



## **OPTICAL FIBER SOLUTIONS** FOR YOUR MEDICAL DEVICE

ISO 9001 and 13485 Certified

FDA Good Manufacturing Practices

USP Class VI and ISO10993 for Biocompatibility

Low Bioburden Assembly Room

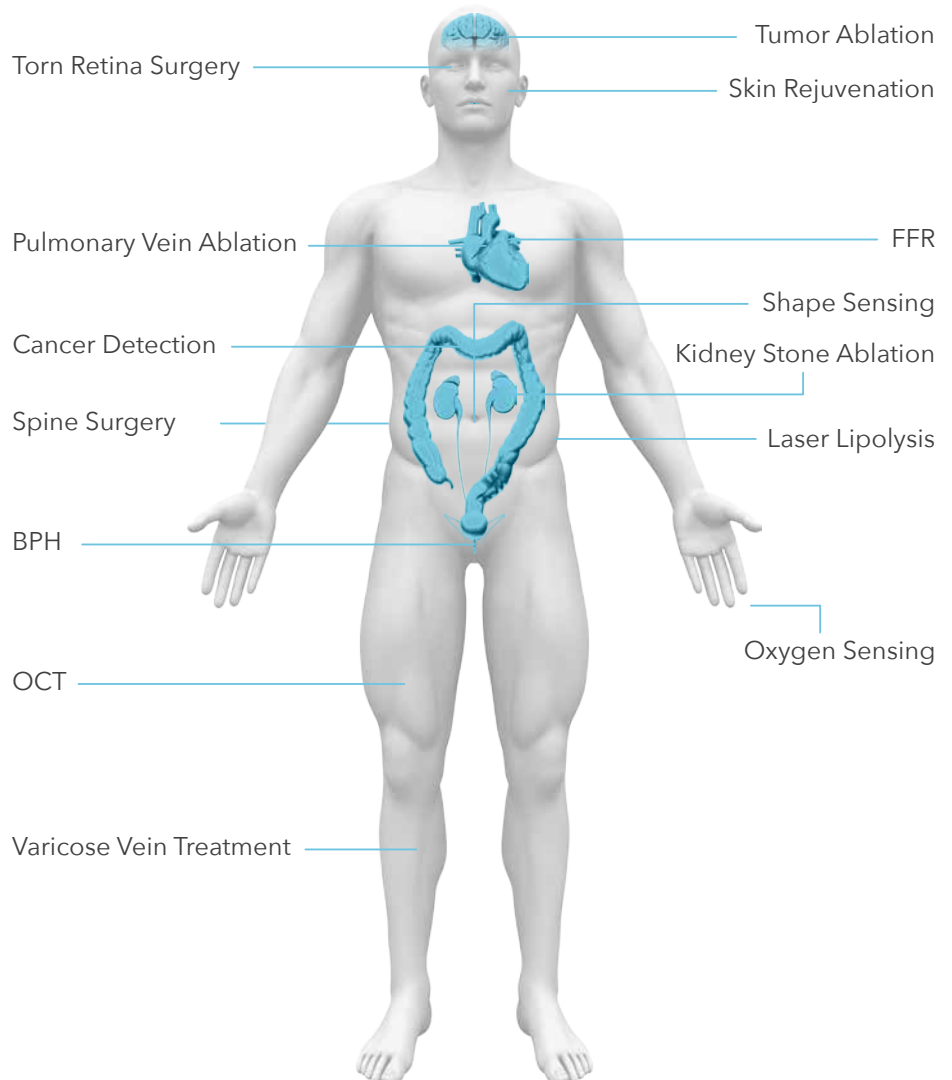
Engineering Support for Fiber, Cable, and Assembly

