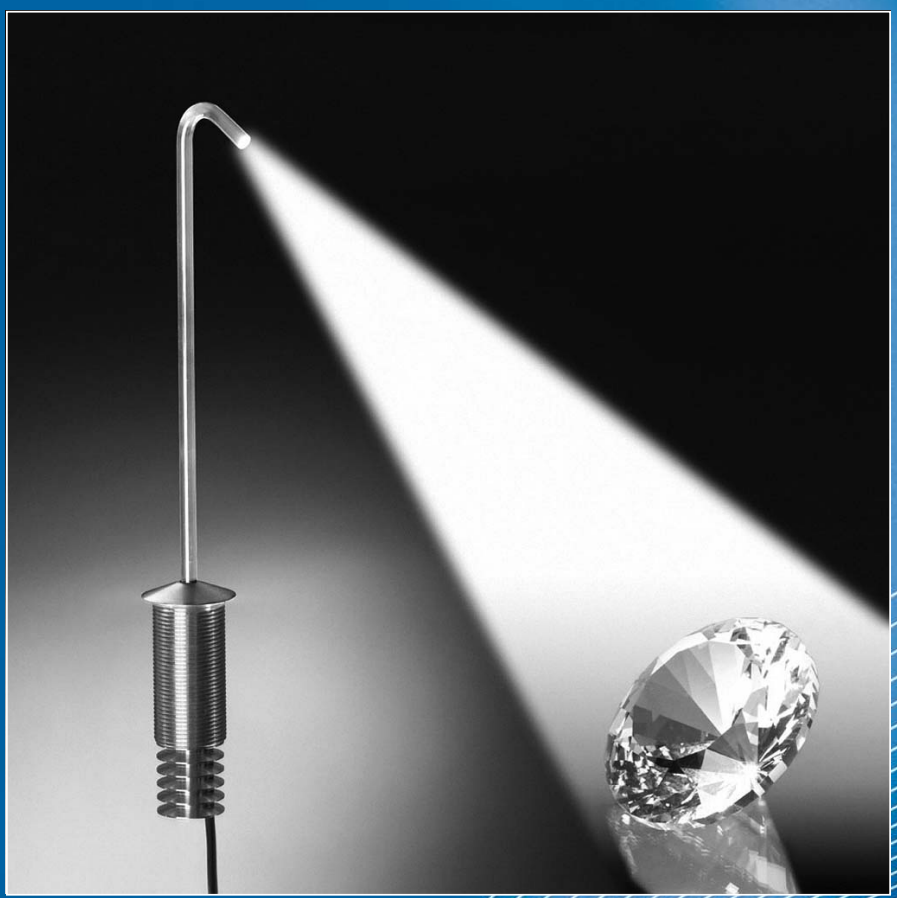
Technical Specifications – SCHOTT Fiber Optics

„Light it right“



SCHOTT
glass made of ideas

Creative new solutions

Generations of know-how as clear as glass

For more than 40 years, our name stands for high quality and innovative solutions in the field of fiber optic lighting. Mastering glass, fibers and processes for the production of fiber optic components, we develop market-oriented products. With our leading technological know-how and innovative ideas we contribute to the success of our customers – around the world. We are continuously striving to develop new Lighting solutions. Our latest developments include LEDs (Light Emitting Diodes) and are easy to combine with to components.

Physical principles and properties of glass fibers and fiber optic systems

Important criteria used in determining fiber optic performance is:

Individual Fibers

- numerical aperture
- fiber diameter and mechanical behaviour
- transmission Spectral attenuation

For fiber optic bundles and systems

- packing density
- system transmission as a function of the bundle length (coupling efficiency)
- Color rendering
- resistance to environmental influence temperature and harmful radiation
- mechanical protection

Physical principles of individual fibers

Fiber optic Lighting utilizes total internal reflection. When light passes from one medium into a second, less dense one, the light bends.

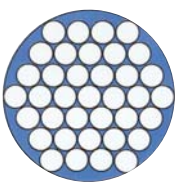
Numerical aperture

Glass fibers for lighting applications consist of a core and a cladding glass. The refraction index of these glasses define the light acceptance angle. The larger the acceptance angle, the more light can be captured from the central light source. The acceptance angle has there for an input on the efficiency of the system.

