

Hollow-Core Anti-Resonant Fiber

Key Features

- **Ultra-Low Nonlinearity:** Hollow-core structure minimizes interaction between light and fiber glass, reducing nonlinear effects such as SRS (Stimulated Raman Scattering) and SPM (Self-Phase Modulation)
- **High Damage Threshold:** Air-core structure supports high-intensity picosecond and femtosecond laser pulses without material degradation, with the possibility of vacuum or gas filling to further enhance damage and non-linear effects thresholds
- **Higher-Order Mode Suppression:** Precisely engineered core geometry ensures stable fundamental-mode operation and superior beam quality
- **Broad Spectral Transmission:** Wide spectral windows across visible and near-infrared ranges, providing flexibility for multi-wavelength applications
- **Controlled Dispersion:** Tailorable dispersion characteristics can be achieved by customizing core dimensions, wall thickness, and optional gas fills for pulse preservation and compression
- **Bend Tolerance:** Fibers are optimized for low bending sensitivity, improving versatility of operation
- **Documented consistency:** Each reel includes a measurement summary, streamlining incoming inspection and system qualification.
- **Expert Application Support:** Engineering assistance available throughout the design, modelling, integration, and qualification processes.

Lumentum's Hollow-Core Anti-Resonant Fibers (HC-ARFs) are engineered for high-power laser transmission featuring high threshold for non-linear effects, exceptional beam quality, and low dispersion. Designed for consistent fundamental-mode operation, HC-ARFs offer stable, high-quality beam transmission across a broad spectral range.

Manufacturing of hollow core fibers is done under stringent process control standards, ensuring reproducible fiber structure and comprehensive traceability. Lumentum offers technical support from initial design through final integration to optimize application-specific fiber performance.

Typical Applications

HC-ARFs are ideally suited for ultrafast laser beam delivery, precision spectroscopy, nonlinear optics experiments, medical laser delivery, advanced sensing systems, and specialized communications requiring high-power handling, low nonlinearities, and consistent beam quality.



GENERAL INFORMATION	
Cladding material	Pure fused silica, 6-tube design
Coating type - primary	High-temperature low or high refractive index acrylate
Coating type - secondary	High-temperature protective acrylate

PERFORMANCE CHARACTERISTICS		
Parameter	Unit	Typical value
Operating wavelength	600 – 1800 nm	We optimize the tube thickness/ geometry to target a specific center wavelength within this range. For shorter (< 600 nm) or longer (> 1.6 μm) wavelengths, consult us for feasibility.
Bandwidth	200 – 400 nm	Depends on the specific geometry.
Attenuation	< 50 dB/km	Depends on the specific geometry and the operating wavelength.
Minimum bending diameter	> 20 cm	Depends on the specific geometry and the operating wavelength.

OPTICAL CHARACTERISTICS		
Parameter	Unit	Product range
Core diameter	20 – 100 μm	
Number of tubes	4 – 8	
Bare fiber diameter	125 – 500 μm	Depends on the previous parameters.
Secondary coating diameter	250 – 600 μm	Depends on the previous parameters.

Ordering Information
For more information on this or other products and their availability, please contact your local Lumentum account manager or Lumentum directly at customer.service@lumentum.com.



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