

OxFAC-08 Angled Fiber Cleaver

User Manual

Issue 1.5

Contents

Issue & Scope	2
Introduction.....	2
Contents of Cleaving Kit & Unpacking	3
Cleaving Problems	8
Blade damage:	9
Cleaver Maintenance	10
Cleaning the clamping surfaces	10
Cleaning Blade	10
Blade Advance Adjustment	11
Cleaver Stop Mechanism	12
Changing Blade	13
Flatness of cleaved end	16
Measurement of Cleave Angle	17
Warranty	18
Service	18
Address for UK Factory:	18

Issue & Scope

This user manual will be updated from time-to-time to reflect technical changes to the product. This user manual covers operation of the **OxFAC-08 Field Angled Cleaver** precision optical fiber cleaver.

Introduction

Field Angled Cleaver

The **OxFAC-08 Field Angled Fiber Cleaver** is designed to cleave a single 125 μ m diameter singlemode optical fiber with a mirror-smooth, damage-free end with the core angled at 8°(\pm 1°) from the perpendicular.

Cleaving a singlemode fiber at around 8° from the perpendicular ensures the back-reflection will not be guided down the fiber, and hence the return loss will be around 60 dB (reflectance of -60dB or greater). 8° angled cleaves are used in mechanical splices to form a mechanical join for instance in FTTx applications.

The cleaver can be used as a field tool or on the benchtop. The fiber is fixed in to a fiber holder. The stripped fiber passes between two dowels on the offcut side.

The cleave is carried out by pressing down the anvil. The two vertical O-rings trap and clamp the fiber, the anvil deflects the fiber to a stop and the tensioned fiber is lowered on to the diamond blade to cleave the fiber.