Fiber Diameter

The small diameter of SCHOTT´s individual fibers ensures the highest bundle flexibility. SCHOTT´s glass fibers have a diameter of 30, 50 or 70 microns providing a high quality of light transmittance.

Glass Optical fiber (GOF)



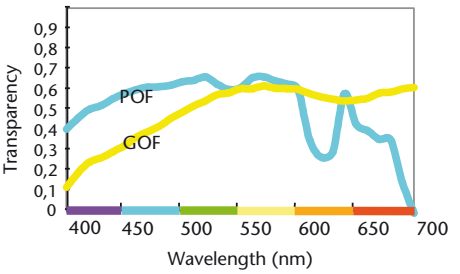
Plastic Optical fiber (POF)

Spectral Transmission

The transmission quality of individual fibers is substantially determinated by the optical performance of the core glass used when drawing the fibers. The optical characteristics for the glass chosen by SCHOTT ensures a consistent and uniform light in the visible range between 380 and 780 nm.

In comparison to plastic fibers, the spectral transmission with SCHOTT glass shows no significant absorption peaks.

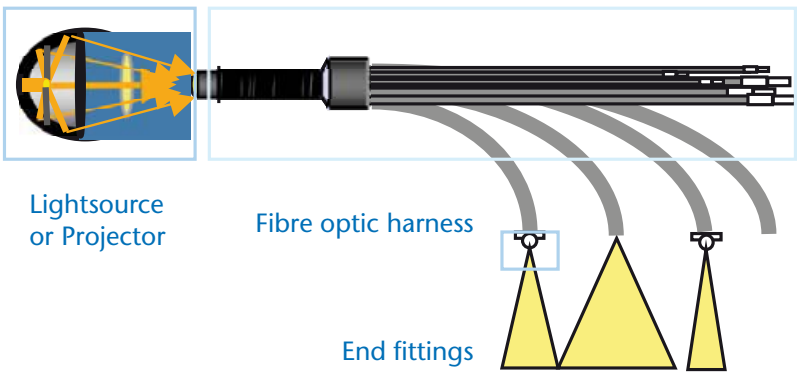
Transparency of 10m thickness



Fiber optic systems and lighting bundles

A fiber optic lighting system is comprised of three elements:

1. The light source
2. Fiber Optic light conducting bundle or harness
3. End fitting



The total system transmission quality depends on:

– The optical characteristics and quality of the fiber material (glass)
– the packing density of the fiber bundle or harness
– the optical polishing of the end termination of both ends
– the length of the bundle
– coupling of light source to bundle

SCHOTTs focus is to offer our customers a fully optimized and integrated lighting system.

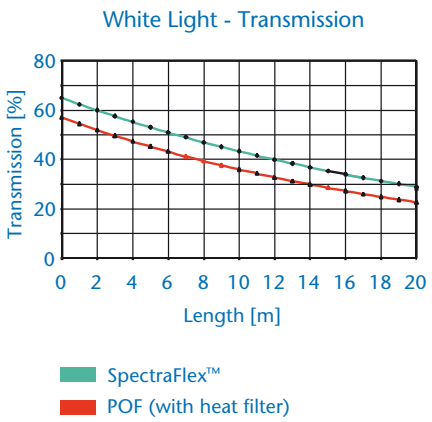
System transmission in relation to Bundle length

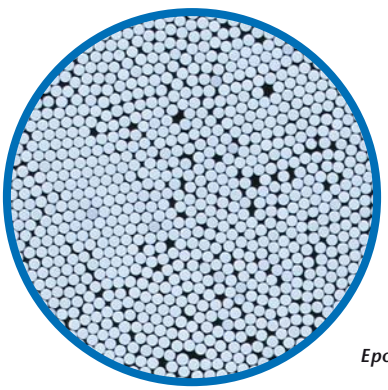
Typically, as the length of a bundle increases, the Light output decreases. Due to SCHOTTs unique glass systems, the SpectraFlex maintains a higher Light transmission then typical plastic fibers.

