

F-RCL Series



Manual Angled Ribbon Fiber Cleaver User's Manual



Newport®

Experience | Solutions

Warranty

Newport Corporation warrants that this product will be free from defects in material and workmanship and will comply with Newport's published specifications at the time of sale for a period of one year from date of shipment. If found to be defective during the warranty period, the product will either be repaired or replaced at Newport's option.

To exercise this warranty, write or call your local Newport office or representative, or contact Newport headquarters in Irvine, California. You will be given prompt assistance and return instructions. Send the product, freight prepaid, to the indicated service facility. Repairs will be made and the instrument returned freight prepaid. Repaired products are warranted for the remainder of the original warranty period or 90 days, whichever first occurs.

Limitation of Warranty

The above warranties do not apply to products which have been repaired or modified without Newport's written approval, or products subjected to unusual physical, thermal or electrical stress, improper installation, misuse, abuse, accident or negligence in use, storage, transportation or handling. This warranty also does not apply to Diamond blades, fuses, batteries, or damage from battery leakage.

THIS WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR USE. NEWPORT CORPORATION SHALL NOT BE LIABLE FOR ANY INDIRECT, SPECIAL, OR CONSEQUENTIAL DAMAGES RESULTING FROM THE PURCHASE OR USE OF ITS PRODUCTS.

First printing 2007

© 2007 by Newport Corporation, Irvine, CA. All rights reserved. No part of this manual may be reproduced or copied without the prior written approval of Newport Corporation.

This manual has been provided for information only and product specifications are subject to change without notice. Any change will be reflected in future printings.

Newport Corporation
1791 Deere Avenue
Irvine, CA, 92606
USA

Part No. 45455-01, Rev. A

Confidentiality & Proprietary Rights

Reservation of Title:

The Newport programs and all materials furnished or produced in connection with them ("Related Materials") contain trade secrets of Newport and are for use only in the manner expressly permitted. Newport claims and reserves all rights and benefits afforded under law in the Programs provided by Newport Corporation.

Newport shall retain full ownership of Intellectual Property Rights in and to all development, process, align or assembly technologies developed and other derivative work that may be developed by Newport. Customer shall not challenge, or cause any third party to challenge the rights of Newport.

Preservation of Secrecy and Confidentiality and Restrictions to Access:

Customer shall protect the Newport Programs and Related Materials as trade secrets of Newport, and shall devote its best efforts to ensure that all its personnel protect the Newport Programs as trade secrets of Newport Corporation. Customer shall not at any time disclose Newport's trade secrets to any other person, firm, organization, or employee that does not need (consistent with Customer's right of use hereunder) to obtain access to the Newport Programs and Related Materials. These restrictions shall not apply to information (1) generally known to the public or obtainable from public sources; (2) readily apparent from the keyboard operations, visual display, or output reports of the Programs; 3) previously in the possession of Customer or subsequently developed or acquired without reliance on the Newport Programs; or (4) approved by Newport for release without restriction.

Service Information

This section contains information regarding factory service for the source. The user should not attempt any maintenance or service of the system or optional equipment beyond the procedures outlined in this manual. Any problem that cannot be resolved should be referred to Newport Corporation.

Technical Support Contacts

North America & Asia

Newport Corporation Service Dept.

1791 Deere Ave.
Irvine, CA 92606
Telephone: (949) 253-1694
Telephone: (800) 222-6440 x31694

Europe

Newport/Micro-Controle S.A.