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

Specifications

OxFAC-08

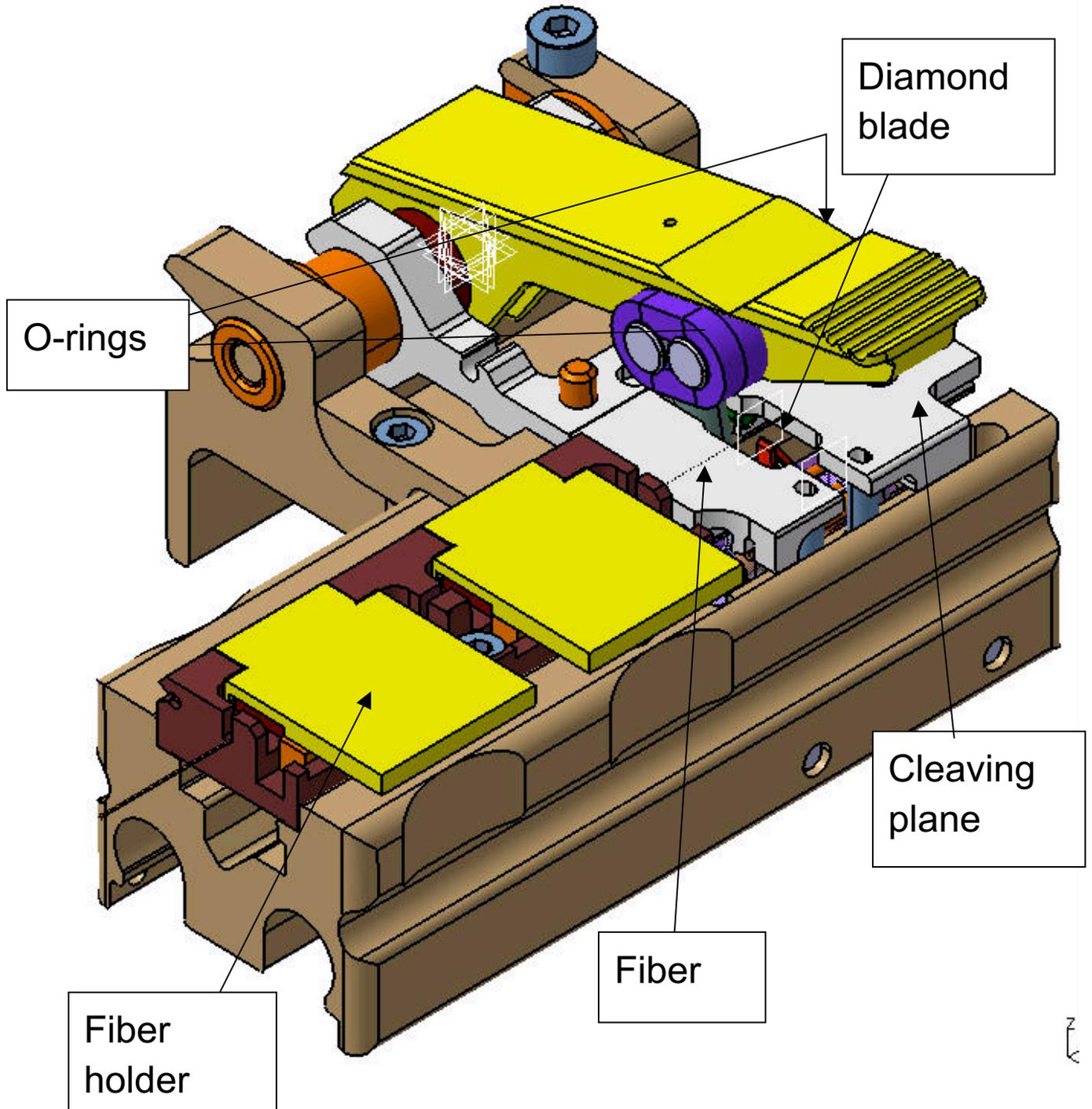
SM Fiber diameter:	125 μm
Coating diameter:	250 μm – 900 μm
Cleave position:	Holder-to-cleave: $\geq 13\text{mm}$ Buffer-to-cleave: $\geq 8.0\text{mm}$
Blade life (#cleaves):	$> 10,000$ (using 10 positions)
Dimensions:	80 mm x 62 mm x 46 mm
Weight:	200 g (0.4 lbs) (expected)
Typical end angle:	6° - 8° (centre of fiber)
Angle variation over core	1° (1-sigma)
Glass roll-off	$\leq 40\mu\text{m}$

Contents of Cleaving Kit & Unpacking

The cleaver is supplied along with the following items:

1. User Manual: folded sheet
2. Soft carrying case

Isometric View



Using the Cleaver

1. *Fiber Preparation*

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

The bare fiber should be at least 35 mm long to ensure that the glass cladding passes over the hole in the reference plane and through the dowels forming the fiber location channel on the offcut side of the hole and over the edge of the cleaving plane for easy offcut extraction.

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.
- Align the fiber to the correct cleave length (minimum = 8mm)
- **Rotate the 900 μ m fiber coating so that the fiber curls downwards towards the polyurethane-coated clamping planes.**
- Secure the fiber by closing the magnetic lid
- Avoid upward curl because this makes the fiber difficult to pass through 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 O-rings trap and clamp the fiber.
- The anvil deflects the fiber by a fixed amount
- The cleaving plane, carrying the clamped and tensioned fiber moves downwards so that the fiber strikes the diamond blade, cleaving the fiber.
- After cleaving, release the anvil and open the tool

4. Remove Cleaved Fiber

Remove the cleaved fiber by opening the magnetic lid

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.

