

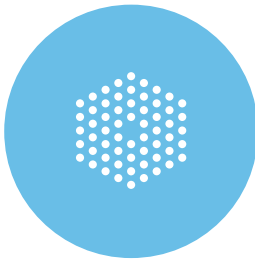
## PHOTONIC CRYSTAL FIBER CABLES PCF

### WHAT ARE PCF FIBERS?

In large mode area [PCF fibers](#) the single-mode transport is introduced by microstructuring the fiber cladding. In our case the PCF fibers have a hexagonal structure of periodic holes that lead to a single-mode transport within the fiber. The fibers are categorized by their core diameter (e.g. 5  $\mu\text{m}$  or 10  $\mu\text{m}$ ).

Detailed calculations reveal that for this type of fibers the mode field diameter MFD is almost wavelength-independent. It is larger than the MFD of comparable [standard fibers](#). In contrast the numerical aperture has a significant wavelength-dependency. This is important to consider when collimating a beam for a large wavelength range.

PCF fibers are endlessly [single-mode](#), (polarization-maintaining, only type [PCF-P](#)), specialized photonic crystal fiber cables. They have a Gaussian intensity profile and are equipped with low-stress fiber connectors with end caps. They have an operational wavelength range of 300 - 1200 nm and can be used for example for very broadband applications or with supercontinuum lasers.



### CROSS-SECTION OF A LARGE MODE AREA PCF FIBER

Typical cross-section of a large mode area photonic crystal fiber cable.

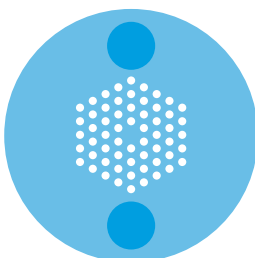
### POLARIZATION-MAINTAINING PCF FIBERS

Polarization-maintaining PCF fibers have additional stress elements that brake the degeneracy of the the two principle states of polarization (SOP).

Just as in standard fibers, light is guided either in the so-called „fast“ or the „slow“ axis and [linearly polarized light coupled precisely into one of these axes is maintained](#). If light is guided partly in the other axis then the coherence of the light source determines the resulting polarization. For sources where the coherence length is larger than the optical path difference between the light in the two principle SOPs of the fiber, the outcome polarization is elliptical. However strain and temperature variations, change this arbitrary elliptical state.

The state of polarization when coupling into PCF fibers can be easily monitored using the [Polarization Analyzer SK010PA](#). More details [here](#).

Please refer [here](#). for a detailed description as to how to characterize polarization-maintaining fibers.



### CROSS-SECTION OF A LARGE MODE AREA PM PCF FIBER

Typical cross-section of a large mode area polarization-maintaining photonic crystal fiber cable.

### WHEN SHOULD I USE A PCF FIBER INSTEAD OF A STANDARD SINGLE-MODE FIBER?

Our PCF fibers are endlessly single-mode, ([polarization-maintaining](#), only type PCF-P), specialized photonic crystal fiber cables with Gaussian intensity profile and low-stress fiber connectors with end caps. They have an operational wavelength range of 370 - 1200 nm and can be used for example for very broadband applications or with supercontinuum lasers.

[Standard \(PM\) fibers](#) have a much more limited operational wavelength range and are no longer single-mode below the cut-off wavelength. If you need a broadband fiber, there are also special [RGB fibers](#) that are broadband and do cover a range of 400 - 680 nm.

**For standard applications standard fibers should be preferred over specialized PCF fibers.**

### END CAPS FOR PCF FIBERS

The fiber connectors of all PCF fiber cables are equipped with an end cap. This means that a short piece of coreless fiber (< 300 µm) is spliced onto the PCF fiber.

**The end cap seals the microstructure of the fiber and allows for an easy cleaning of the end-face.**

Additionally it also reduced the power density at the fiber end-face.

This is a printout of the page <https://sukhamburg.com/support/technotes/fiberoptics/cablebasics/pcf.html> from 5/22/2026

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