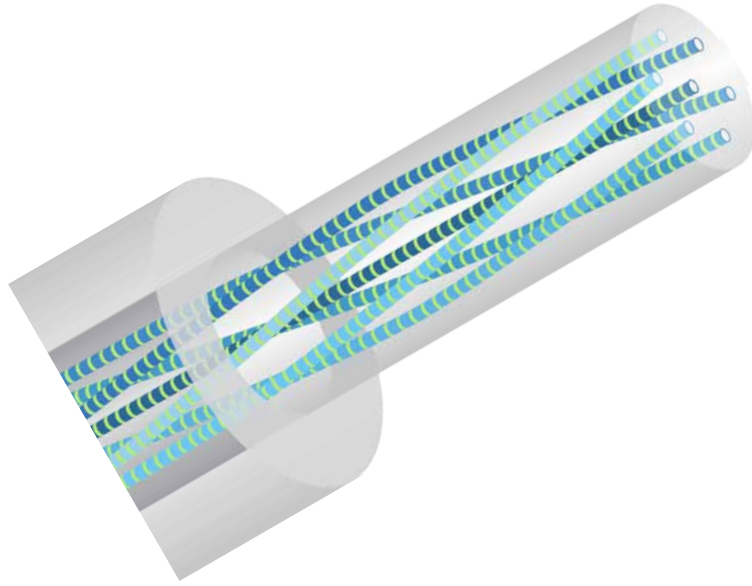
## PREFACE

OFS is **ISO13485 certified**, follows **FDA Good Manufacturing Practices**, and tests fibers to **USP Class VI** standards and **ISO10993** for biocompatibility.

OFS is a vertically integrated optical fiber manufacturer from the glass preform to probe assembly with more than 30 years' experience in the design and production of specialty optical fibers.

## TYPICAL APPLICATIONS





### PRODUCT SPECIFICATIONS

#### FIBER DIMENSION/GEOMETRIC PROPERTIES

<b>Fiber Core Geometry</b>	6 around 1
<b>Cladding Diameter</b>	125 $\mu\text{m}$
<b>Coating Type</b>	Acrylate
<b>Coating Diameter</b>	200 $\mu\text{m}$
<b>Coating Concentricity</b>	< 8 $\mu\text{m}$
<b>Core-to-Core Spacing</b>	35 $\mu\text{m}$
<b>Center Core Concentricity in Glass</b>	0.5 $\mu\text{m}$
<b>Twist Rate</b>	50 twists/m
<b>Numerical Aperture</b>	0.21
<b>Mode Field Diameter at 1550 nm</b>	6 $\mu\text{m}$
<b>Fiber Proof Strength</b>	100 kpsi

#### GRATINGS CHARACTERISTICS

<b>Grating Length</b>	35 mm
<b>Typical Spacing Between Gratings</b>	0.2 mm
<b>Grating Center Wavelength</b>	1540 nm
<b>Typical Integrated Grating Reflectivity in each Core for 1cm of Grating</b>	-70 dB
<b>Typical Array Length</b>	25 m

**NOTE:** Custom fibers/gratings are available to achieve specific requirements.

### KEY FEATURES

- Multicore fiber with continuous FBGs
- Designed for shape sensing applications
- Multicore connectorization and fan-outs
- Low back reflection termination

High quality continuous gratings without stripping and recoating preserve the fiber's mechanical integrity. This manufacturing platform enables us to customize and optimize the product to meet various customers' demands more economically.\*

\* For further details and applications, request a copy of our white paper, entitled "Multicore Optical Fiber Grating Arrays for Sensing Applications."

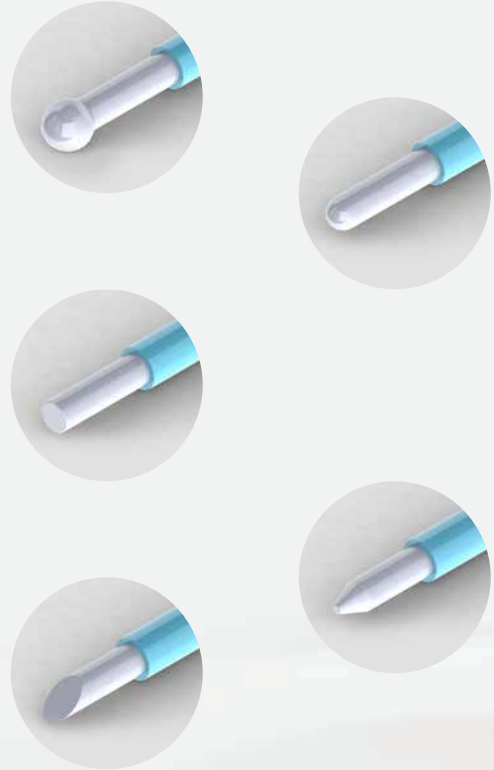
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*Our support for your medical applications goes beyond fiber, cable, and assembly.*

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From simple flat cleaving to complex-shape, OFS offers highly customizable fiber tip assemblies for your needs. Your products are made and packaged in environmentally controlled room, ready for sterilization.

