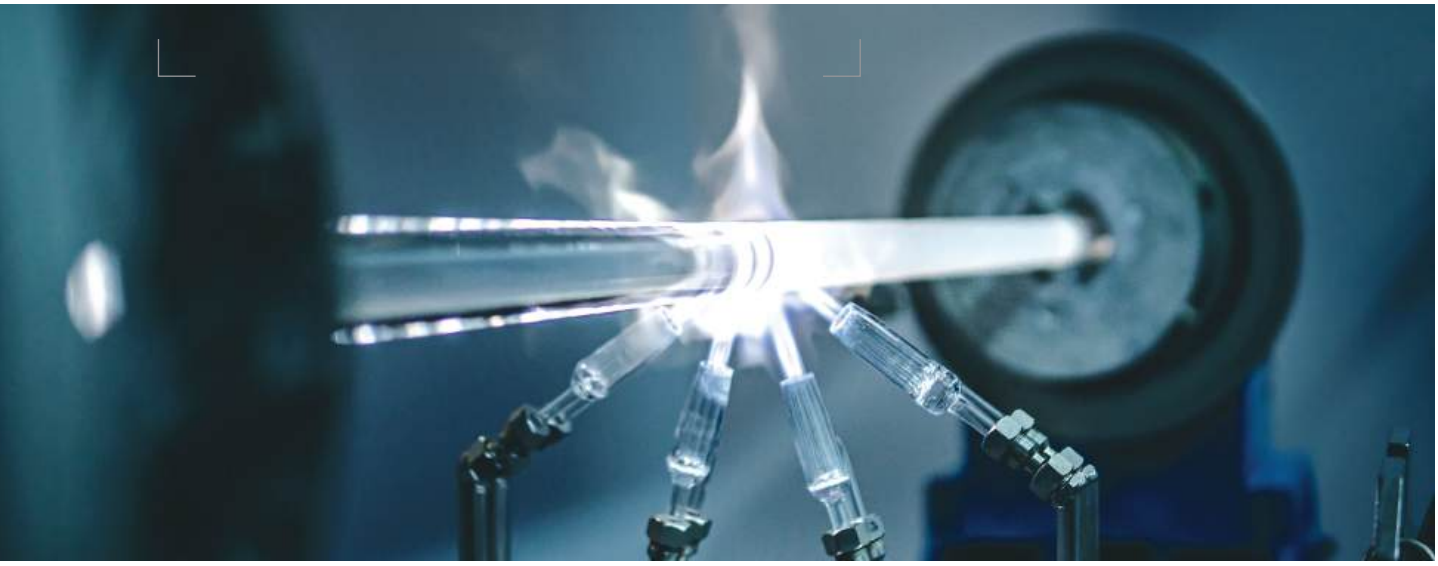
INDUSTRIAL

Ceramoptec®

Innovative Fiber Optics

Every Step of the Way™



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A full range of services for your needs

Customized solutions from individual fibers to ready-to-use cable assemblies

With over 35 years' experience in the development and production of optical fibers and assemblies, we are a trusted partner for industry, medical and research. We develop our precision-made solutions in-house, from preform manufacturing to customized cables and bundles as well as medical fibers and probes. This allows us to provide you with effective, expert support and meet your individual requirements efficiently. We offer a one-stop solution for all your fiber optics needs. Many prestigious clients rely on our products. We hope that this brochure will provide you with a sound basis for your decision, and we would be delighted to tell you more about our products and processes in person.

Your advantages

- More than 500 fibers with different core sizes and geometries as well as jackets available from stock
- Customized fiber geometries and shapes (square, rectangular, x-gonal)
- One-stop shop (including AR-coatings of fiber ends and sterilization of medical fibers and probes)
- ISO 9001 14001, 13485 certified manufacturing
- Application optimized fiber properties (esp. high NA or solarization resistant)
- Large portfolio of fiber jackets (material, color and marking)

From initial enquiry to the finished product

ENQUIRY | TECHNICAL DEVELOPMENT | PROTOTYPING | PRODUCTION

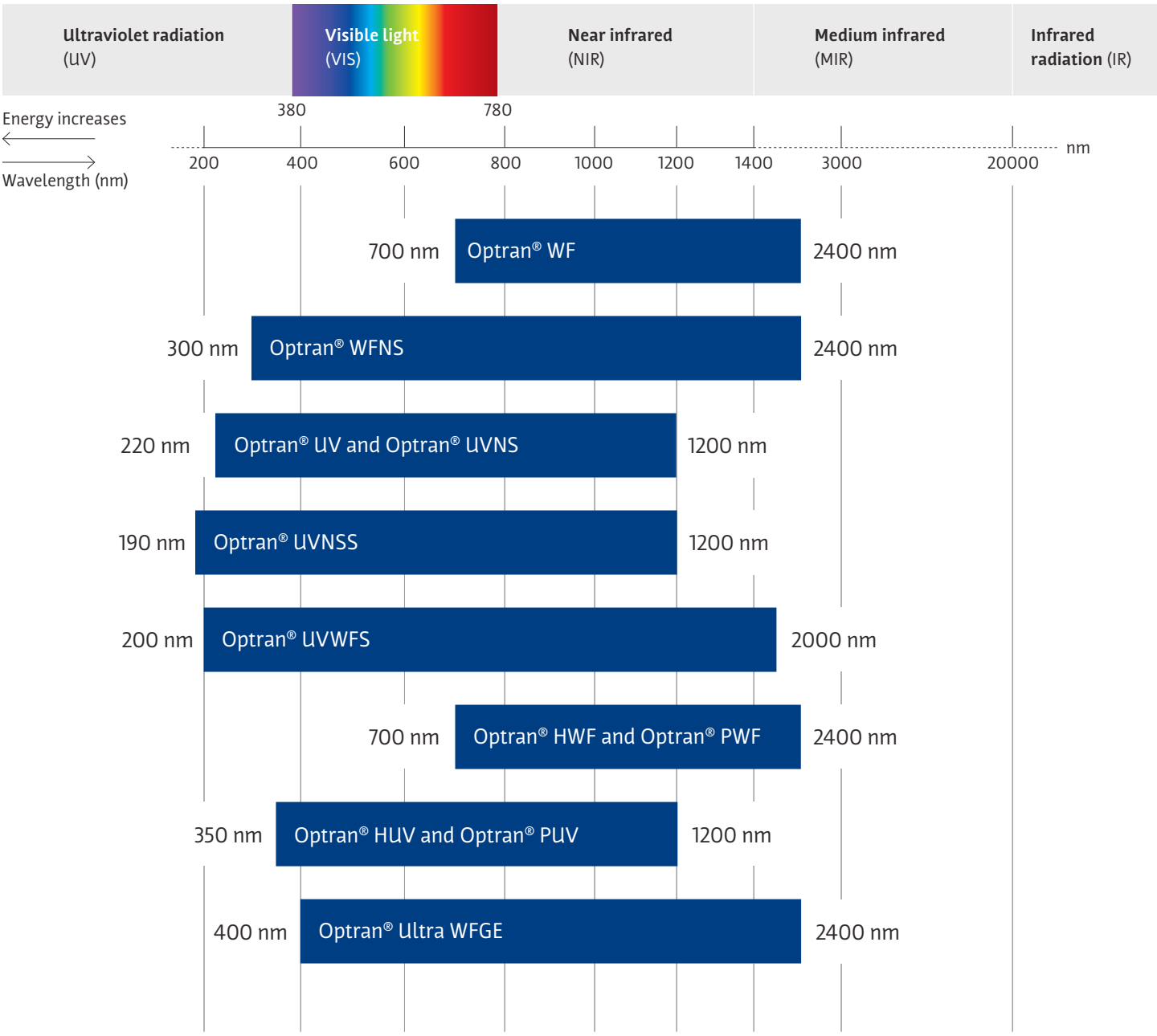
All-silica preforms
by POVD and PCVD methods

As one of the few suppliers on the market, CeramOptec® covers the entire manufacturing chain from the preform to full fiber assembly. The preform largely defines both optical properties and the geometry of the all-silica fiber drawn from it.

CeramOptec® utilizes POVD and PCVD plasma technologies for the deposition of fluorine doped silica layers on a core material. We achieve a Numerical Aperture between the deposited material and pure silica core of 0.28. The fibers drawn from POVD and PCVD preforms have different characteristics. The use of two different deposition technologies for the production of preforms opens up a wide range of technical options and enables us to manufacture particularly demanding special shapes.

Fiber overview
Choose the right one

Different types of optical fibers are used at different wavelengths depending on their transmission properties.



Optran® WF, Optran® WFNS
All-silica with low OH

Standard fibers for NIR
Spectroscopy, medical diagnostic, medical technology,
laser delivery systems, low power astronomy applications, etc.