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

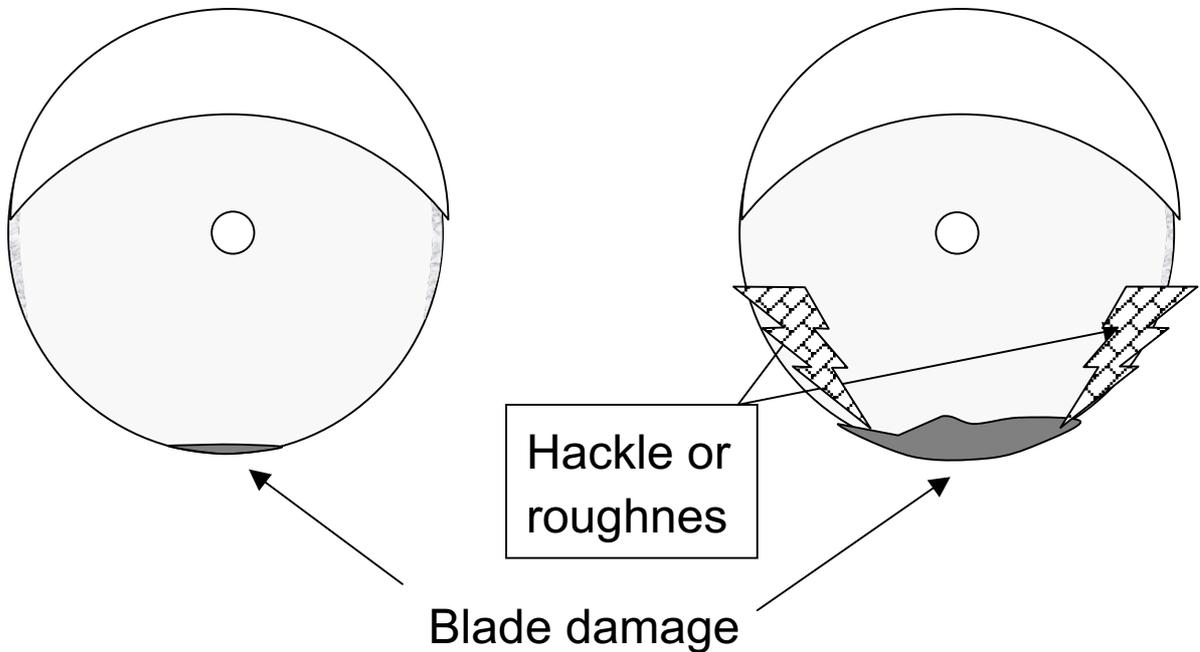
The fiber off-cut is a sharp hazard which should be removed. Periodically empty the offcut bin and dispose of fiber offcuts safely using a "cin"-bin.

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 finger. Dispose of offcut
- *Will not cleave.* Blade damaged - advance blade by turning end screw **clockwise** by 2 full turns.
- *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 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 2 turns clockwise.
- *Excess hackle or poor surface quality:* Can occur if 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 2 turns 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 and fiber off-cuts at all times. 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 and free from dust or grease. Wipe the blade 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.

An UNC6-32 screw (accessed from the rear of the cleaver) controls the blade advance. To advance the blade by 315 μ m turn the screw clockwise by 1/2 turn.