- Single-use disposable products
- Multiple-use serializable products
- Sub-assemblies
- Final-assemblies
- Various connectors available

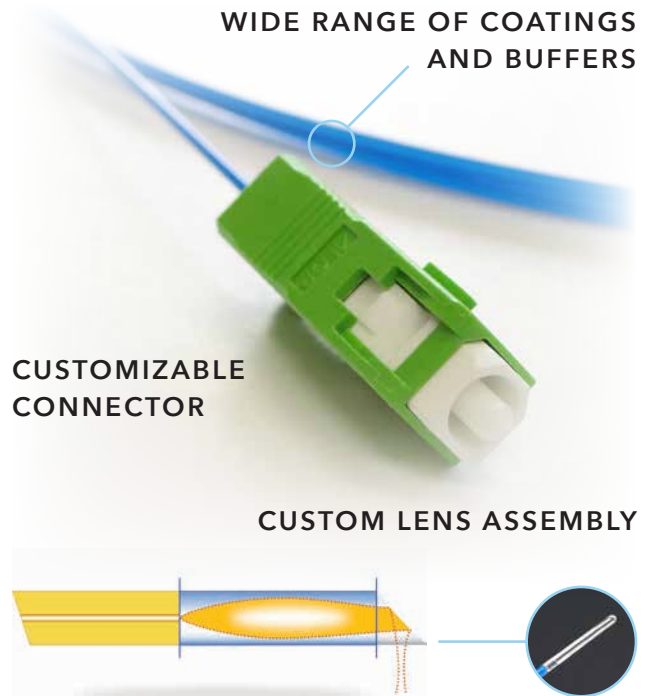


OFS plays an important role in the expanding adoption of optical coherence tomography (OCT) using miniature optical fiber probes in such applications as cardiology, oncology, and gastroenterology.

OFS has created the technology platform necessary to build high quality optical fiber probes with flexible tip lensing designs that allow beam shaping to meet specific focal distances.

### TYPICAL PROBE SPECIFICATIONS

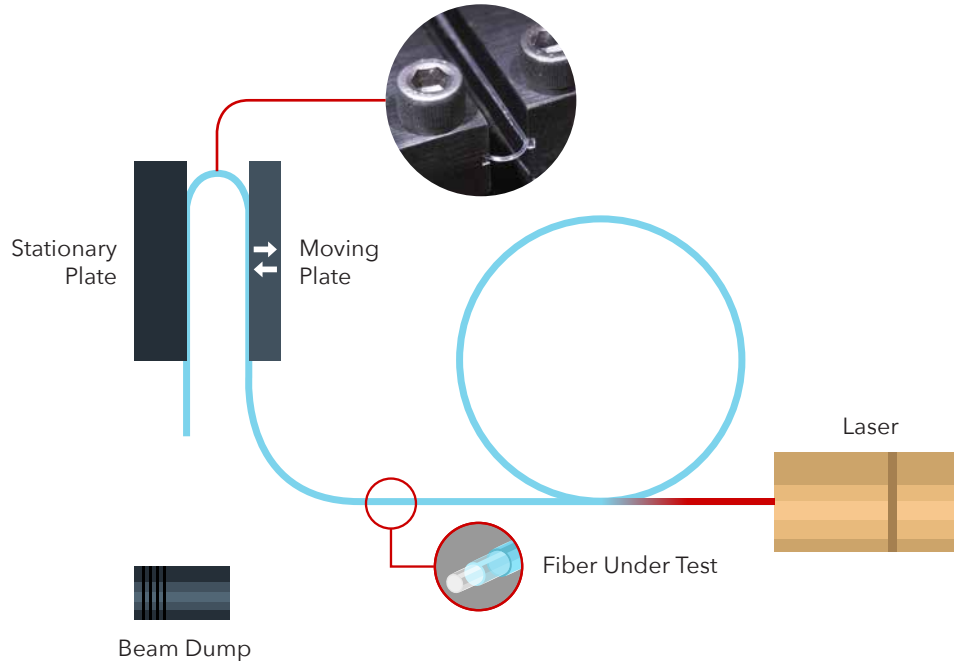
- Operating Wavelength: 850, 1310, 1550 nm and others
- Internal Back Reflection: -60 dB or better
- Return Loss: -20 to -70 dB
- Outer Diameter: 100-400  $\mu\text{m}$
- Beam Size: 20 - 60  $\mu\text{m}$
- Working Distance: up to 1.5 mm