- Superior performance and fiber optic properties in NIR range
- Optran® WFNS expands wavelength range down to UV
- Available in a wide range of core diameters and assemblies
- Tailored to your specific application needs

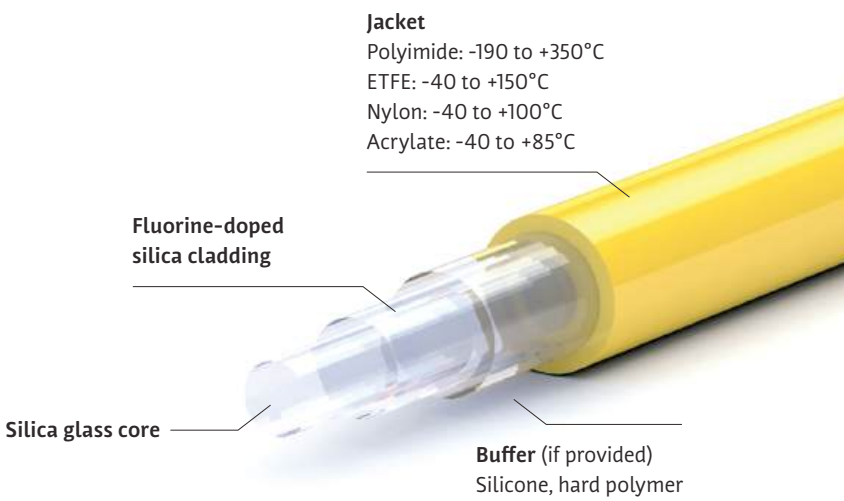
Standard NIR

Wavelength

Optran® WF	700–2400 nm
Optran® WFNS	300–2400 nm

Numerical aperture (NA)

Low	0.12 ± 0.02
Standard	0.22 ± 0.02
High	0.28 ± 0.02



Technical data

Wavelength / spectral range	Optran® WF: 700–2400 nm Optran® WFNS: 300–2400 nm
Numerical aperture (NA)	0.12 ± 0.02 | 0.22 ± 0.02 | 0.28 ± 0.02 or customized
Operating temperature	-190 to +350°C
Core diameter	Available from 30 to 3000 µm
Standard core / cladding ratios	**1:1.04 | 1:1.06 | 1:1.1 | 1:1.15 | 1:1.2 | 1:1.25 | 1:1.4** or customized
OH content	Optran® WF, Optran® WFNS: low (< 1 ppm) Fibers with OH contents < 0.25 ppm are available upon request
Standard prooftest	100 kpsi (nylon, ETFE, acrylate jacket) | 70 kpsi (polyimide jacket)
Minimum bending radius	50 × cladding diameter (short-term mechanical stress) 150 × core diameter (during use with high laser power)
Product code	See glossary, p. 28
Attenuation values	in relation to wavelength: see p. 29

Optran® UV, Optran® UVNS
All-silica with high OH

Standard fibers for UV-VIS wavelength range
Spectroscopy, medical diagnostic, medical technology, laser delivery systems etc.

- Superior performance and fiber optic properties from UV to IR wavelengths
- Optran UVNS has an excellent solarization resistant at higher UV power levels
- Available in a wide range of core diameters and assemblies
- Tailored to your specific application needs

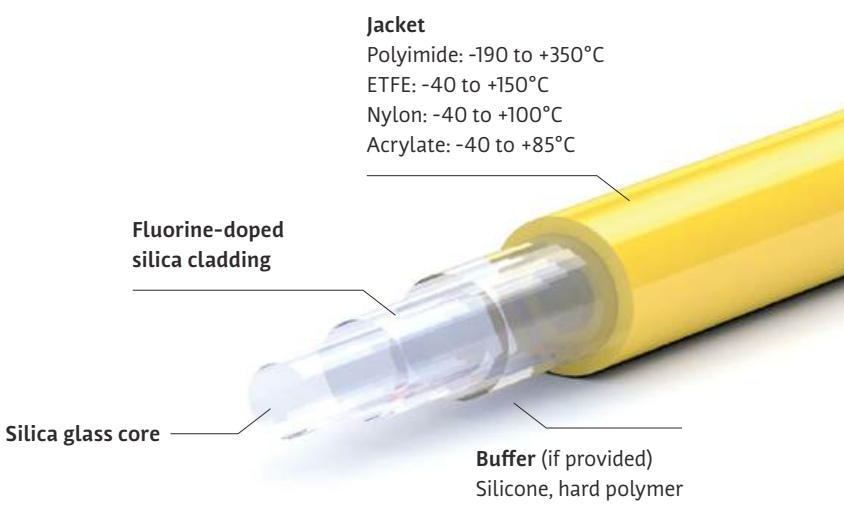
Standard UV

Wavelength

Optran® UV	220–1200 nm
Optran® UVNS	190–1200 nm

Numerical aperture (NA)

Low	0.12 ± 0.02
Standard	0.22 ± 0.02
High	0.28 ± 0.02



Technical data

Wavelength / spectral range	Optran® UV, Optran® UVNS: 220–1200 nm
Numerical aperture (NA)	0.12 ± 0.02 | 0.22 ± 0.02 | 0.28 ± 0.02 or customized
Operating temperature	-190 to +350°C
Core diameter	Available from 50 to 3000 µm
Standard core / cladding ratios	**1:1.04 | 1:1.06 | 1:1.1 | 1:1.15 | 1:1.2 | 1:1.25 | 1:1.4** or customized
OH content	Optran® UV: high (> 700 ppm)
Standard prooftest	100 kpsi (nylon, ETFE, acrylate jacket) | 70 kpsi (polyimide jacket)
Minimum bending radius	50 × cladding diameter (short-term mechanical stress) 150 × core diameter (during use with high laser power)
Product code	See glossary, p. 28
Attenuation values	in relation to wavelength: see p. 29

Optran® UVNSS
All-silica stabilized with high OH

UV-fibers with improved solarization resistance and extra stability
Spectroscopy, semiconductor technology, laser delivery systems and other applications.

- Superior performance and fiber optic properties especially in the deeper UV and higher power levels
- Extremely high solarization resistance
- Available in a wide range of core diameters and assemblies
- Tailored to your specific application needs

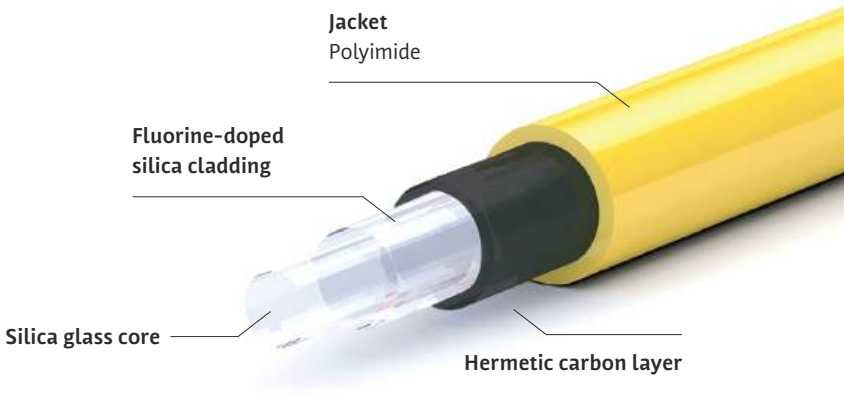
High solarization resistance

Wavelength

Optran® UVNSS	190–1200 nm

Numerical aperture (NA)

Low	0.12 ± 0.02
Standard	0.22 ± 0.02
High	0.28 ± 0.02



Technical data

Wavelength / spectral range	Optran® UVNSS: 190–1200 nm
Numerical aperture (NA)	0.12 ± 0.02 | 0.22 ± 0.02 | 0.28 ± 0.02 or customized
Operating temperature	-190 to +150°C
Core diameter	Available from 100 to 600 µm
Standard core / cladding ratios	**1:1.06 | 1:1.1 | 1:1.2 | 1:1.4** or customized
OH content	High (> 700 ppm)
Standard prooftest	70 kpsi (polyimide jacket)
Minimum bending radius	50 × cladding diameter (short-term mechanical stress) 300 × core diameter (during use with high laser power)
Attenuation values	in relation to wavelength: see p. 29

Optran® UVWFS broadband fiber
All-silica with low OH and without Cl_2

Ultra broadband fiber for the 200 nm to 2000 nm
Spectroscopy, analytical instruments, sensing applications, astronomy, aerospace and avionics, defense and wherever different wavelengths are used simultaneously.