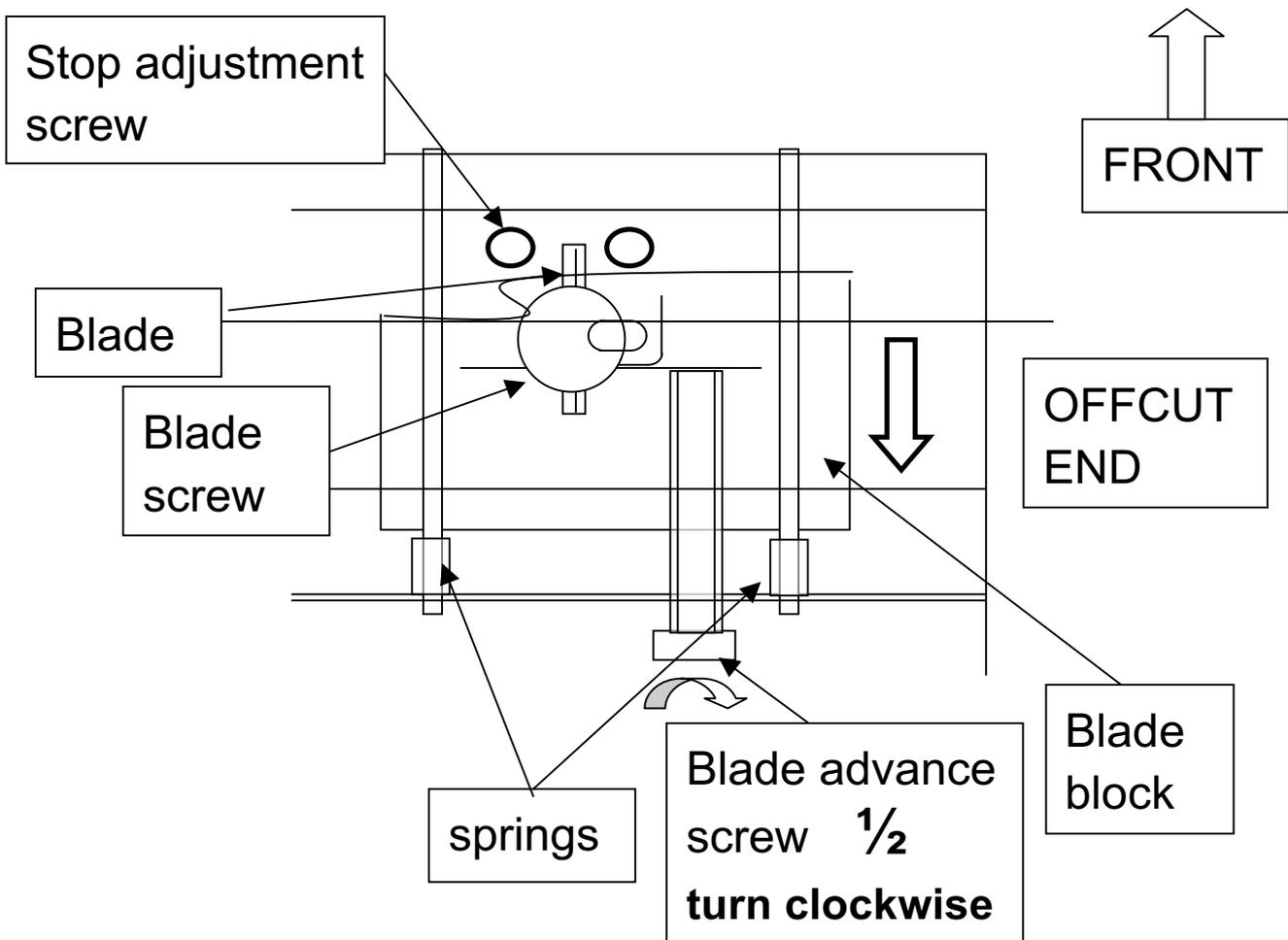
This drags the blade-carrying block backwards along its supporting rails (against a pair of springs), so advancing the blade to a new position.

Blade position is shown underneath by scale on blade advance block. The blade is 3.4mm long and so there are up to 10 positions on each blade.

The blade adjust screw should only be turned clockwise, advancing the blade to an unused position. If the screw is turned anti-clockwise, this will expose an 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

Underneath view of blade advance mechanism



Cleaver Stop Mechanism

The screw to set the stop for the cleaver movement is seen underneath the tool. The stop is set to prevent further movement after the cleave has taken place to prevent the cleaved fiber being damaged by the blade.