Zone Industrielle
45340 Beaune la Rolande, FRANCE
Telephone: (33) 02 38 40 51 49

Asia

Newport Opto-Electronics Technologies

中国 上海市 爱都路 253号 第3号楼 3层
C部位, 邮编 200131
253 Aidu Road, Bld #3, Flr 3, Sec C,
Shanghai 200131, China
Telephone: +86-21-5046 2300
Fax: +86-21-5046 2323

Newport Corporation Calling Procedure

If there are any defects in material or workmanship or a failure to meet specifications, promptly notify Newport's Returns Department by calling 1-800-222-6440 or by visiting our website at www.newport.com/returns within the warranty period to obtain a **Return Material Authorization Number (RMA#)**. Return the product to Newport Corporation, freight prepaid, clearly marked with the RMA# and we will either repair or replace it at our discretion. Newport is not responsible for damage occurring in transit and is not obligated to accept products returned without an RMA#. E-mail: rma.service@newport.com

When calling Newport Corporation, please provide the customer care representative with the following information:

- Your Contact Information
- Serial number or original order number
- Description of problem (i.e., hardware or software)

To help our Technical Support Representatives diagnose your problem, please note the following conditions:

- Is the system used for manufacturing or research and development?
- What was the state of the system right before the problem?
- Have you seen this problem before? If so, how often?
- Can the system continue to operate with this problem? Or is the system non-operational?
- Can you identify anything that was different before this problem occurred?

1.1	Contents	
	Warranty	2
	Technical Support Contacts	4
1.1	Contents	5
1.2	Introduction	6
1.2.1	Angled Cleaving	6
1.2.2	Angled Cleaving of Fiber Ribbons	6
1.3	Unpacking	7
1.4	Installation	7
1.5	Operating Principles	8
1.5.1	Window Stripping	9
1.5.2	Clamping	12
1.5.3	Cleaving	13
1.5.4	Cleave Angle	13
1.5.5	Adjustments	14
1.5.6	Cleave Variability	14
1.6	Maintenance	15
1.6.1	Diamond Blade	15
1.6.2	Shape of Cleaved Ends	16
2	Factory Service Information	17
2.1	Service Form	17

1.2 Introduction

1.2.1 Angled Cleaving

- o Many applications in optical telecommunications, such as pigtailling optical fiber to lasers, detectors or other optical components require minimal optical noise.
- o When the cleaved end face is angled away from the perpendicular in the region of the fiber's core, any back-reflected light is not transmitted down the optical fiber and so does not contribute to optical noise. An 8° angle is sufficient to reduce the collected light to around -60dB for a single mode fiber.

1.2.2 Angled Cleaving of Fiber Ribbons

- o The **F-RCL Series Angled Ribbon Cleaving System** is designed to angle cleave multiple fibers in a ribbon. Angled cleaved ribbon fibers are required to reduce back-reflections in ribbon fibers which interface with arrays of photonic components. It uses a patented technique of shearing the optical fiber prior to cleaving giving a smooth angle cleaved end.
- o The **F-RCL-8-4F** cleaves fiber ribbons of up to 4 fibers with 8° angles across the cores of 125µm single mode fibers coated with encapsulation up to 1200µm wide with preset cleave lengths of 5-15mm.
- o The **F-RCL-8-8F** cleaves fiber ribbons of up to 8 fibers with 8° angles across the cores of 125µm single mode fibers coated with encapsulation up to 2200µm wide with preset cleave lengths of 5-15mm.
- o Newport also carries the **F-CLX-8-3** and the **F-CLX-0-3** which produce, respectively, 8° angled and perpendicular cleaves on the end of single fibers.

1.3 Unpacking

The **F-RCL Series Angled Ribbon Cleaving System** includes the following components:

- F-RCL Cleaving Tool, including two fiber clips (one attached to tool and one removable).
- The cleaving tool is held in a carry case.

- The ribbon fiber must be window stripped prior to cleaving using a thermal stripping tool. The following tool is recommended: JR-5 Thermal Stripping Tool (manufactured by Sumitomo Electric) plus power supply
 - Optionally, a stripping rig is available which can be used with the JR-5 to obtain superior quality window-stripped ribbon fiber

1.4 Installation

- Unpack the various components from their packaging.
- Remove small rubber sleeve which protects the diamond blade during shipping. Check diamond blade is clean. **NOTE:** Use lint-free paper or rubber to clean the diamond blade but never touch the diamond with metal
- Turn on thermal stripper and allow it to warm up for 15 minutes, ensuring that unit does not turn off by raising and lowering the lid every 5 minutes. Use the highest temperature setting so that the stripper is warm to touch.