- Superior performance and fiber optic properties from deeper UV to NIR
- Available in a wide range of core diameters and assemblies
- Tailored to your specific application needs

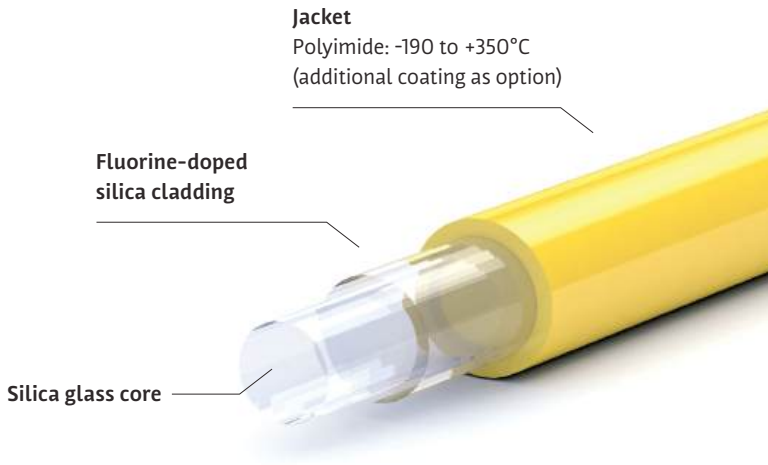
Broadband

Wavelength

Optran® UVWFS	200–2000 nm

Numerical aperture (NA)

Low	0.12 ± 0.02
Standard	0.22 ± 0.02
High	0.28 ± 0.02



Technical data

Wavelength / spectral range	Optran® UVWFS: 200–2000 nm
Numerical aperture (NA)	0.12 ± 0.02 | 0.22 ± 0.02 | 0.28 ± 0.02 or customized
Operating temperature	-190 to +350°C
Core diameter	Available from 100 to 800 µm | standard 200 µm
OH content	Optran® UVWFS: ~ 5 ppm
Standard core / cladding ratios	**1:1.06 | 1:1.1 | 1:1.2 | 1:1.4** or customized
Standard prooftest	70 kpsi (polyimide jacket)
Minimum bending radius	50 × cladding diameter (short-term mechanical stress) 150 × core diameter (during use with high laser power)
Attenuation values	in relation to wavelength: see p. 30

Optran® HUV, Optran® HWF
Silica fiber with F-acrylate cladding

Cost-effective silica fiber with a high numerical aperture
Illumination, sensing applications, photodynamic therapy and other applications.

- Superior performance and fiber optic properties from UV to NIR
- Available as UV or VIS/NIR fiber (HUV/HWF)
- Available in a wide range of core diameters and assemblies
- Tailored to your specific application needs

High NA at a low price

Wavelength

Optran® HUV / HWF	350–2200 nm

Numerical aperture (NA)

Standard	0.37 ± 0.02
High	0.48 ± 0.02
	0.52 ± 0.02
	0.57 ± 0.02

Technical data

Wavelength / spectral range	Optran® HUV, Optran® HWF: 350–2200 nm
Numerical aperture (NA)	0.37 ± 0.02 | 0.48 ± 0.02 | 0.52 ± 0.02 | 0.57 ± 0.02
Operating temperature	-40 to +150°C
Core diameter	Available from 100 to 2000 µm
OH content	Optran® HUV: high (> 700 ppm) Optran® HWF: low (< 1 ppm)
Standard prooftest	100 kpsi
Minimum bending radius	50 × cladding diameter (short-term mechanical stress) 150 × core diameter (during use with high laser power)
Attenuation values	in relation to wavelength: see p. 30

Optran® PUV, Optran® PWF
Silica fiber with silicone cladding

Cost-effective with a high numerical aperture
Remote illumination, sensing applications, medical and other applications.

- Superior performance and fiber optic properties from UV to NIR
- Available as UV or VIS/NIR fiber (PUV/PWF)
- Available in a range of core diameters and assemblies
- Tailored to your specific application needs

High NA at a low price

Wavelength

Optran® PUV / PWF	350–2200 nm

Numerical aperture (NA)

Standard	0.40 ± 0.02

Advantages

- Cost-effective (compared to silica / silica fibers)
- High concentricity
- Step-index profile
- Biocompatible material
- Sterilizable using ETO and other methods

Technical data

Wavelength / spectral range	Optran® PUV, Optran® PWF: 350–2200 nm
Numerical aperture (NA)	0.40 ± 0.02
Operating temperature	-40 to +150°C
Core diameter	Available from 100 to 2000 µm
OH content	Optran® PUV: high (> 700 ppm) Optran® PWF: low (< 1 ppm)
Standard prooftest	100 kpsi
Minimum bending radius	50 × cladding diameter (short-term mechanical stress) 150 × core diameter (during use with high laser power)
Attenuation values	in relation to wavelength: see p. 30

Optran® WFGE
All-silica GeO_2 doped

Maximum numerical aperture, unmatched performance, and a broad spectral range
Spectroscopy, laser technology, research, sensing, Illumination, photodynamic therapy, and many other applications.

- Superior performance and fiber optic properties from VIS to NIR >2000nm
- Available in a range of core diameters and assemblies
- Tailored to your specific application needs

High NA for demanding applications

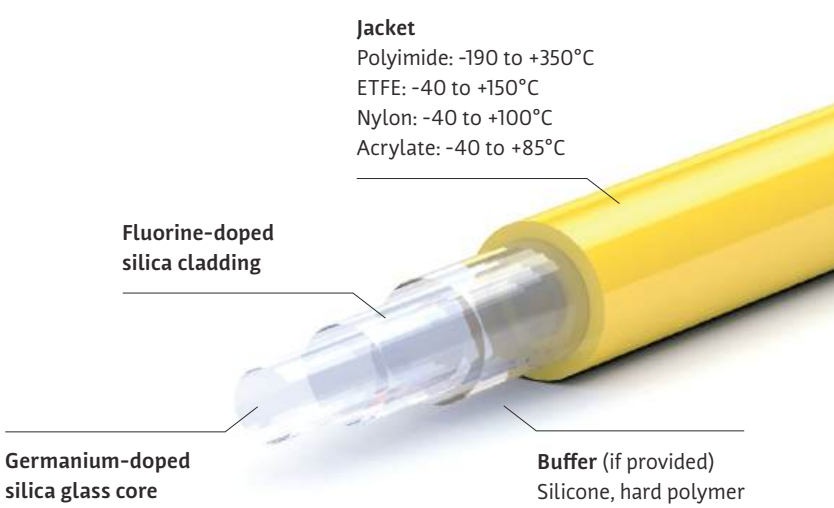
Wavelength

Optran® WFGE	400–2400 nm

Numerical aperture (NA)

Standard	0.37 ± 0.02

Higher NA on request



Technical data

Wavelength / spectral range	Optran® WFGE: 400–2400 nm
Numerical aperture (NA)	0.37 ± 0.02
Operating temperature	-190 to +350°C
Core diameter	Available from 50 to 1000 µm
Standard core / cladding ratios	**1:1.04 | 1:1.06 | 1:1.1 | 1:1.15 | 1:1.2 | 1:1.25 | 1:1.4** or customized
Standard prooftest	100 kpsi (nylon, ETFE, acrylate jacket) 70 kpsi (polyimide jacket)
Minimum bending radius	50 × cladding diameter (short-term mechanical stress) 150 × core diameter (during use with high laser power)
Attenuation values	in relation to wavelength: see p. 29

Fiber taper products
Optran® UV, WF, WFGE

CeramOptec®'s fused tapered fibers can be deployed from the deep UV to the NIR range. Taper products are required where input and output diameters differ. CeramOptec® offers a wide range of options, including for special applications.

Formula

A tapered optical fiber acts as a beam diameter and numerical aperture converter, with the input beam being converted according to the following formula:

$$NA_2 = \frac{D_1}{D_2} NA_1$$

NA_1: Input NA | NA_2: Output NA
D_1: Input diameter | D_2: Output diameter
The output NA is limited by the NA of the fiber used, which may result in a loss of light.