Changing Blade

Place rubber protection sleeve over diamond blade

- Undo M3 set screw at back of anvil by 3 turns.
- Unscrew M3 screw under the right-side of cleaver chassis to release stainless steel block. Unscrew M3 screw under left-side of cleaver chassis to release stainless steel block
- Allow cleaving plane to rise; **store** spring.
- Remove worn blade assembly by releasing nut on under side of cleaver; store nut . The blade is mounted on a machined dowel and this can be pressed out through the top of the cleaver.
- Place new blade assembly in circular hole; the 2mm dowel should lie in the V-groove of the blade-carrying block with the diamond on the offcut side of the cleaver. Posts ensure diamond is mounted in the correct orientation. Push dowel down, locating cross dowel in V-groove. Attach M4 nut and spring washer from rear and tighten.
- Replace spring over vertical grub screws on left-hand side of cleaver. Lower datum plane on to spring. Re-attach 2-off steel blocks using M3 screws. Push left-hand datum plane down against spring several times to ensure springs are located and datum plane moves freely.
- Tighten M3 set screw at back of anvil by 3 turns.
- When the anvil is open, the brass dowel fixed in the anvil extends down in to the gap in the datum plane. The dowel contacts the small dowels on each side of datum plane

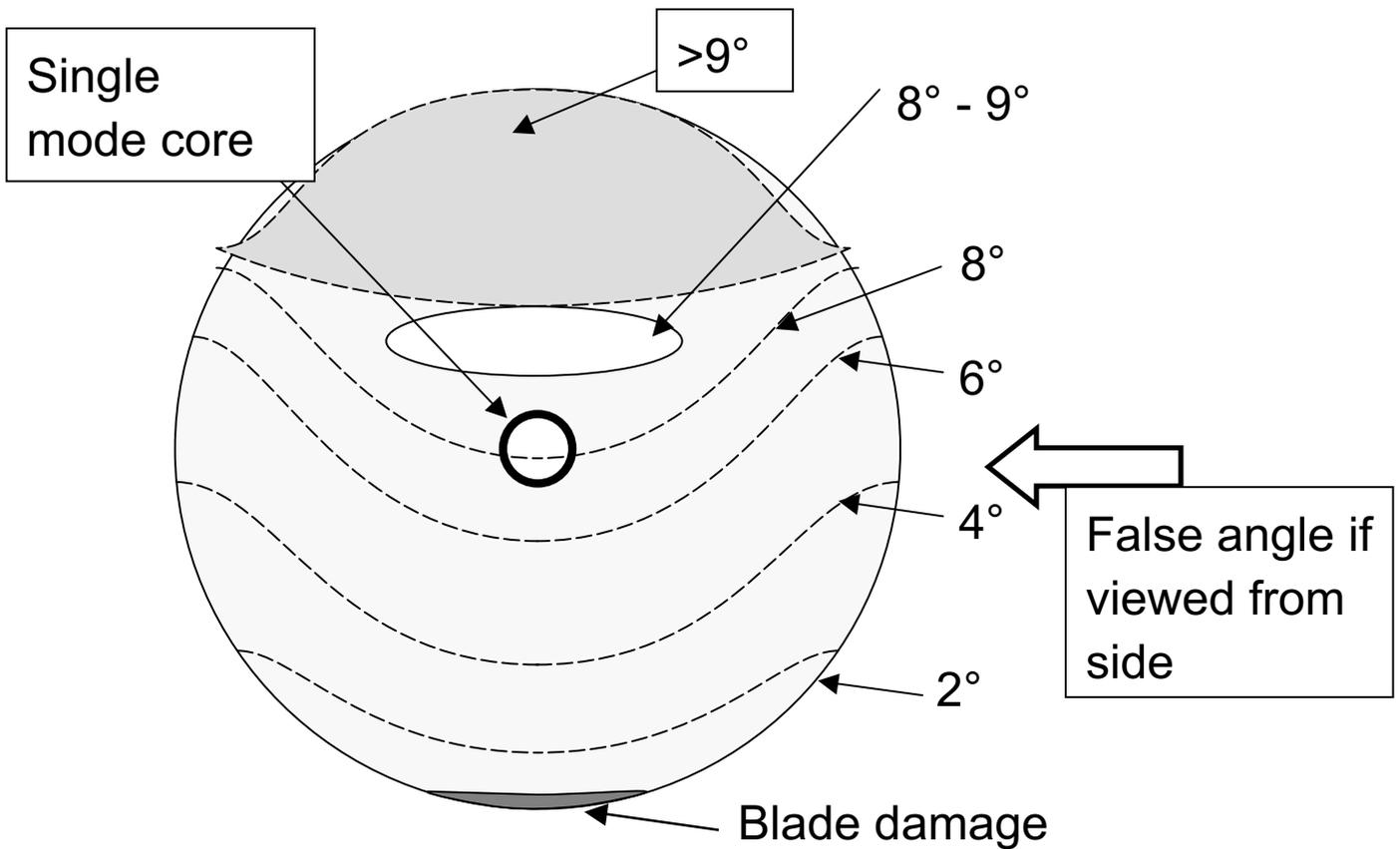
Cleaving Principles

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 "O"-rings.
- *Bending Fiber* The clamped fiber is bent downwards into the rectangular hole by the anvil located between the two "O"-rings. This also tensions the fiber.
- *Tensioning the fiber* The left-hand cleaving plane is fixed. Pushing the anvil swinger down causes the right-hand cleaving plane to move downwards and so stretch and tension the fiber.
- *Scratching the fiber* The bent and tensioned fiber is scratched and cleaves on contact with the blade as the cleaving plane swings downwards.

Shape of cleaved end

The cleaved end has an end angle of 8° across the single mode core of the optical fiber with a standard deviation of less than 1° . The cleaved end is at an angle which is approximately constant over the region of 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.

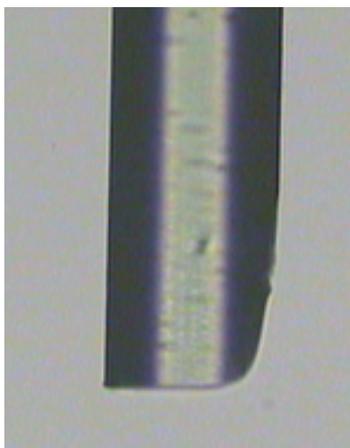


Flatness of cleaved end

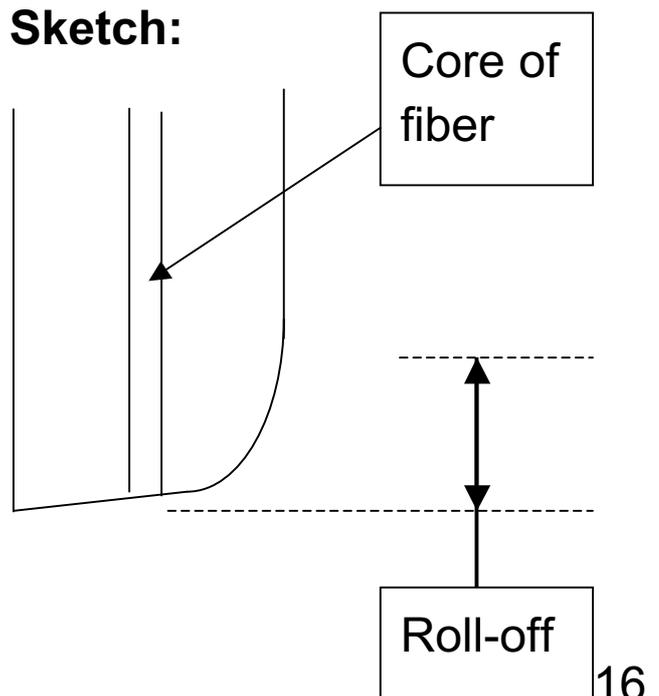
The cleaved end has a portion which is at high angle where the glass rolls-off. A view of the cleaved end face in side projection below.