	Single-mode	Single-mode	Single-mode	Single-mode	Single-mode Bend Insensitive (Under Development)
<b>Operating Wavelength</b>	850 nm	980 nm	1310 nm	1310 nm	1310 nm
<b>Fiber Cutoff Wavelength</b>	750 $\pm$ 50 nm	$\leq$ 960 nm	$\leq$ 1260 nm	1250 $\pm$ 60 nm	1250 $\pm$ 60 nm
<b>Mode Field Diameter</b>	6.0 $\pm$ 0.5 $\mu\text{m}$	5.0 $\pm$ 0.3 $\mu\text{m}$	9.3 $\pm$ 0.5 $\mu\text{m}$	9.3 $\pm$ 0.5 $\mu\text{m}$	TBD
<b>Attenuation @ 820 nm</b>	$\leq$ 6.0 dB/km	-	-	-	-
<b>Attenuation @ 980 nm</b>	-	$\leq$ 3.0 dB/km	NA	-	-
<b>Attenuation @ 1310 nm</b>	-	-	$\leq$ 0.7 dB/km	$\leq$ 3.0 dB/km	TBD
<b>NA (nominal)</b>	0.12	0.16	0.12	0.12	0.12
<b>Cladding Diameter</b>	125 $\pm$ 1 $\mu\text{m}$	125 $\pm$ 1 $\mu\text{m}$	125 $\pm$ 1 $\mu\text{m}$	80 $\pm$ 2 $\mu\text{m}$	80 $\pm$ 2 $\mu\text{m}$
<b>Coating Diameter</b>	155 $\pm$ 5 $\mu\text{m}$	155 $\pm$ 5 $\mu\text{m}$	155 $\pm$ 5 $\mu\text{m}$	100 $\pm$ 4 $\mu\text{m}$	100 $\pm$ 4 $\mu\text{m}$
<b>Clad Non-Circularity</b>	$\leq$ 2%	$\leq$ 2%	$\leq$ 2%	$\leq$ 2%	$\leq$ 2%
<b>Core/Clad Offset</b>	$\leq$ 0.5 $\mu\text{m}$	$\leq$ 0.5 $\mu\text{m}$	$\leq$ 0.5 $\mu\text{m}$	$\leq$ 1 $\mu\text{m}$	$\leq$ 1 $\mu\text{m}$
<b>Coating Material</b>	Polyimide				
<b>Operating Temperature</b>	-65 to +300 $^{\circ}\text{C}$				
<b>Proof test Level</b>	200 kpsi	200 kpsi	200 kpsi	150 kpsi	150 kpsi
<b>Order by Part Number:</b>	BF04701	F9022	BF05717-06	BF04441-06	TBD

Custom graded-index fibers are available to achieve specific GRIN lens focal point requirements.

**NOTE:** The operating temperature ranges are general guidelines. Consult with our Technical Sales department to determine the optimal coating and jacketing material for your specific application. 1.860.678.6636



**EXPERIMENTAL SETUP**

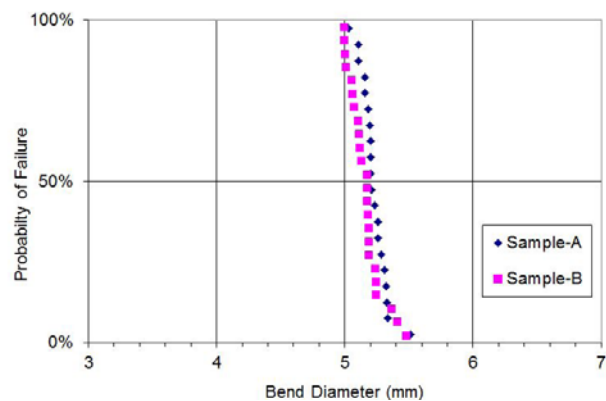
100W of laser power is launched into the fiber when bent, excess fiber looped into a diameter of 20 cm