Technical data

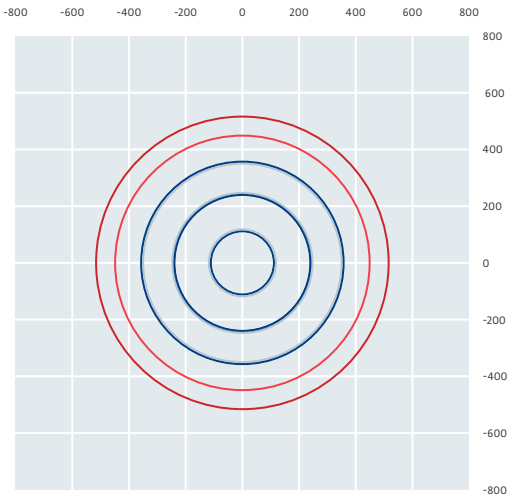
Available fibers	Optran® UV | Optran® WF | Optran® WFGE
Wavelength	From deep UV to NIR
Core diameter	50 to 1500 µm
Standard taper ratios	2:1 | 3:1 | 4:1 | 5:1 or customized
Standard prooftest	100 kpsi
Minimum bending radius	5–100 mm (depending on the selected fiber diameter)

Multi-Core Optical Fiber

Silica fibers – concentric or individual cores

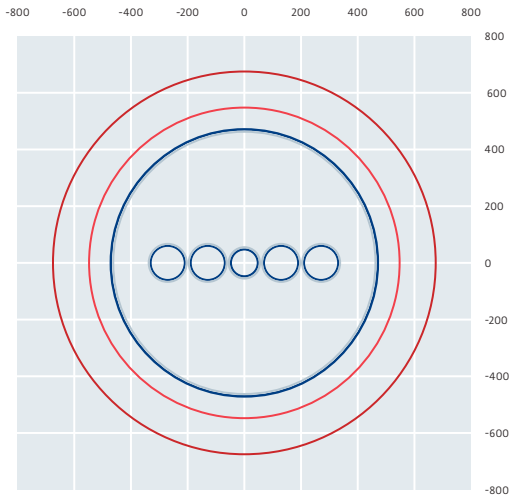
Multi-Core Fiber Optics open a range of capabilities for applications in sensing, laser delivery and more. CeramOptec® offers Concentric Core and Separated Core fiber options, fully customizable to meet your needs.

Fiber Cross-Section / µm

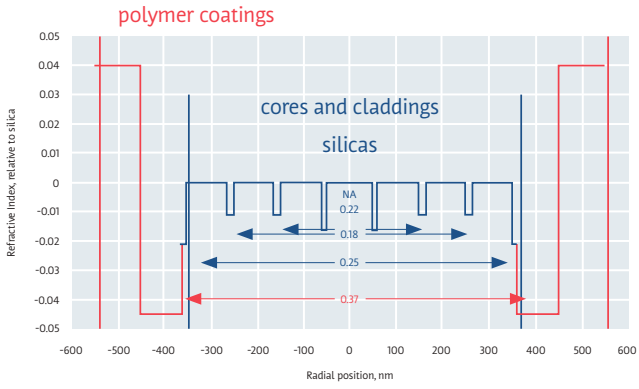


Concentric Core Fiber
Advantages: Great for Power Density Control

Fiber Cross-Section / µm



Separated Core Fiber (under development)
Ceram Optec® can produce separated core fibers upon customer request.
Advantages: Ideal for beam shaping



Technical data
Our multi-core fibers are fully customizable. Please contact us for more information.

Optran® UVNCC, Optran® WFNCC
All-silica with non circular cores

These fibers are ideal for laser applications, where the shape and homogeneity of the output beam is decisive. CeramOptec® offers rectangular core fibers with aspect ratios of up to 1:6 and regular polygon core fibers with 4 to 8 side faces as a standard product.

Corner radii

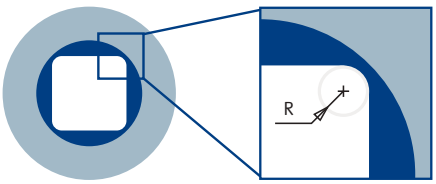
The corner radius for rectangular shapes (r_4) is described as the ratio between the radius of a circle inscribed in the corner of the rectangle and the diameter of a circle inscribed within the rectangle itself (D_{in}). (See drawing below) Three types of standard radii are available for a square shape: r_4<10%, 10%<r_4<20%, r_4>20%.

Wavelength

Optran® UVNCC	190–1200 nm
Optran® WFNCC	300–2400 nm

Numerical aperture (NA)

Low	0.16 ± 0.02
Standard	0.22 ± 0.02
High	0.28 ± 0.02

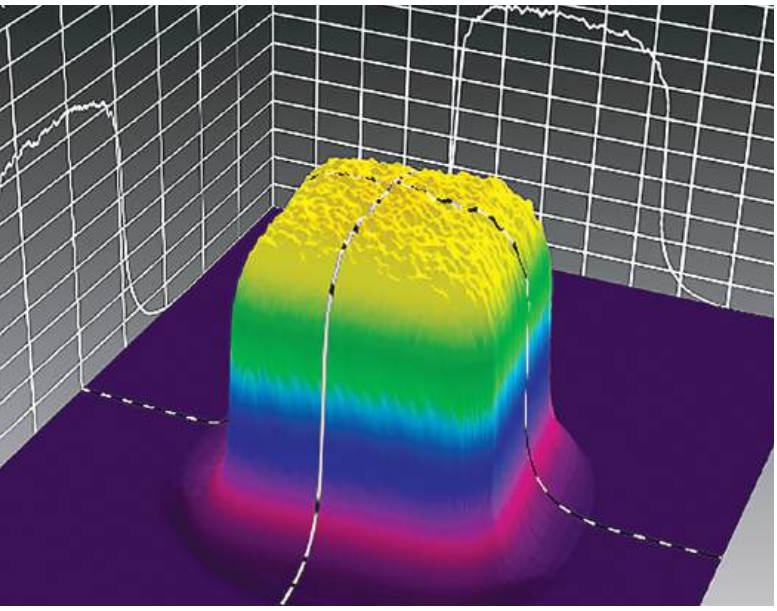


$r_4 = R/D_{in} * 100\%$

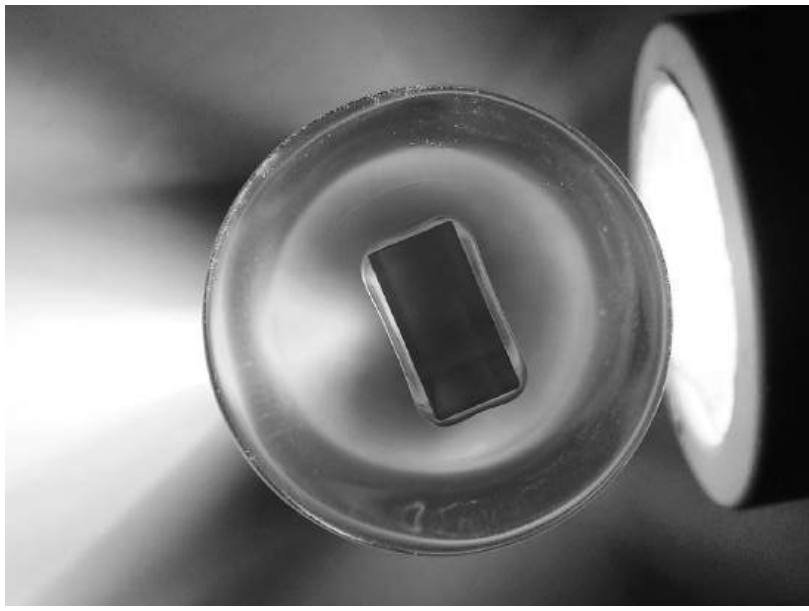
Corner sharpness for regular polygons with a number of sides >4 defined by the ratio between the diameters of circumscribed and inscribed circles.

Technical data

Wavelength / spectral range	Optran® UVNCC: 190–1200 nm Optran® WFNCC: 300–2400 nm
Numerical aperture (NA)	0.16 ± 0.02 | 0.22 ± 0.02 | 0.28 ± 0.02 or customized
Operating temperature	-190 to +350°C
Core diameter	Geometries and diameters upon request
OH content	Optran® UVNCC: high (> 700 ppm) Optran® WFNCC: low (< 1 ppm) Fibers with OH content < 0.25
Standard prooftest	100 kpsi (nylon, ETFE, acrylate cladding) 70 kpsi (polyimide cladding)
Minimum bending radius	50 × cladding diameter (short-term mechanical stress) 150 × core diameter (during use with high laser power)
Attenuation values	in relation to wavelength: see p. 29



Fibers with a rectangular core geometry homogenize the intensity distribution. The image shows the intensity distribution on the focal level, using NCC fibers with core diameter of 800 × 800 µm.



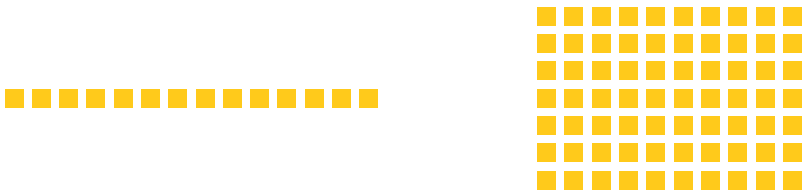
Fiber with rectangular core geometry.

Applications

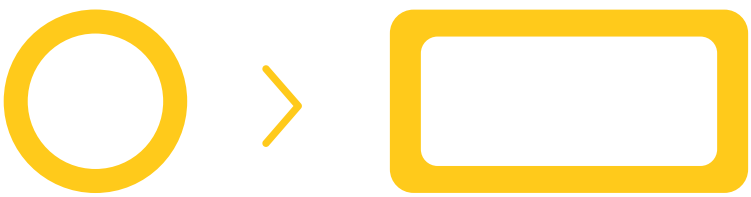
First choice for applications for beam shaping e.g. including surface treatment or for lighting.