Packing density – Hot fusing technology

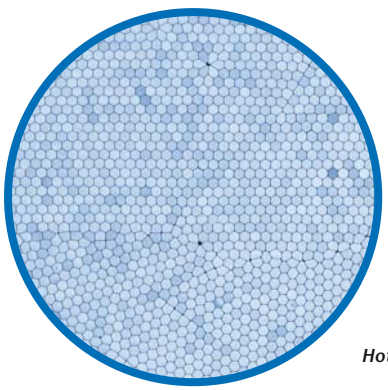
In combination with cladding and core glasses, the total amount of light injected and then transmitted through a fiber bundle depends on the packing density of the individual fibers. Traditionally packed fibers have gaps which do not transmit light. Depending on the bundle area, these non transmissive surfaces can represent up to 20% of the available light area. SCHOTT has developed a unique end termination fusing process. That does not use epoxy, thus virtually eliminating the gaps between the individual fibers. This unique process combines high heat and pressure, fusing the fibers together increasing the optically active surface upto 20%. This fusing process transforms the fibers into a hexagonal shape resulting in the accomodation of more fibers in the optical cross section, increasing transmission efficiency. Additional benefits of this fusing process include high temperature resistance (up to 350°) and a longer lifetime with high power lightsources. The SCHOTT SpectraFlex Excel uses this new technology.

Light incoupling losses





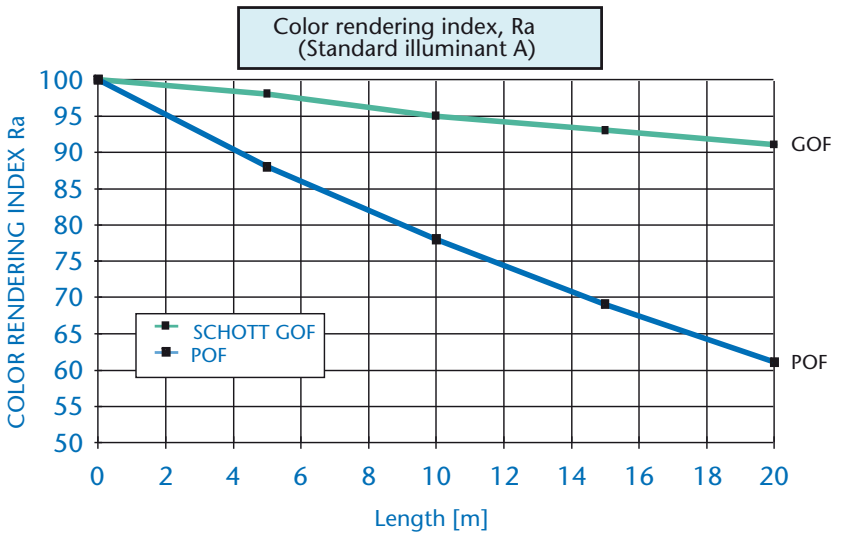
Epoxied



Hot-fused

Color Rendering

SCHOTT Glass fiber Optic systems provide a high CRI without transmitting harmful ultraviolet and infrared radiation.

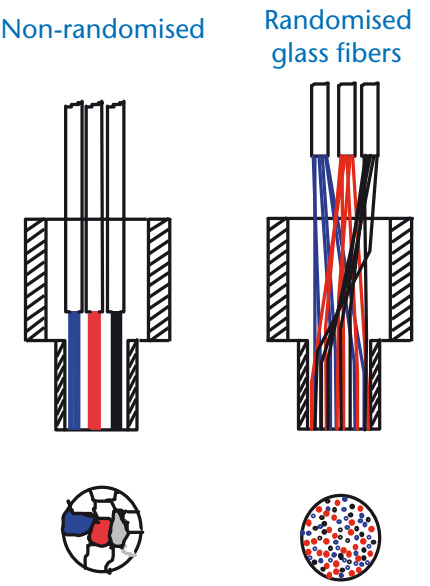


Mechanical Protection

The length of time a light guide operates reliably depends to a large extent on the protective sheathing used. All lighting bundles offered by SCHOTT are protected by a special halogen fire an flame retardant sheathing that completely conforms to international fire protection requirements, according to IEC 60332-1.