**Reliable laser delivery up to a 5 mm bend\***

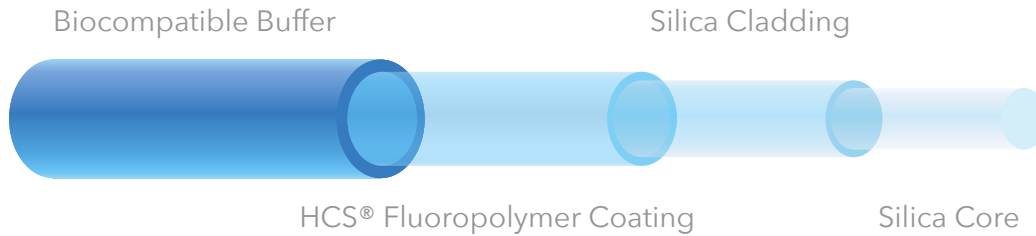
HCXtreme Optical Fiber technology addresses the problem of fiber failure due to tight bending of optical fiber under power. This optimized fiber design reduces bend loss and offers superior performance in high power laser delivery application that requires bending.

\* For further details and testing methodology, request a copy of our white paper, entitled "Study of Optical Fiber Damage Under Tight Bend with High Optical Power at 2140 nm."

**FIBER FAILURE PROBABILITY VS. BEND DIAMETER UNDER LASER POWER**



**FIBER TESTED:** 365 μm core; 400 μm clad; 0.22 NA



PRODUCT SPECIFICATIONS					
	272-22 HCXtreme	272-29 HCXtreme	365-22 HCXtreme	550-22 HCXtreme	940-22 HCXtreme
OPTICAL CHARACTERISTICS					
<b>Numerical aperture</b>	0.22	0.29	0.22	0.22	0.22
<b>Attenuation @ 850 nm</b>	≤10 dB/km	≤12 dB/km	≤10 dB/km	≤10 dB/km	≤10 dB/km
<b>Water content</b>	Low OH				
DIMENSION/GEOMETRIC PROPERTIES					
<b>Core diameter</b>	272 ± 6 μm	272 ± 10 μm	365 ± 10 μm	550 ± 12 μm	940 ± 15 μm
<b>Cladding diameter</b>	299 ± 6 μm	326 ± 10 μm	400 ± 10 μm	600 ± 10 μm	1000 ± 15 μm
<b>Hard coating diameter</b>	330 ± 7 μm	356 ± 10 μm	430 ± 10 μm	630 ± 10 μm	1035 ± 15 μm
<b>Buffer diameter</b>	400 ± 30 μm	420 ± 30 μm	550 ± 30 μm	750 ± 30 μm	1400 ± 50 μm
<b>Clad/coating offset</b>	≤9 μm	≤10 μm	≤9 μm	≤9 μm	≤11 μm
COATING/BUFFER DESCRIPTIONS					
<b>Coating material</b>	HCS fluoropolymer coating				
<b>Buffer material</b>	Blue ETFE				
<b>Operating temperature</b>	-65 to +125 °C				
MECHANICAL AND TESTING DATA					
<b>Bend radius</b>					
<b>Short-term (1 Hour)</b>	≥22 mm	≥24 mm	≥29 mm	≥58 mm	≥73 mm
<b>Long-term (20 Years)</b>	≥36 mm	≥40 mm	≥47 mm	≥94 mm	≥118 mm
<b>Proof test level</b>	≥100 kpsi (0.689 GPa)				
<b>Product Description Code</b>	272-22 HCXtreme	272-29 HCXtreme	365-22 HCXtreme	550-22 HCXtreme	940-22 HCXtreme
<b>Order by Part Number</b>	F24748	F18939	F18940	F18941	F18942
<b>Options</b>	Core Diameter, Clad Diameter, Numerical Aperture, Proof Test, Cabling, Connectorization, Metalization, Additional Coatings, other Buffer Colors, Low Bioburden Packaging and Manufacturing.				

**NOTE:** The operating temperature ranges are general guidelines. Consult with our Technical Sales department to determine the optimal coating and jacketing material for your specific application. 1.860.678.6636



# OFS and FEC Manufacturing Locations



For additional information please contact your sales representative.

You can also visit our website at [www.ofsoptics.com](http://www.ofsoptics.com)  
or call 1-888-FIBER-HELP (1-888-342-3743) from inside the USA  
or +1-770-798-5555 from outside the USA.  
EMEA Specific: +49 (0) 228 7489 201

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