the fiber and so give poor cleaving.

Cleaning Blade

The blade should be clean. Wipe along its length with an alcohol soaked tissue or cotton bud.

Caution: Any hard or dirty cleaning implement may damage the sharp edge of the diamond blade.

Blade Advance Adjustment

The part of the diamond blade that cuts into the fiber may become worn or chipped, giving poor cleaves. The blade can be advanced so a new portion cleaves the fiber. The blade has multiple positions, with each position capable of carrying out more than 1,000 cleaves.

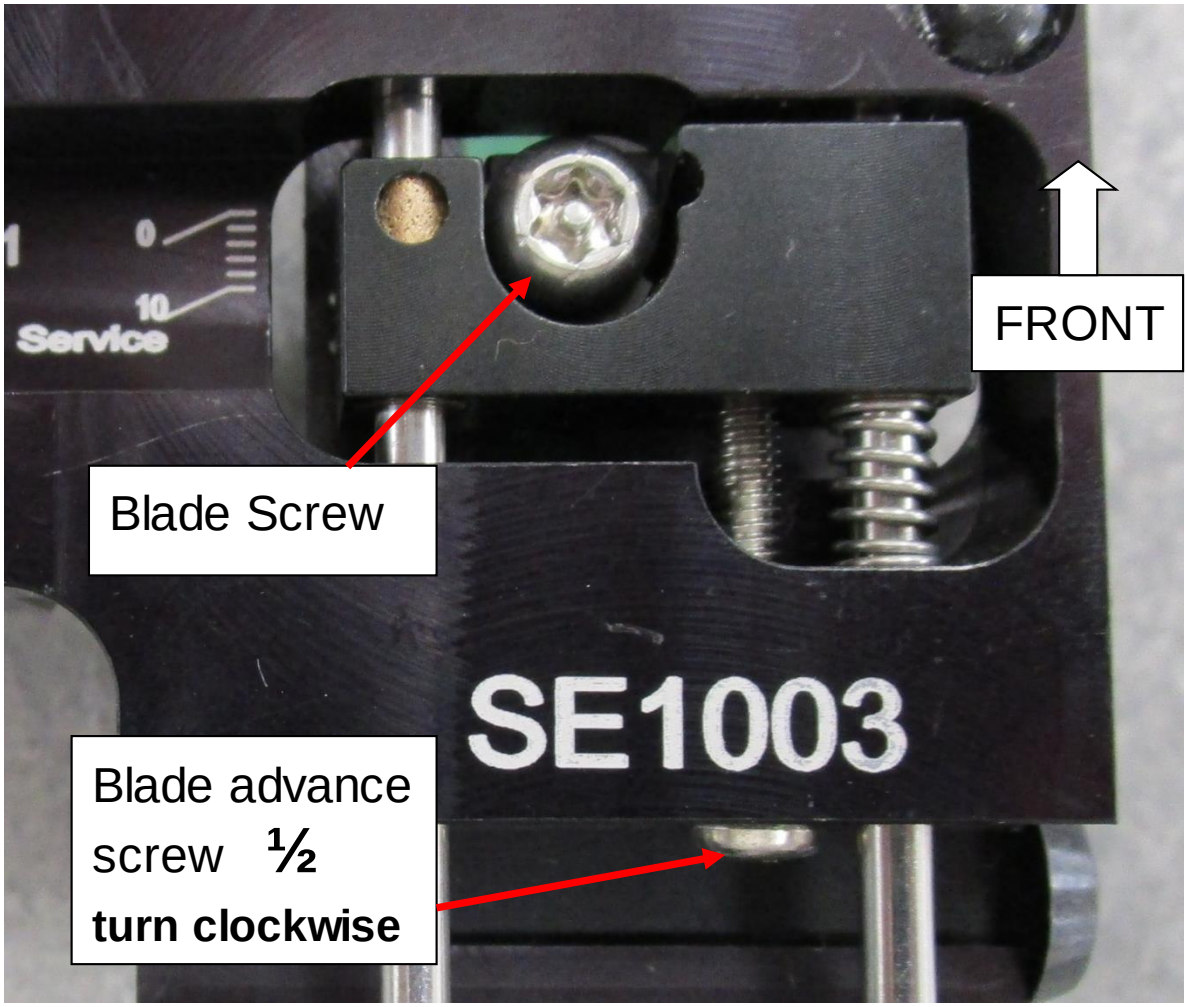
A UNC5-40 screw (accessed from the rear of the cleaver) controls the blade advance. To advance the blade to the next position, turn the screw clockwise by **1/2 turn** (see red circle). This drags the blade-carrying block backwards, so creating a new blade position.