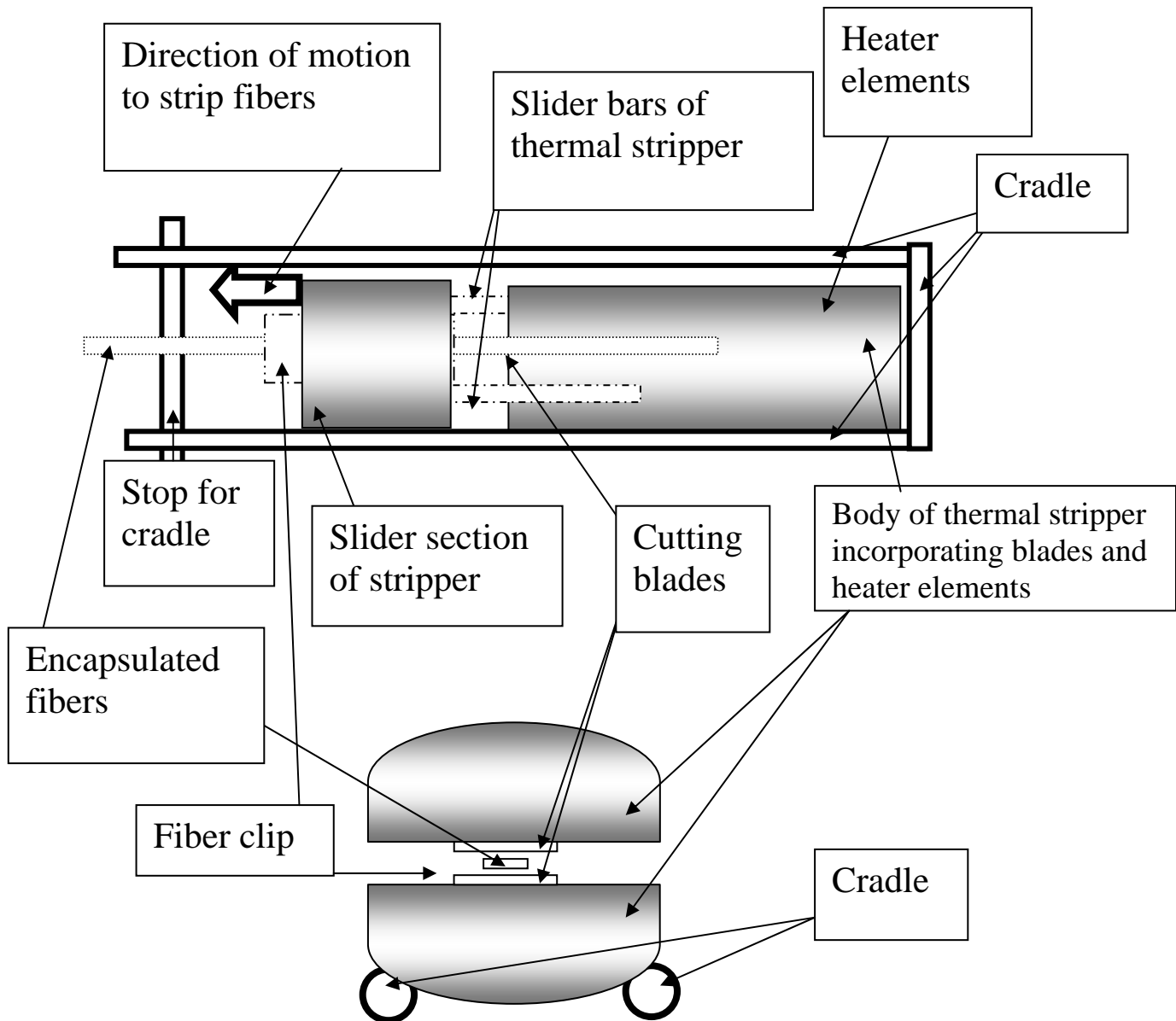
1.5 Operating Principles

Angled cleaving uses the following steps:

