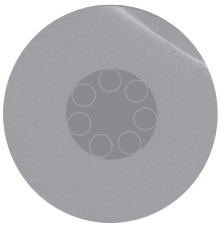
Partnership with

PHOTONICS BRETAGNE
Product line PERFOS

SPECIALTY OPTICAL FIBER

IXF-ARF Series

Anti-Resonant Hollow Core Fibers



The IXF-ARF family are anti-resonant hollow-core fibers. These fibers exhibit a large mode effective area, ultra low dispersion within the transmission band and extremely low overlap of guided power with the surrounding silica. ARF fibers are particularly suited as delivery fiber for ultrafast laser operating at 750 nm, 920 nm or 1030-1060 nm, for low latency applications, and for gas sensing.

IXF-ARF fibers can be connectorized into patchcords or fiber assemblies for easier integration, handling and improved robustness.

Benefits & Features

- Low loss for fiber delivery applications
- High damage threshold
- Ultra low dispersion in the transmission bands
- Nearly single mode guidance
- Connectorization into patchcords possible

Applications

- Delivery fiber for ultrafast lasers
- Low latency data transmission
- Gas-filled AR hollow core fiber laser
- Molecular tracing, gas detection

Related Publications

- Jason Kapit and Anna P. M. Michel, «Dissolved gas sensing using an anti-resonant hollow core optical fiber,» Appl. Opt. 60, 10354-10358 (2021)
- R. Nagase, H. Kamitsuna, R. Sasaki, and T. Maeijima, «Hollow-Core Fiber Connector,» in 26th Optoelectronics and Communications Conference, P. Alexander Wai, H. Tam, and C. Yu, eds., OSA Technical Digest (Optica Publishing Group, 2021), paper S4E.3.
- 28th International Conference on Optical Fiber Sensors, Hamamatsu Japan, November 2023, Paper Tu3.10 (2023), «A High Sensitivity, Fast Response Optical Fiber Gas Sensor using Micro-drilled Anti-Resonant Fiber»

IXF-ARF-	40-240	33-160-V1	45-240-V1	40-230	120-400
Optical parameters					
Design wavelength (nm)	750	1064	1550	2000	3000
Mode field diameter (µm) *	29	26	37	33.5	90
Attenuation (dB/km) *	< 50	< 50	< 35	< 80	< 70
Bandwidth < 100 dB/km (nm)	700 – 915	1000 - 1260	1450 - 1750	1600 - 2200	2900 - 3150
Dispersion (ps/nm/km) *, typical	0.8	2	1	2	0.8
Numerical aperture *	0.02	0.03	0.03	0.03	0.03
HOM suppression (dB)	-	10 (after 3 m)	10 (after 5 m)	> 25 (after 5 m)	-
3 dB bend loss radius (cm) *	4 ± 1	4 ± 1	6 ± 1	8 ± 1	11 ± 1
Mode overlap with core (%)			> 99.99		
Physical and Material parameters					
Core material			Air core		
Core diameter (µm)	38 ± 2	33 ± 2	46 ± 2	40 ± 2	119 ± 2
Cladding diameter (µm)	71 ± 3	66 ± 3	99 ± 3	105± 3	233 ± 3
Fiber diameter (µm)	242 ± 5	160 ± 5	239 ± 5	230 ± 5	404 ± 5
Coating diameter (µm)	398 ± 10	325 ± 10	395 ± 10	340 ± 10	492 ± 10
Coating type			Dual coat high index acrylate		

* at design wavelength

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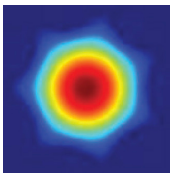
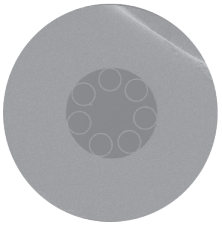
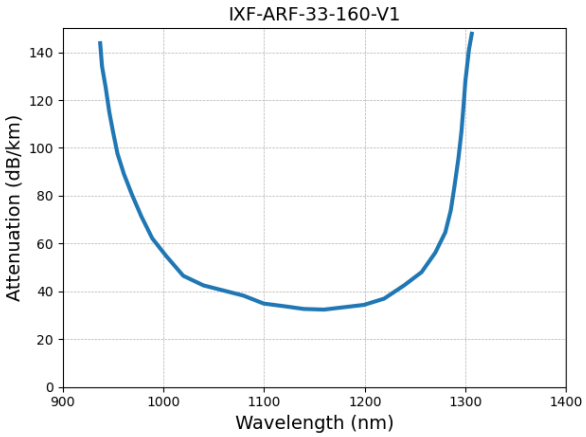
IXF-ARF Series

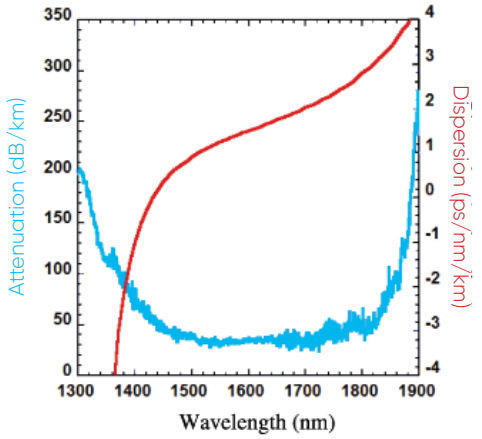
ARF fibers exhibit a gaussian profile and nearly-singlemode behavior. Their wide transmission window and moderate loss make them an appealing option for many applications, including the delivery of high power ultrafast lasers. The large mode field diameter and very low numerical aperture require special care when coupling optical signal into ARF fibers.







Typical attenuation of IXF-ARF-33-160-V1 fiber optimized for operation around 1 µm.

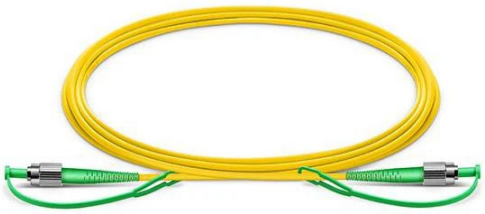


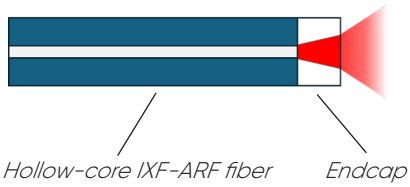
Typical attenuation and dispersion of IXF-ARF-45-240-V1 fiber optimized for operation around 1550 nm

PATCHCORDS & FIBER ASSEMBLIES

ARF fibers can be connectorized into patchcords or pigtails for easier integration, handling and improved robustness. When connectorized, fiber end-faces are terminated with thin endcaps to seal and protect the hollow microstructure while maintaining the optical beam quality.

Patchcord	
Length (m)	Up to 12
Connectors	FC (APC or PC) SC (APC or PC) SMA Other upon request
Jacket	No jacket (bare fiber) Ø900 µm hytrel Ø3 mm PVC Stainless steel
Endcap length (µm)	< 100
Endcap material	Fused silica





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