Pure fused silica/F-doped fused silica square and rectangular shaped fibers

Fibers which deviate from the traditional round form with a square or rectangular shape offers advantages due to providing maximum packing density for input and output. These fibers are very suitable for connections to angular sources and receivers. The angular shaped core provides consistent short-distance homogenization input power distribution. Our angular fibers are also available in rectangular shapes with large side ratios and a small corner radius, thanks to our special PCVD-technology.

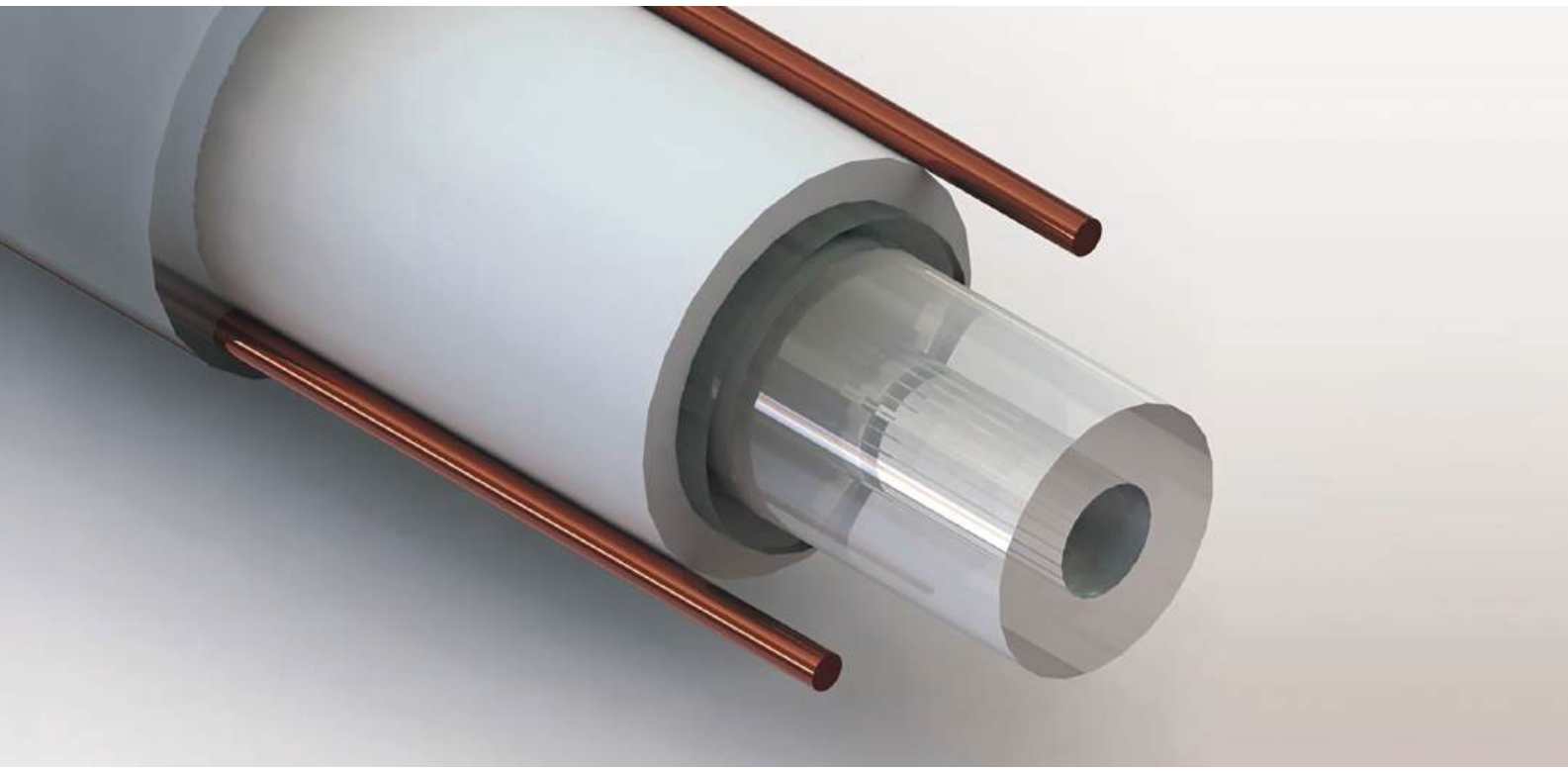


Large NCC's are ideal for applications which require a combination of flexibility and large cross sections in silica fibers, e.g. a diode laser delivery system.



Safety Fiber

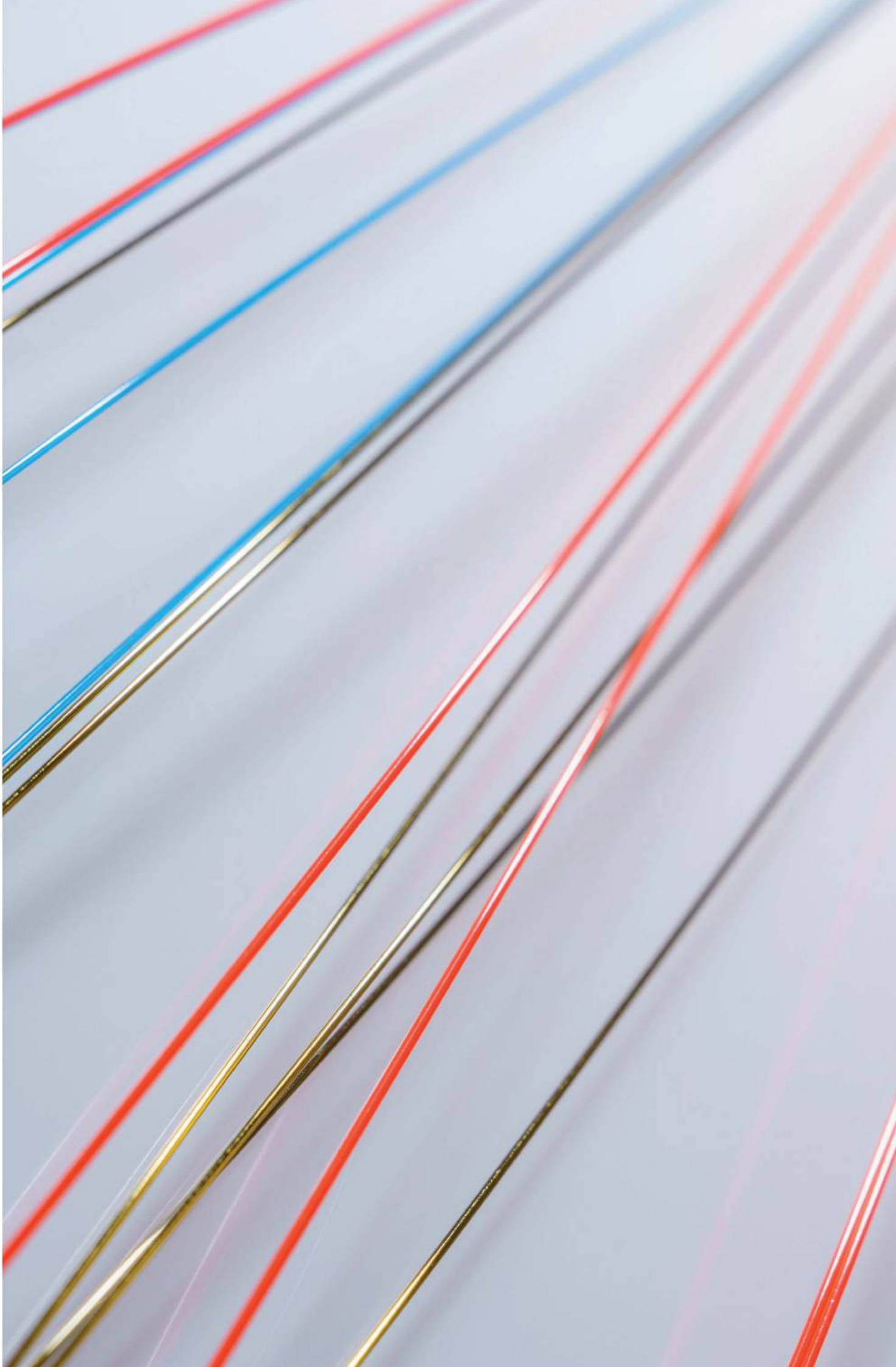
More safety for users of fiber-coupled high-performance lasers



Copper wire conductors with a jacket facilitate the design of active protective devices

A new fiber design from CeramOptec® increases user safety in connection with fiber-coupled high-performance lasers. Copper wires in a polyamide jacket support the configuration of active protective devices that interrupt the laser circuit in the event of fiber breakage or connection problems and protect the user from leaking radiation.