This is shown underneath by a scale printed on the blade advance block (see green circle). The blade is 3.5mm long and so there are up to 10 positions on each blade.

The blade adjustment screw should only be turned clockwise, advancing the blade to an unused position. If the screw is turned anti-clockwise, this will expose a used part of the blade which is probably damaged; in addition, the screw may loosen itself in the cleaver.

CAUTION: Poor cleaving may be caused by dirt. Clean the blade and the fiber thoroughly and re-cleave the fiber. Only advance the blade if cleaving does not improve.

Under-view of blade advance mechanism



Cleaver Stop Mechanism

The screw to set the stop for the cleaver movement is located on the Chassis under the anvil. The stop is set to prevent further movement after the cleave has taken place, to prevent the cleaved fiber being damaged by the blade.

Cleaving Principles

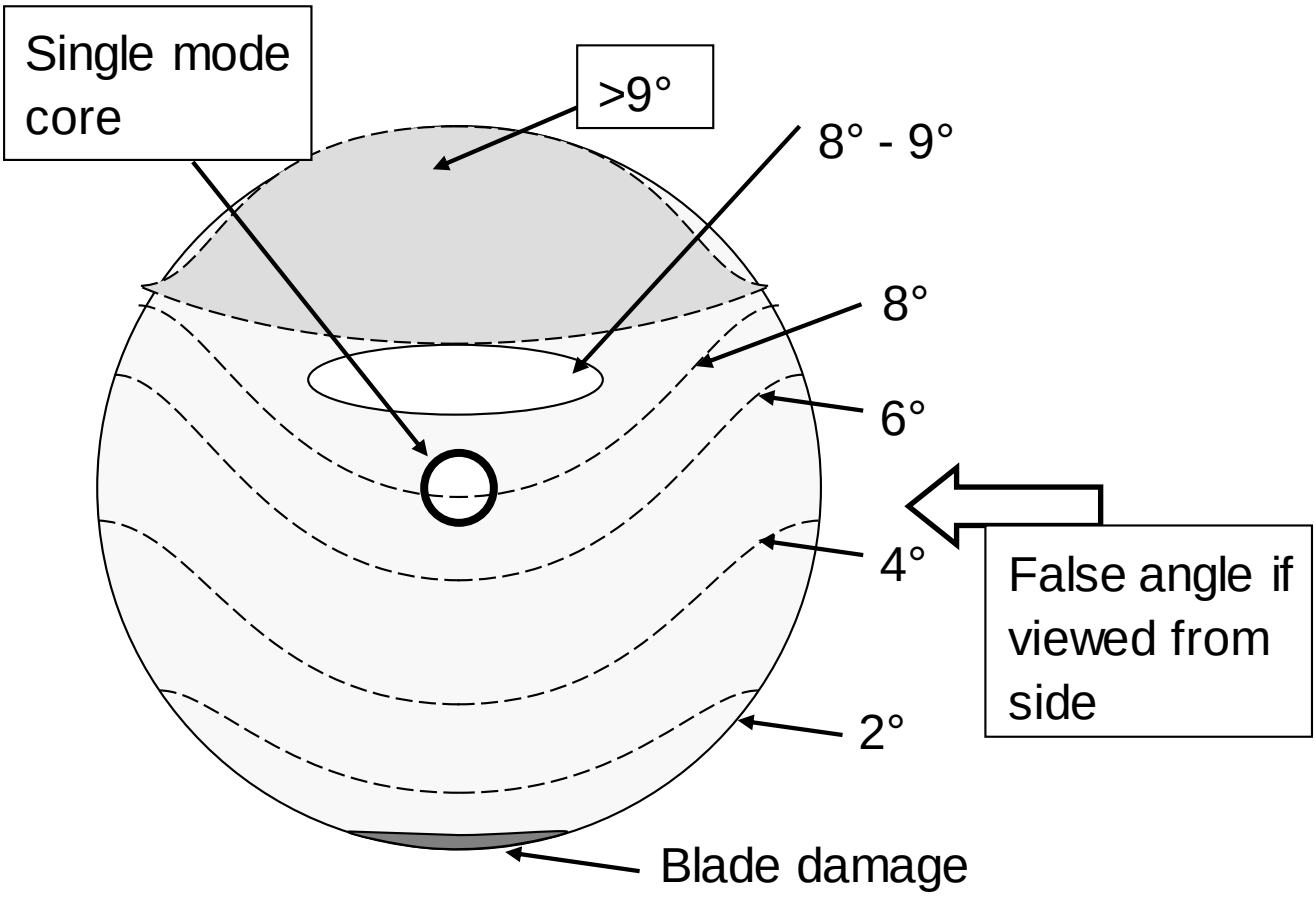
Optical fiber cleavers operate by a combination of scoring and tensioning the glass of the fiber. The quality of a cleaved fiber end will depend on the degree of control provided by the scoring and tensioning mechanisms. The precision fiber cleavers here described have been designed to minimise the damage to the cleaved end