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

Picture:



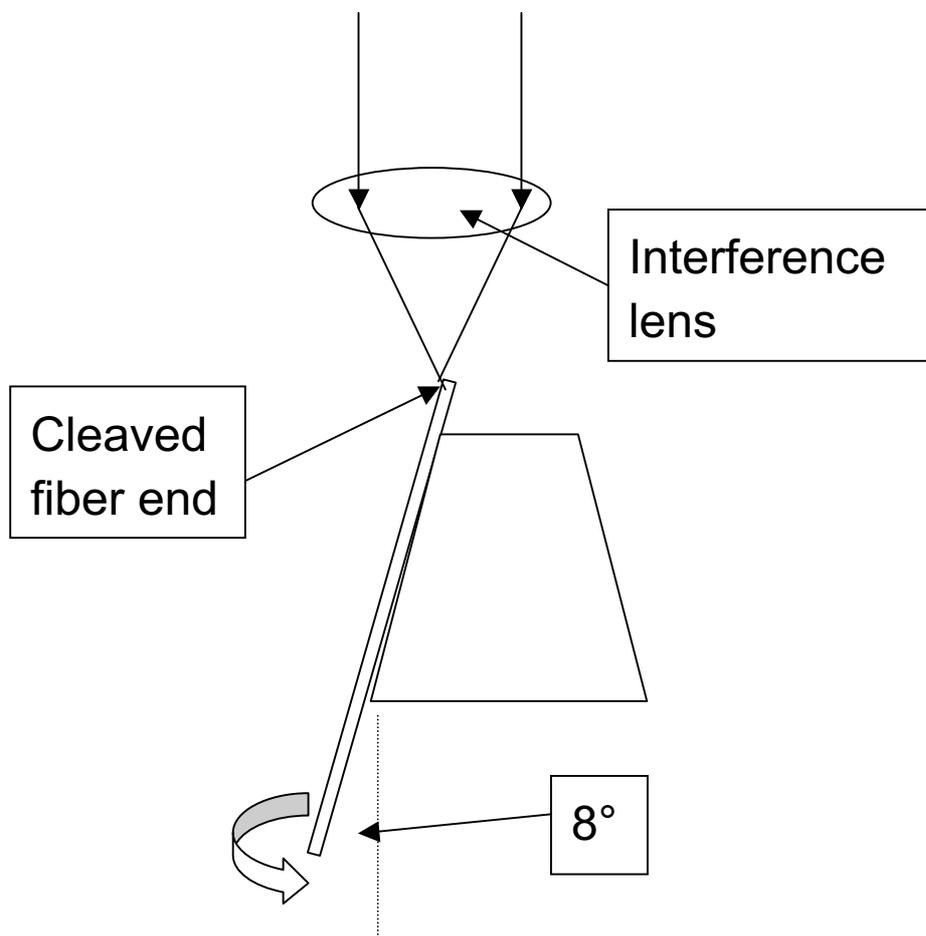
Sketch:



Measurement of Cleave Angle

The end angle is measured using an interference lens:

- The cleaved fiber is mounted vertically under a microscope
- The mounted fiber is tilted by 8° and rotated, making horizontal those regions of the fiber which are angled at 8° .
- The end face is inspected with an interference lens which shows interference fringes. The deviation of the end face from 8° can then be calculated.



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

Warranty

These precision fiber cleavers are fully guaranteed for parts and labour for a 12month period.

The 12-position diamond blade is not included within this guarantee. The wear of the diamond depends on number of cleavers carried out and the cleanliness of the fiber.

The manufacturer accepts no responsibility for damage arising from cleaver misuse or damage to the blade by metal.

Service

The cleaver may be serviced by your local agent or returned to the factory in the UK, explaining the problems encountered.

Address for UK Factory:

Oxford Fiber Ltd.,
244 Hillmorton Road
Rugby CV22 5BQ
U.K.

TEL: +44 (0)1788 57 67 00

FAX: +44 (0)870 0516 877

e-mail: sales@oxfordfiber.com

www.oxfordfiber.com

*Copyright © 2012 Oxford Fiber Ltd. All rights reserved.
No part of this document may be reproduced or
transmitted. In whole or in part, by whatever means,
without the prior written permission of Oxford Fiber Ltd.*