1. Window-strip fiber ribbon
2. Clamp stripped fibers at two positions
3. Deflect the clamped fibers laterally using an anvil to give:
 - Tension, because the fiber is stretched by the anvil
 - Shear, because the fibers are bent between the edge of the anvil and the edge of the clamp
4. Scratch the tensioned and sheared fiber(s) using a diamond blade. The blade moves at a tangential angle to reduce cutting stresses.
 - o All of the fibers in the ribbon must be clamped independent of each other so that they can be tensioned and sheared independently. The cleaving system achieves this by window-stripping the ribbon using a thermal stripper. The coating is removed in the cleave area, leaving coated ribbon on both sides of the stripped area of the fibers.
 - o The fibers are then deflected by an anvil, giving both tension and shear. Cleaving occurs when initiation scratches are introduced in the tensioned and sheared fiber(s) using a diamond blade.

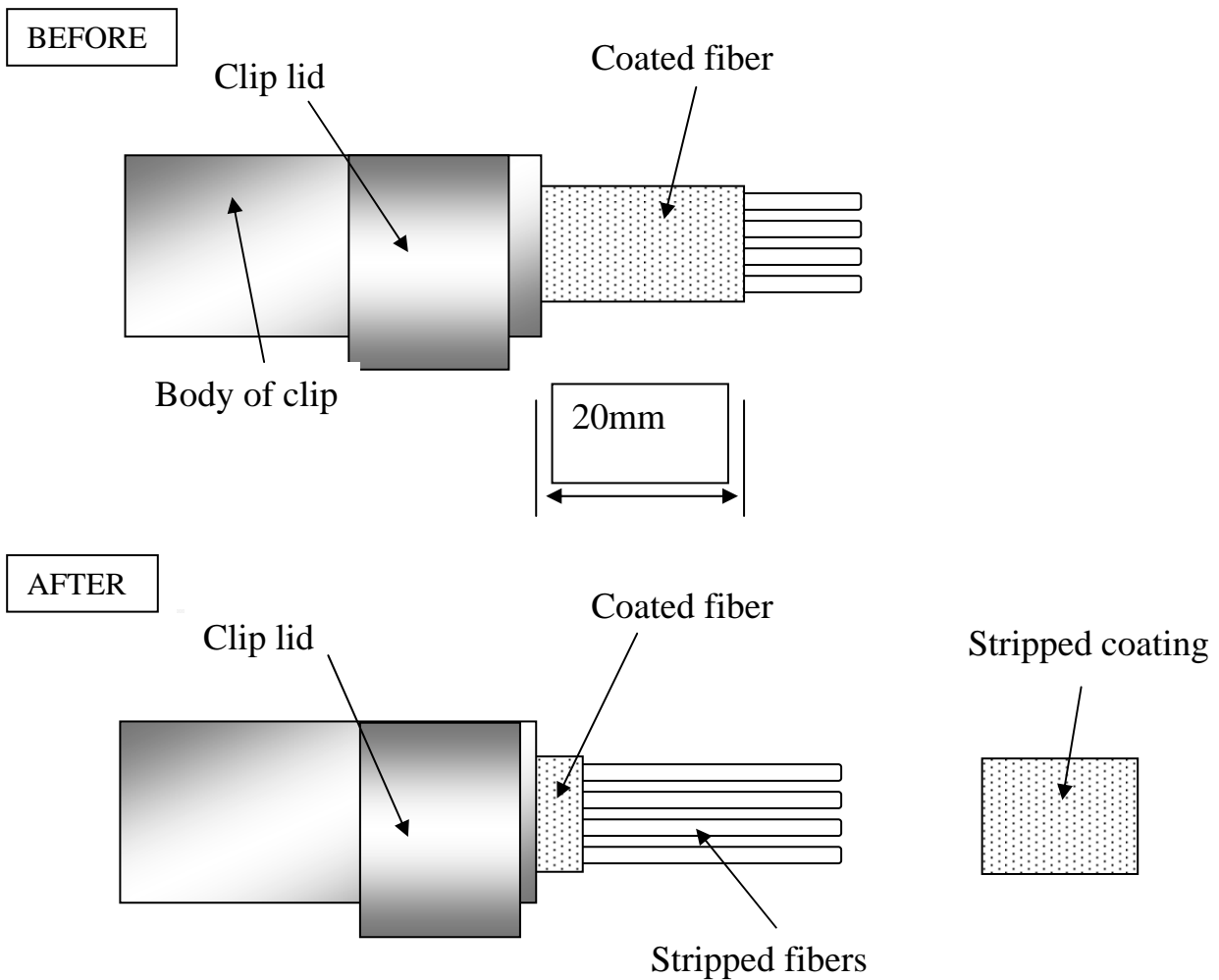
1.5.1 Window Stripping

- o Shown below is the thermal stripper in place in the stripper jig.
- o It is also possible to use the thermal stripper without the stripping rig if care is taken in window stripping the fiber.



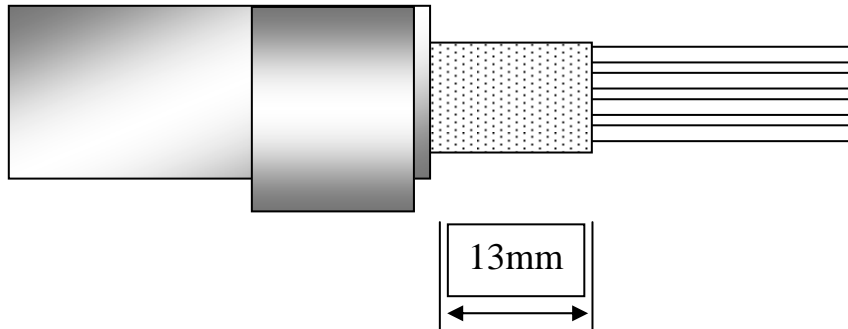
First strip

- Place the ribbon fiber in the removable Oxford ribbon fiber clip so that a length of 20mm of coating protrudes beyond the end of the clip:
- Close slider on thermal stripper
- Place fiber in clip in thermal stripper and close both lids
- Fully strip exposed coating by pressing down on both sides of stripper and pulling apart slider. A high closing force is required to ensure that the coating strips off cleanly.

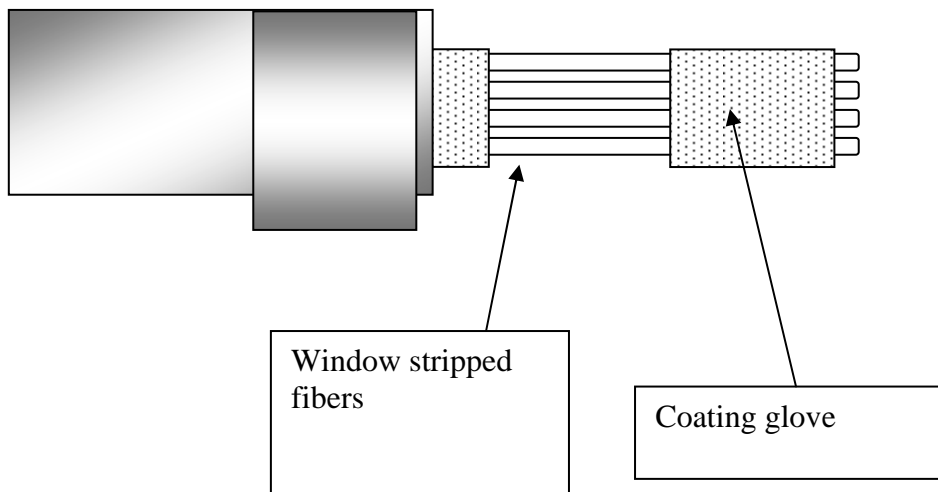


Second (window) strip

- Reposition stripped fiber in clip so that approximately 30mm of ribbon fiber protrudes from the clip, including about 13mm of remaining coating (assuming a final cleave length of 10mm)