Since the two copper wires are applied together with the polyamide sheathing after the fiber drawing process, the new fiber concept can be implemented for all standardized CeramOptec® glass fibers. All-rounders such as the standard Optran® UV/WF fibers are also available as safety fibers, as are the homogenizing Optran® NCC fibers with polygonal core geometry. For optimum coverage of all bending radii and temperature zones, safety fibers are available with copper wire conductors of 50, 100 and 150 micrometers. Custom configurations are also available on request.



Jackets for Silica Fiber

Each application requires its own jacket

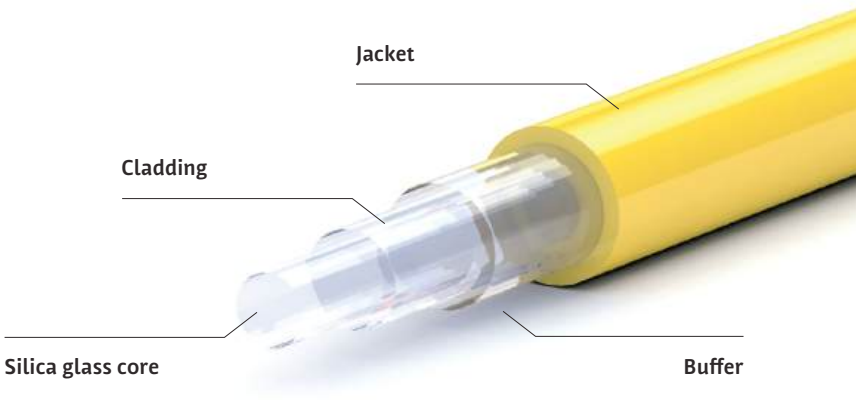
Fiber jackets protect the fiber, give stability and ensure robustness. Depending on the application, the fiber must be able to withstand high temperatures, be biocompatible or highly visible.

Available Jackets

- Polyimide: -190 to +350°C
- ETFE:-40 to +150°C
- PTFE: -40 to +260 °C
- Nylon: -40 to +100°C
- Acrylate: -40 to +85°C

Options

- Abrasion-resistant marking
- Biocompatible materials
- Custom colors available



Metal Coated Silica Fibers
All-silica with metal coating

Metal coated silica fibers can withstand the highest temperatures of any fiber and are suitable for harsh environments. Aluminum as a standard. Other materials on request.

Wavelength

Optran® UV	190–1200 nm
Optran® WF	300–2400 nm

Numerical aperture (NA)

Low	0.12 ± 0.02 | 0.15 ± 0.02
Standard	0.22 ± 0.02
High	0.26 ± 0.02 | 0.28 ± 0.02

Advantages

- High temperature resistance
- High chemical resistance
- Solderable
- Hermetically sealed only for Aluminum

Technical data

Wavelength / spectral range	Optran® UV: 190–1200 nm Optran® WF: 300–2400 nm
Numerical aperture (NA)	0.12 ± 0.02 | 0.15 ± 0.02 | 0.22 ± 0.02 | 0.26 ± 0.02 | 0.28 ± 0.02 or customized
Operating temperature	-196 °C to +400°C
Silica diameter	Available from 100 to 2100 µm
Tensile strength (short gauge), GPa	Aluminum: 3.5 to 6
Two point bending strength, GPa	Aluminum: >10
Static fatigue parameter, n	Aluminum: >100
Minimum bending radius	100 × diameter (short-term mechanical stress) 200 × diameter (during use with high laser power)

Fiber probes
Customized medical fibers

CeramOptec® offers customized medical fibers and probes for every application and laser type, tailored to your specific requirements. Our solutions match highest quality standards and make them the first choice for modern medical laser treatment.

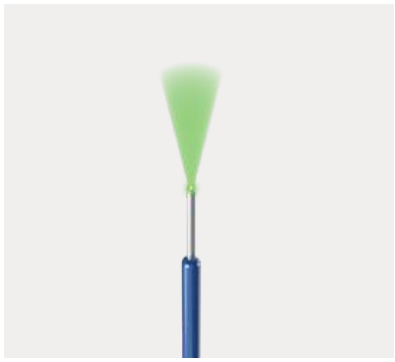
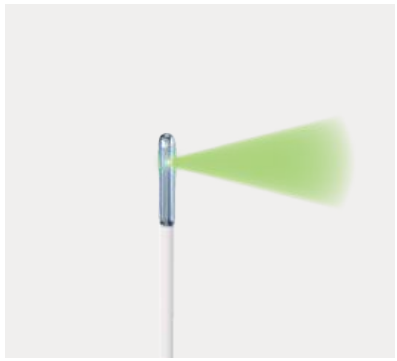
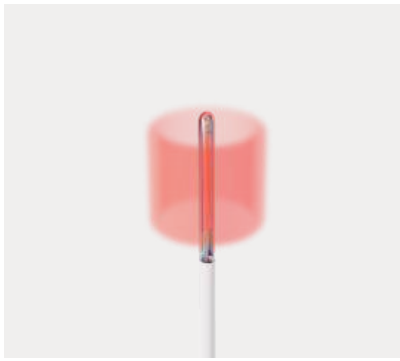
Our certified probes and fibers are suitable for a wide range of applications, from Aesthetics, ENT, and Gynecology to Phlebology, Proctology and Urology.

Available standard fiber types

- One-Ring fiber
- Bare fiber / Holmium fiber
- Side fiber
- Diffusor fiber
- and many more on request

Options

- ISO certified sterilization process
- Abrasion resistant marking Fused
- and glued capillaries

Fiber cables
Single-fiber assemblies

CeramOptec® offers a comprehensive range of cables and high-power cables tailored to your specific application needs. As we maintain complete control over the entire process, from preform manufacturing to the finished product, we are able to supply cables that meet the most demanding requirements regarding quality and fiber optic properties.

Advantages

- Broad temperature range
- High resistance against laser damage
- Special jackets available for high temperatures, high vacuum and harsh chemicals
- All dielectric, non-magnetic design
- Various lengths available

Options

Available fibers	All fibers from our range
Connectors	SMA | FC/PC | ST and others upon customer request, including ferrules
Protection tubes	PVC | PTFE | Kevlar | C-Flex | Kevlar-reinforced PVC | Metal | Steel and others
Cable variation	AR coating possible

Fiber bundles
Multi-fiber assemblies

CeramOptec®'s fiber bundles are designed for superior quality and optimum fiber optic properties. We optimize your bundles for various parameters, including NA and packing efficiency. Our fiber assemblies can be flexibly configured and tailored precisely to your application needs.

Options

Available fibers	All fibers from our range
Active bundle surface geometries	Circular | Semi-circular | Square | Rectangular | Line | Ring | Segmented ring
Bundle design	Single-branch | Dual-branch | Multi-branch
Bundle variant	Glued | Fused | Sorted | AR coated
Connectors	SMA | FC/PC | ST and others upon customer request

Fiber bundles
Fused-end bundles

CeramOptec®'s fused-end bundles set the benchmark for consistently high long-term performance. The fusing process completely eliminates inter-fiber spaces and thus positions CeramOptec®'s fused-end bundles among the most sophisticated fiber bundles on the market. As the bundles do not rely on adhesive, they are resistant to temperatures of more than +600°C, making them the first choice for demanding applications!

Wavelength

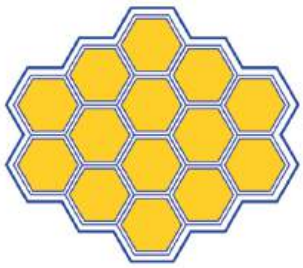
Fused-end bundles	190–2400 nm

Numerical aperture (NA)

Low	0.12 ± 0.02
Standard	0.22 ± 0.02
High	0.37 ± 0.02

Advantages

- High transmission
- No inter-fiber spaces
- Large active diameter
- Wide range of ready-to-use assemblies available
- Long service life
- Even distribution in multi-branch bundles
- High temperature resistance above +600°C

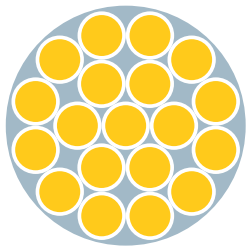


Bundles made from end-fused fibers show no gaps between individual fibers, since the fibers attain a hexagonal shape during the fusing process.

Fiber bundles
Overview

Gluing

Glued fiber bundles offer the greatest flexibility in terms of achievable diameters and geometries.

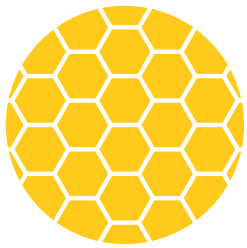


Sorting

Sorted fibers allow an even power distribution across several bundle arms and can increase the measuring precision thanks to spatial mapping of the fibers.

