HB-P

Polyimide Coated Fiber for Embedded and High Temperature Applications

When your application calls for a PM fiber able to withstand temperatures above +85°C, you need Fibercore Limited's polyimide coated 'HB-P'.

HB-P can withstand temperatures as high as 400°C (300°C continuous) and is ideally suited for medical and sensing applications where the fiber must be sterilized at high temperature, or withstand the curing temperatures of even the highest performance laminates.

Polyimide is a high performance polymer widely used throughout the electronics industry. The polyimide coating is chemically bonded to the fiber's surface and is an exceptionally rugged and chemical-resistant material, offering fiber protection when applied to a thickness of just 10 µm. In comparison, a standard acrylate coating must be applied to a thickness of 40 µm for a 125 µm cladding diameter fiber.

HB-P is particularly suited to embedded 'Smart-Skins' type applications due to its low-profile, which helps to maintain composite strength through a reduction in the area of the Resin Rich Zone (RRZ). In addition, the relatively thin coating, combined with the high adhesion of the glass-polyimide bond, can optimize the mechanical strain transfer in a fiber sensing system.

'Bow Tie' PM fiber

Fibercore's PM fibers dominate the Fiber Sensor Industry and use 'Bow-Tie' stress-applying-parts (SAPs) to create birefringence in the core. The design of these highly efficient SAPs generates exceptional levels of birefringence without excessive stress, allowing polarization orientation to be controlled effectively across a fiber system - essential for many telecoms and sensor applications.

High Temperature, Low-Profile PM Fiber

Operating Wavelengths

830nm or 1310nm options (other wavelengths – please enquire)

400ºC Temperature Ceiling

Polyimide coating remains stable up to 400°C. Suitable for medical sensors requiring high temperature sterilization and embedding in high-performance composites (PEEK)

Ultra Low Profile

10 µm, high-temperature polyimide coat gives a total, coated diameter of 145 µm making HB-P ideal for embedded, 'Smart Skins' applications

Excellent PM Performance and Handling

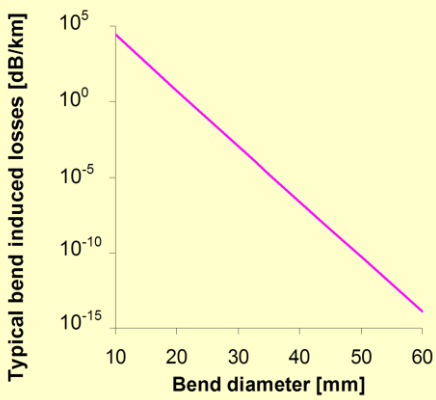
'Bow-Tie' SAPs maximize birefringence whilst minimizing internal stress within the fiber by 'focusing' stress efficiently to the core – providing optimum H-parameter with good cleave-quality and fusion-splice yields

Extinction Ratio of -30 to -35 dB

Nominal PER in an idealized deployment of 500m wound at low tension (<5g) on a 150mm diameter spool

High Resistance to Macro and Micro-bend-induced Loss

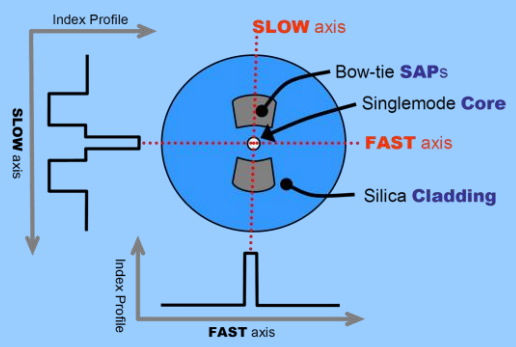
High NA provides excellent resistance to the macro and micro-bend environments encountered in typical embedded applications



‘Bow Tie’ PM fiber

The core is flanked by areas of high-expansion, boron-doped glass that shrink-back more than the surrounding silica as the fiber is drawn and freeze the core in tension. This tension induces birefringence (ie it creates two different indices of refraction: a higher index parallel and a lower index perpendicular to the applied stress). In essence, this phenomenon is very similar to that which creates visible interference fringes when transparent plastics are stressed, except that in silica the effect is highly controlled and its magnitude is at least an order of magnitude lower than may be achieved in a plastic.

Fibercore Limited’s ‘Bow-Tie’ design is capable of creating more birefringence than any other stressed design simply because it is based on two opposing wedges – the simplest and most efficient means of applying stress to a point.



Why Polyimide?

Extended Thermal Protection
Up to 400ºC; ideal for military and medical applications

High Solvent Resistance
Maintains fiber performance in harsh environments

Specifications

	HB800P	HB1250P	HB1500P
Design wavelength[1] λ_{op} (nm)	830	1310	1550
Cut-off wavelength (nm)	600 - 800	1030 - 1270	1230 - 1520
Numerical Aperture	0.14 - 0.18		
MFD[2] @ λ_{op} (µm) *nominal*	4.2	6.6	7.9
Attenuation[3] @ λ_{op} (dB/km)	≤ 5	≤ 2	
Beat-length [4] (mm)	≤ 2		
Proof test (%)	1 (100 kpsi)		
Fiber diameter (µm)	125 ± 1		
Core-cladding concentricity (µm)	≤ 1		
Coating type	Polyimide		
Maximum temperature (°C)	300 long term / 400 short term		
Coating diameter (µm)	140 ± 5%		

Notes:

1. The Design Wavelength is the wavelength (or wavelengths) at which the fiber is typically used. In practice, the fiber will transmit the single mode at wavelengths of up to ~ 200 nm longer than the cut-off wavelength.
2. The Mode Field Diameter is a nominal, calculated value, estimated at the operating wavelength(s) using typical values for numberical aperture and cut-off wavelength.
3. Attenuation is a worst-case value, quoted for the shortest design wavelength.
4. Beat length is measured at 633 nm for all HB fiber types. To a first approximation, beat-length scales directly with operating wavelength.
5. Background loss is quoted at the minimum point of the spectrum (typically 1100 nm to 1200 nm for the Er-Doped fibers).

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