- Replace clip in stripper (slider closed)
- Place stripper (and clip with fiber) in stretching rig.
- Operate the stripper by pulling the slider of the stripper as far as possible so that it hits the end of the operating rig (if used) - a distance of about 10-12mm. When stripping, squeeze top and bottom together to ensure coating is cut and stripped
- Remove clip from stripper and rig
- Remove coating sleeve from stripping tool and close top and stretcher



Window stripped fibers

- o The 90°C temperature of the stripper breaks the bond between the coating and the fibers, but after cooling, the bond between the partially-stripped coating glove and the fibers is partly reformed. Therefore, the fibers in the ribbon can be clamped by clamping the coating glove. When the unstripped portion of the coating is also clamped, the fibers can be tensioned, sheared and cleaved.
- o For a desired 10mm cleave length, the window-stripped portion of the fibers should be about 13mm long. For a 7mm cleave length the stripped portion should be about 10mm long.

Possible problems with window stripped fibers

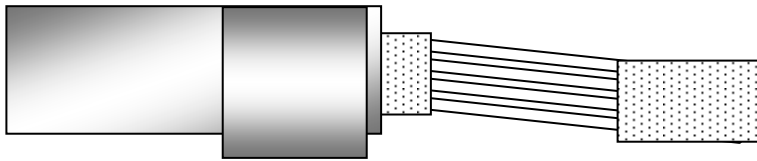
1. Problem: The coating does not move as a tube

Solution: The coating is not hot enough so leave longer for the stripper to heat up or use easy-strip coated fiber.

2. Problem: The coating slips out of the clip and does not strip

Solution: The clamping force of the clip is not high enough, so press down on both parts of stripper to ensure closing force on clip

3. Problem: The coating buckles the fiber in **second strip**



Solution: During stripping pull the slider of the stripper parallel to the axis of the fibers, i.e. along the rails of the jig

Summary

- o The window-stripped fiber ribbon should be stripped neatly and all fibers should be straight with no buckling.

1.5.2

Clamping

- o The window stripped fiber in the movable clip is placed in the cleaver. The right-hand, fixed clip is open to accept the fiber.
- o The movable clip is magnetically driven against a stop and the coating glove enters the fixed clip. Close the fixed clip so that the stripped fiber is clamped at two points and the fixed clip clamps on the coating glove.

Possible problems with clamping stripped fibers

1. Problem: The fibers are not straight between the clamps

Solution: Window stripped fibers are not straight. Cut off the coating glove and repeat

1.5.3 Cleaving

- o Close the top of the cleaver, pushing down on the green handle. The green handle closes the top half of the cleaver (black anodized portion) which also carries the anvil.
- o The anvil contacts the fiber, displacing it by about 0.75mm, until the top half of the cleaver (and the anvil) reaches a stop against a silver M3 screw.
- o Continue to push down on the green handle.
- o The blade moves at a glancing angle until it touches the deflected fibers. Because the fibers are deflected by the anvil and therefore tensioned, the scratched fibers cleave, cleaving at an angle because of the shear. A slight noise is heard (and felt) as the fibers cleave. All of the fibers cleave at approximately the same time.

Cleaving principles

- o The correct amount of tension (approximately 2N in each fiber) is required to achieve a good quality cleave. The tension is achieved by deflecting the fibers with the anvil. A set cleave length (given by the position of the clamp stop) therefore requires a set deflection of the fibers by the anvil to achieve an optimum tension but the amount the fiber is deflected also determines the cleave angle. Each tool is factory-set to produce a set cleave length and a set cleave angle. The user can only carry out only a small adjustment of cleave length.

1.5.4 Cleave Angle

- o The cleave angle is preset in the factory to give an 8° cleave across each fiber core.

Removing the cleaved fibers

- o Release the green handle and the top of the tool will open automatically.
- o Remove the movable clip from the cleaver and release the cleaved fibers from the clip.
- o Open the fixed clip to reveal the coating glove and 4 off-cut fibers. Remove with tweezers.
- o **NOTE:** Do not touch the diamond with metal tweezers.