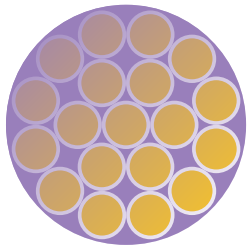
Fusion

In bundles of fused fibers all gaps between the fibers are eliminated, delivering an increase in the filling factor and thus transmission by up to 20%.



AR coating

An AR coating almost completely eliminates reflection losses at the fiber ends, which can increase transmission by about 7%.



Our glossary

We have explained some important concepts of fiber optics below.

Please do not hesitate to contact us if you have any questions.

Fiber optics	The branch of optical technology concerned with the transmission of radiant power through fibers made of transparent materials such as glass, fused silica or plastic.
Optical fiber	(Also optical waveguide, fiber optic cable, optical cable) – a thin filament of drawn or extruded glass or plastic having a central core and a cladding of lower-index material to promote internal reflection.
Fiber bundle	A rigid or flexible, concentrated assembly of glass or plastic fibers used to transmit light.
Core	The light conducting portion of an optical fiber. It has a higher refractive index than the cladding.
Cladding	Low refractive index material that surrounds the core of an optical fiber. It contains the core light while protecting against surface scattering. The cladding can consist of fused silica, plastic or specialty materials.
Numerical aperture (NA)	In fiber optics, the NA describes the range of angles at which light can enter and exit the system. NA is an important parameter in applied fiber optics.
Ultraviolet spectrum	The invisible region of the spectrum beyond the violet end of the visible region. Wavelengths range from 10 to 400 nm.
Visible spectrum	The region of the electromagnetic spectrum to which the retina is sensitive and by which the eye sees. It extends from about 400 to 700 nm in wavelength.
Infrared spectrum	Region of the electromagnetic radiation spectrum where wavelengths range from about 700 nm to 1000 nm.
Attenuation	The phenomenon of the loss of average optical power in an optical fiber or medium.
Bend loss	Loss of power in an optical fiber due to bending of the fiber. Usually caused by exceeding the critical angle required for total internal reflection by internal light paths.
Transmission	In optics, the conduction of radiant energy through a medium. Often denotes the percentage of energy passing through an element or system relative to the amount that entered.

1 2 3 4 5 6 7 8 9

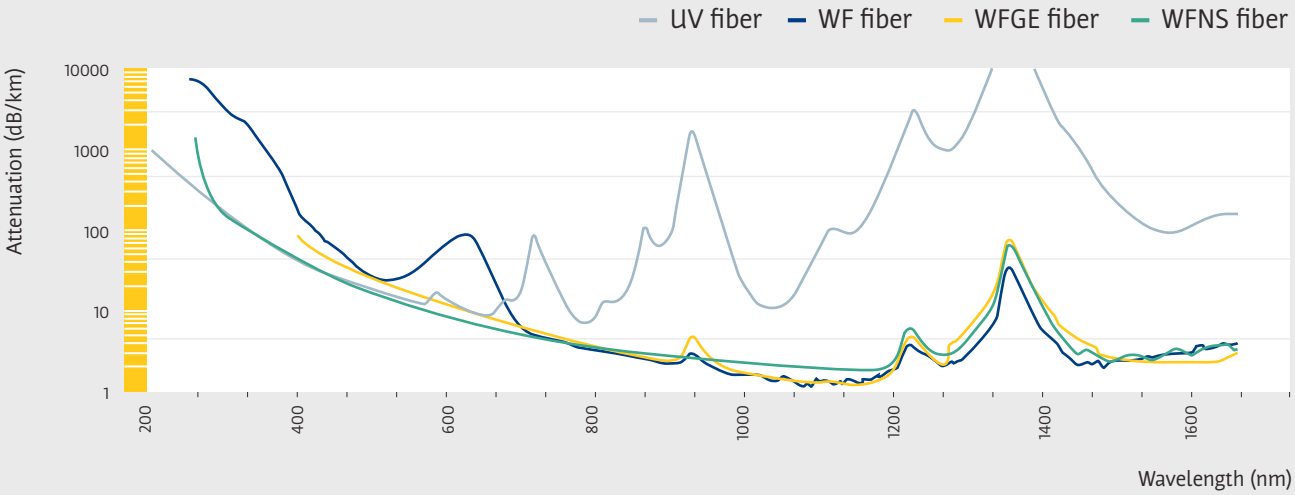
Product code key using the example of **WF NS (HEX) 400/480 /1050 (H) (B)N NA=0.26**

1 **Fiber type**	UV = Optran® UV | WF = Optran® WF | UVNSS = Optran® UVNSS | NCC = Optran® NCC HUV = Optran® HUV | HWF = Optran® HWF | WFGE = Optran® WFGE UVNS = Optran® UVNS | WFNS = Optran® WFNS | UVWFS = Optran® UVWFS
2 **Core shape (optional)**	RCT = rectangle | PEN = pentagonal | HEX = hexagonal
3 **Core size µm**	Circular = core diameter | PEN, HEX, HEP, OCT = insribed circle diameter | RCT = side 1 x side 2
4 **Cladding size µm**	Circular = cladding diameter | RCT = cladding side 1 x side 2
5 **Final fiber diameter, µm**	
6 **Buffer (optional)**	H = hard polymer buffer | S = silicone buffer | No information = no buffer
7 **Color (optional)**	B = black | BL = blue | W = white | Y = yellow | R = red | G = green No information = transparent
8 **Jacket material**	A = acrylate jacket (no buffer) | N = nylon jacket (silicone or hard polymer jacket) T = ETFE jacket (silicone or hard polymer buffer) | P = polyimide jacket (no buffer)
9 **NA core to cladding**	Standard 0.1 to 0.26 for WF and UV | 0.12 to 0.29 for WFNS | 0.15 to 0.29 for UVNS | 0.37 for WFGE | 0.37 to 0.57 for HUV and HWF | 0.32 for PUV and PWF