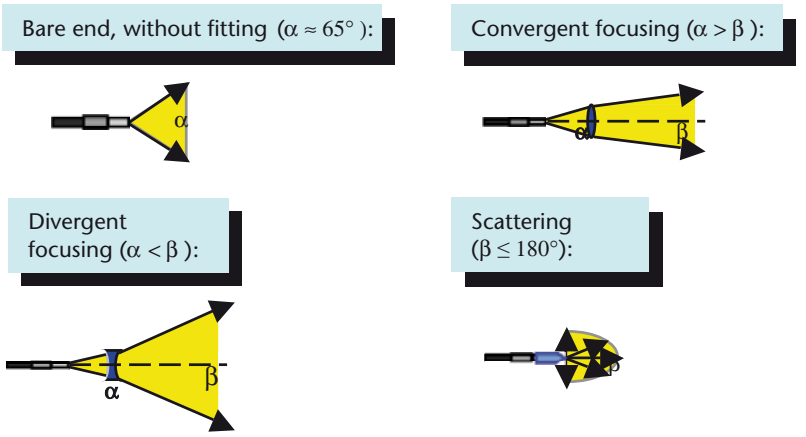
Randomizing

Some commercial light sources emit a non-uniform light distribution usually resulting in a decrease of light. With a larger coupling cross section this effect may become more significant.
SCHOTT corrects this potential non-uniform emitions of light by a “randomizing” process used in all lighting products. This process evenly distributes the fibers throughout the tails spreading the light evenly across the entire surface.



Optical Fittings

Optical End Fittings connect to the ends of the bundles focusing the light in different angles, accentuating the displayed objects individually, creating that “sparkle” and “pop”.



Advantages of Fiber Optic Systems

– **Virtually no transfer of IR radiation and UV light**
Glass fibers absorb harmful UV light. This makes it an ideal solution for sensitive objects on displays. In addition, with an additional heat filter on the lightsource, there will be no transmission of IR radiation.

– **Diverse**
Fiber Optics allows for great flexibility in indoor and outdoor lighting applications due to its significant durability.

– **Security**
Since the lightsource is external to the display, the lamp can be easily changed without compromising the security of the case.

– **Low maintenance**
Multiple light points are functioning from a light source allowing a simple access point for maintenance.

– **Diversity**
With the different varieties of cable diameters, tail numbers, optical end fittings and lightsources, SCHOTT is able to provide a wide variety of lighting solutions.

LED

In addition to Fiberoptic Lighting solutions SCHOTT offers LED (Light Emitting Diode) lighting solutions.

Physical properties

LED are semiconductor elements. Contrary to traditional Lighting sources, LEDs transforms elictricity into Light. High powered LEDs operate with higher current levels and therefore require special heat management measures to achieve their maximum live expectancy. LED light emits through a very small special range.

White Light LEDs are commonly generated by combining a blue chip with a yellow phosphorus layer. The combination of the blue wavelength with the yellow fluorescent overlays create a bright white light.

Characteristics

Significant longer life time

To achieve the maximum life span of LEDs SCHOTT utilizes a unique thermal management system thermally radiating the heat away from the LED and maximizing the LED life span.

Low power consumption

SCHOTT LED lighting components integrate LEDs from the world´s largest LED manufacturers. They always ensure state of the art technology with Light lm/w efficiencies.

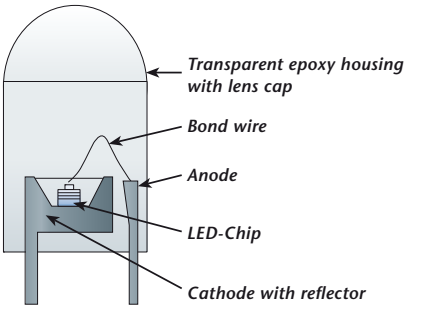
Easy installation

The SCHOTT LED components have a slim profile design allowing for easy integration within the display case.

Color Temperature

Optionally SCHOTT integrates LED´s with color temperature ranging from 3000 K “warm” white light to 6000 K “cold” with light.

Principle design of a LED:



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