- *Clamping Fiber:* The fiber is clamped at 2 positions by vertical polyurethane rubber rings.
- *Bending Fiber:* The clamped fiber is bent downwards in to a hole by the green anvil . This also tensions the fiber.
- *Tensioning the fiber:* The cleaving planes are fixed. Pushing the anvil swinger down causes the fiber to stretch and tension the fiber.
- *Scratching the fiber:* The bent and tensioned fiber is pushed into contact with the blade as the anvil swings downwards. The blade scratches the fiber causing it to cleave.

Shape of cleaved end

The cleaved fiber has an end angle of 8° at the center of the 125μm diameter optical fiber.

The cleave angle is approximately constant over the core of the single mode fiber. However, the region of the cleaved end close to the diamond blade score has a lower end angle and the region distant from the diamond blade score has a higher end angle.



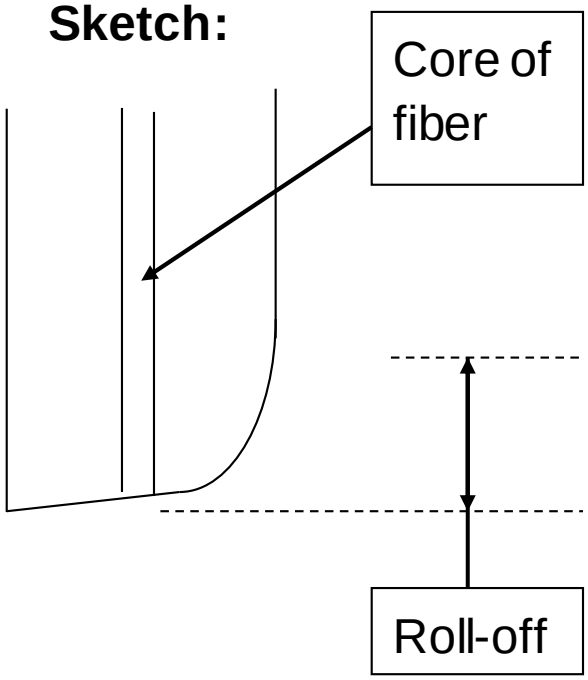
Flatness of cleaved end

The cleaved end has a portion which is at high angle where the glass rolls-off. A view of the cleaved end face in side-projection is seen below.

The amount of roll-off is controlled and is less than 40μm.

Picture:

Sketch:



PLEASE NOTE:

The angle of the core of the cleaved end cannot be measured by inspection from the side of the fiber. The core is not visible when viewed from the side of the fiber.

In the event of problems, please contact Newport Corporation, as below.

Service & Contact Details

The cleaver may be serviced by your local agent or returned to Newport at the address below, explaining the problems:

Newport Corporation,
1791 Deere Avenue
Irvine,
California 92606
USA

https://www.newport.com/f/manual-fiber-cleavers