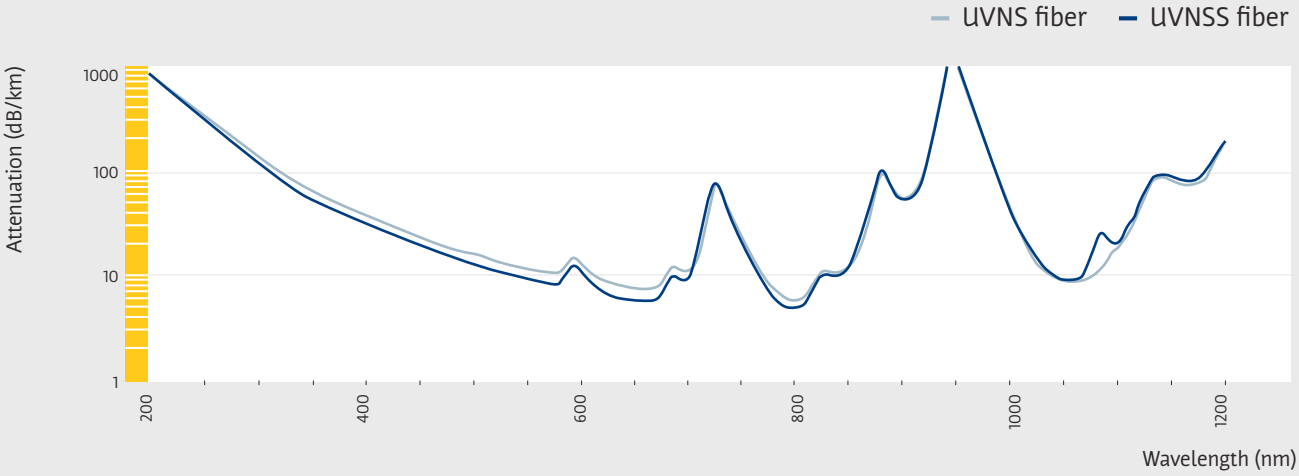
At a glance

Comparison of attenuation values

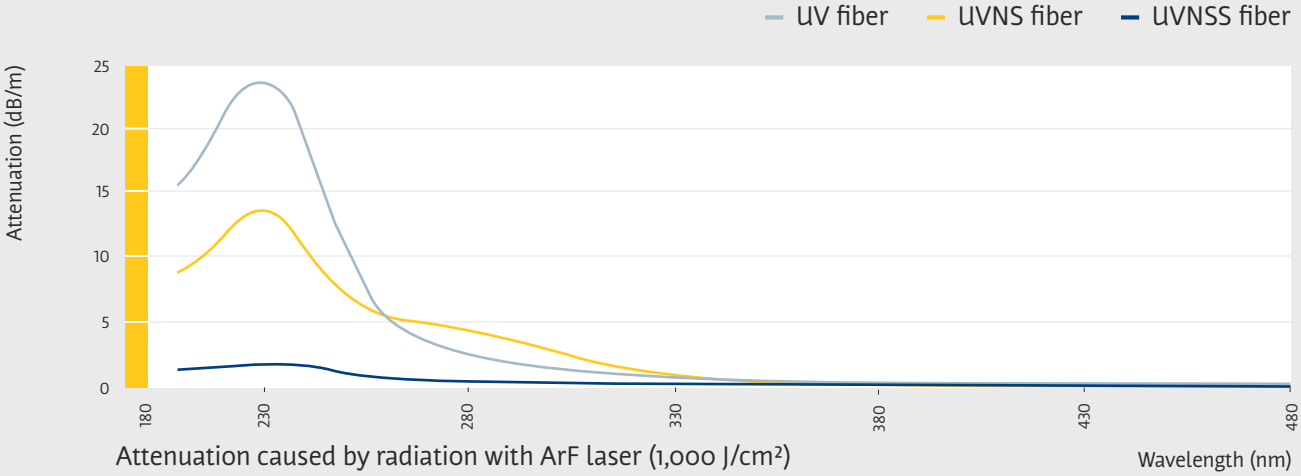
Optran® UV, WF, WFGE, WFNS



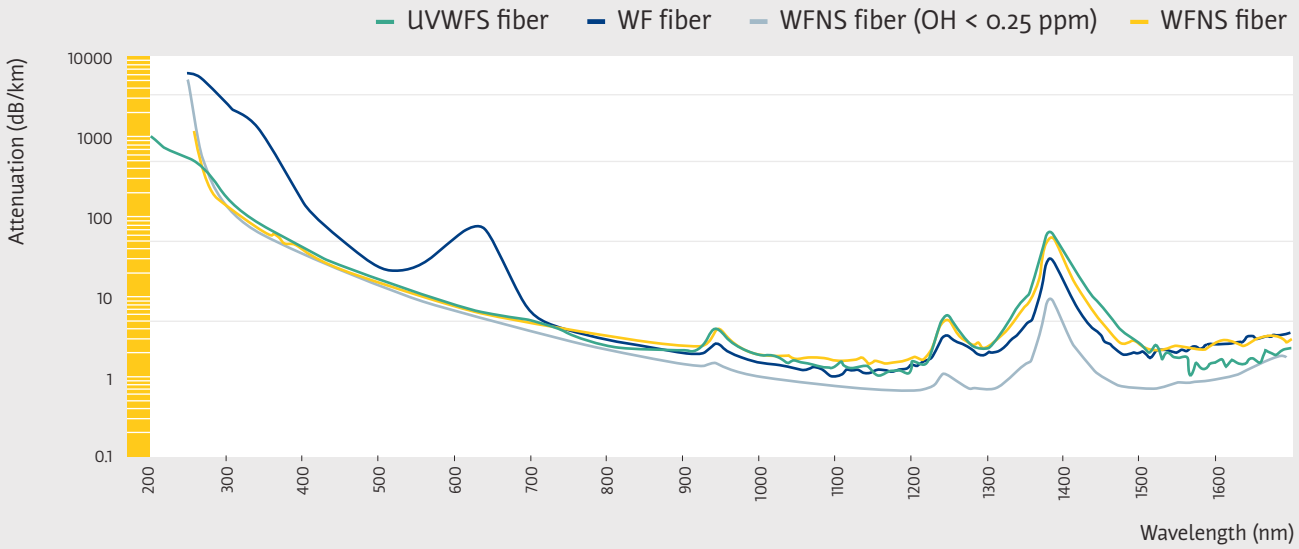
Optran® UVNS, UVNSS



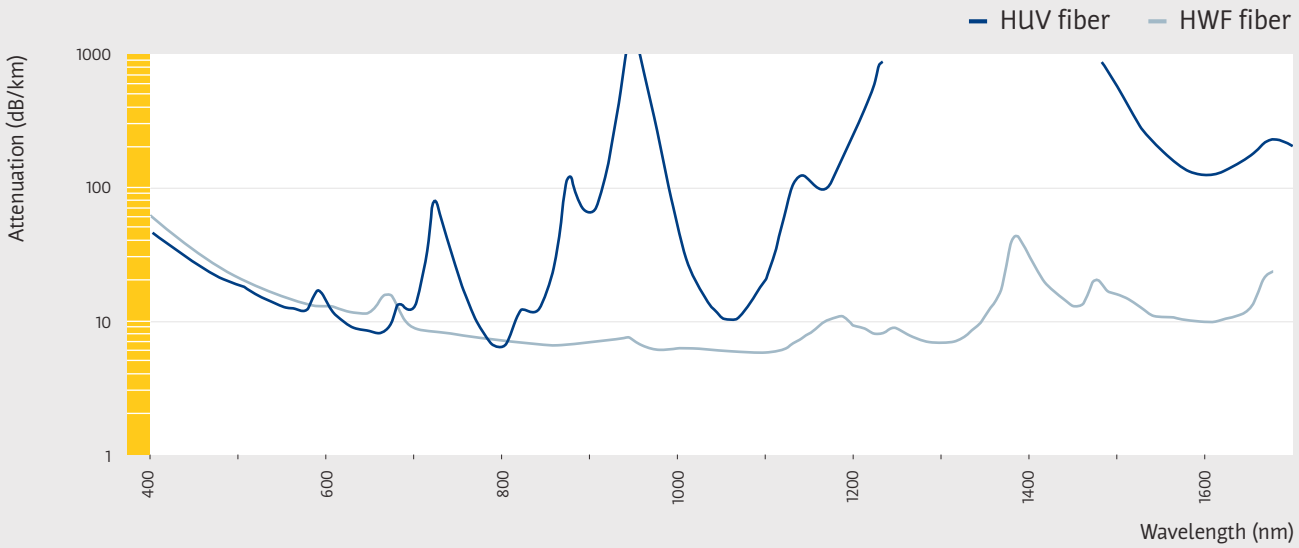
Optran® UVNSS (Comparison of solarization resistance)



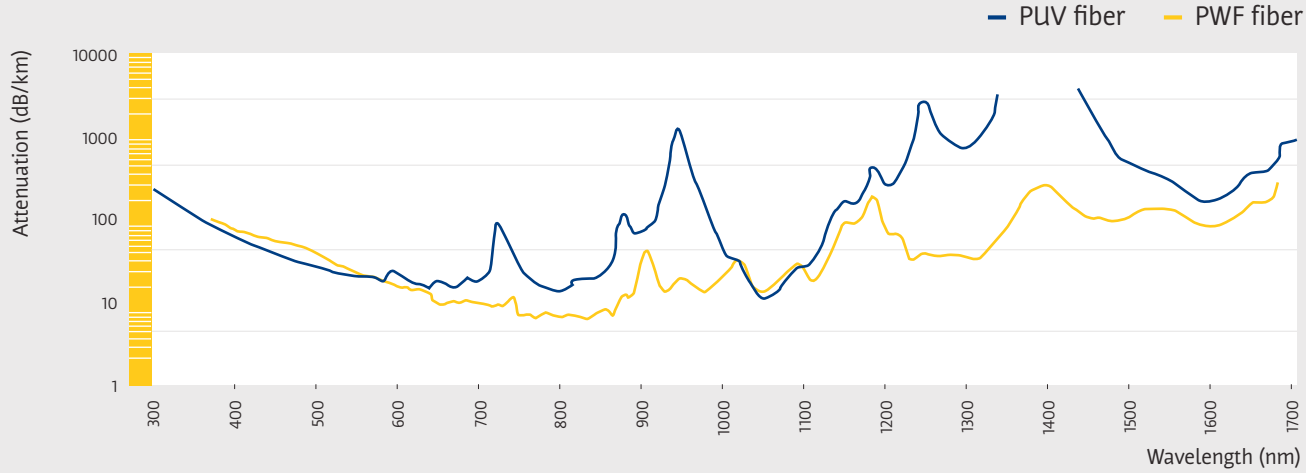
Optran® UVWFS broadband fiber



Optran® HUV, Optran® HWF



Optran® PUV, Optran® PWF



Instructions for use
Fibers, fiber cables, fiber bundles

Please note the following information to ensure the long-term safe use of your fiber products:

Safety

1. The NA of the laser beam must be smaller than the NA of the fiber.
2. The laser beam must be directed towards the core diameter or fused bundle, as connectors or adhesive between the bundles may otherwise overheat.
3. It is recommended to have the laser energy distributed evenly (instead of a Gaussian distribution).

Application

1. Clean the fiber endface before switching on the laser.
2. Ensure that the ferrule and receptacle are entirely free from any contamination, as contaminants may burn in.
3. The cable/bundle surface may be cleaned with isopropyl alcohol, ideally under a microscope using a cotton bud.
4. Ensure that the optical axes are correctly aligned and not at an angle to each other, and that the focal point is correctly aligned. It is recommended to verify the alignment using a He-Ne laser.
5. Ensure that the minimum bending radius is complied with to prevent fiber breakage.

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