1.5.5 Adjustments

Cleave Length

- o The cleave length is set by the distance between the end of the coating and the diamond blade. When the stripped fiber is transferred to the cleaver in the movable clip, the cleave length is set by the distance between the end of the coating (dependent on manufacturer of stripper) and the diamond blade.
 - o The cleave length is preset in the factory. Cleave lengths in the range of 5-15mm can be set. The movable clip is magnetically driven against a metal stop (6mm in diameter with a screwdriver slot on top).

1.5.6 Cleave Variability

- The **F-RCL-8-4F** and **F-RCL-8-8F** have a variation in end angle of up to $\pm 1^\circ$ for each fiber in the fiber ribbon.
- The variation of length of cleaved fiber ends within the fiber ribbon is around $25\mu\text{m}$.

1.6 Maintenance

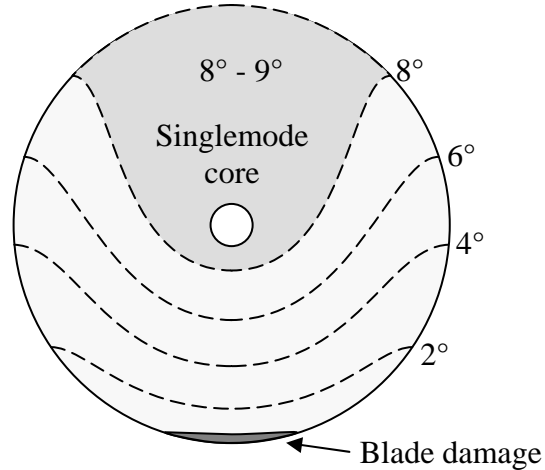
- o The cleavers should be kept clean and free of dust and fiber off-cuts at all times. The cleaver should be transported in its carrying case.
- o All stripped fibers should be cleaned with an alcohol wipe prior to insertion into the cleaver to prevent dirt accumulating under the clamping surfaces which may break fibers.
- o The diamond blade wears with time. A maintenance schedule should be agreed with the operators in advance and the blade should be changed after a certain number of cleaves have been carried out or a certain amount of time has elapsed.
- o **Caution:** Any hard or contaminated cleaning implement may damage the sharp edge of the diamond blade.

1.6.1 Diamond Blade

- o The cleaver is not designed to have an adjustable blade. The blade scratches the 4 fibers over a length of 1mm and because the length of the blade is only 1.6mm, no significantly adjustment can be made. Therefore the hexagonal screw on the front of the body of the cleaver should not be used to change the position of the blade.

1.6.2 Shape of Cleaved Ends

- o The angled cleaved end is not completely flat but is very repeatable such that the centre of the cleaved end has an average end angle of 8.0° for all fibers in the ribbon. The region of the cleaved end close to the diamond blade score has a lower end angle.



The end angle is measured by mounting the cleaved fibers under a microscope and tilting over at 8° so that the angled cores are horizontal. An interference lens is used to obtain Newton rings to measure the deviation of the cleaved end away from 8° .

Each fiber in the ribbon is cleaved at approximately the same end angle

2 0 Factory Service Information

2.1 Service Form



Newport®
Experience | Solutions

Newport Corporation
U.S.A. Office: 800-222-6440
FAX: 949/253-1479

Name _____ Return Authorization # _____
(Please obtain RA# prior to return of item)

Company _____

Address _____ Date _____

Country _____ Phone Number _____

P.O. Number _____ FAX Number _____

Item(s) Being Returned:

Model # _____ Serial # _____

Description _____

Reason for return of goods (please list any specific problems):

Notes: _____

**Newport Corporation
Worldwide Headquarters**

1791 Deere Avenue
Irvine, CA 92606

(In U.S.): 800-222-6440
Tel: 949-863-3144
Fax: 949-253-1680

Internet: sales@newport.com



Newport
Experience | Solutions

Visit Newport Online at: www.newport.com



Newport Corporation, Irvine, California, has been certified compliant with ISO 9001 by the British Standards Institution.

Printed in the U.S.