Optical Fiber Tapers

Fiberguide Industries

Acrylate Coated Silica/Silica

Technical Data

REFERENCE SUMMARY

Product Category:
Fiber

Mode:
Step Index, Multimode

Type:
Optical Fiber Tapers

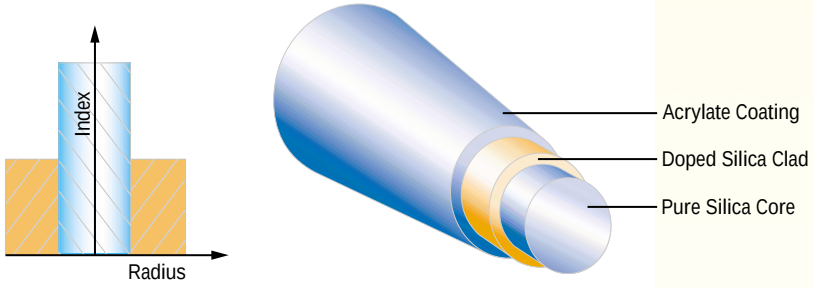
Trade Name:
Acrylate Coated Silica/Silica

DESCRIPTION

Tapered optical fibers can be made either by fusing a short tapered section onto a longer fixed diameter fiber, or, by very carefully controlling the drawing process to produce a single continuous fiber with an integral tapered section. Fiberguide used the latter process since it results in superior fiber strength, alignment precision and optical power transmission. Tapered optical fibers cause optical mode mixing that tends to homogenize spatial power distribution. A larger input core diameter can prevent input damage and allow a smaller diameter pigtail for convenience in adapting to a wide range of optical applications.

Tapered optical fibers can be used as a passive optical component to alter the input and / or output divergence (N.A.) with regard to an optical fiber, as a high power coupler for laser energy, as this will spread the energy over a larger area, or simply as a device to relax tolerances in an optical system. To ensure maximum efficiency of light transmission, the numerical aperture (N.A.) of the light entering the taper input should be 0.22 divided by the taper ratio. As an example, assume the input core diameter of the taper is 400µ and the output core is 200µ, which is a 2:1 taper ratio, and then the N.A. of the light entering the taper will be 0.22/2, or 0.11 N.A.

FIBER CROSS SECTION



FEATURES & BENEFITS

Features	Benefits
• Continuous length.	• No need to fuse two fibers together.
• Highest power handling and lowest loss.	• Fused tapers tend to have higher losses.
• Concentrates optical input into a smaller output area.	• Increased brightness.
• Causes optical mode mixing.	• Tends to homogenize spatial power distribution.

APPLICATIONS

- Laser marking
- Laser welding and soldering
- Fluid level sensors
- Laser surgery, angioplasty, lithotripsy
- Non-linear optics
- Diode laser array coupling
- Spectroscopy, analytical instruments, laser delivery
- Biosensors
- Near-Field Scanning Optical Microscopy\Raman and IR Spectroscopy
- Humidity sensing
- Delivery systems for laser diode
- High power laser transmittance
- Dynamic position sensing
- Fluorescent detection

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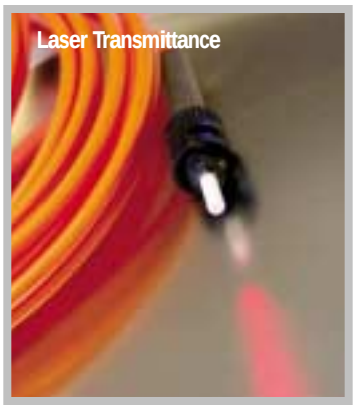
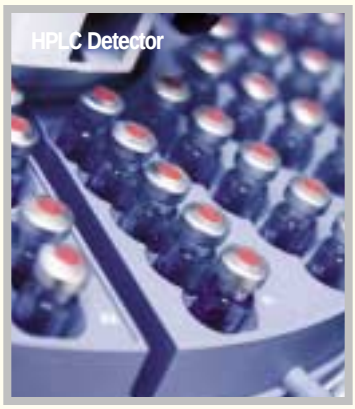
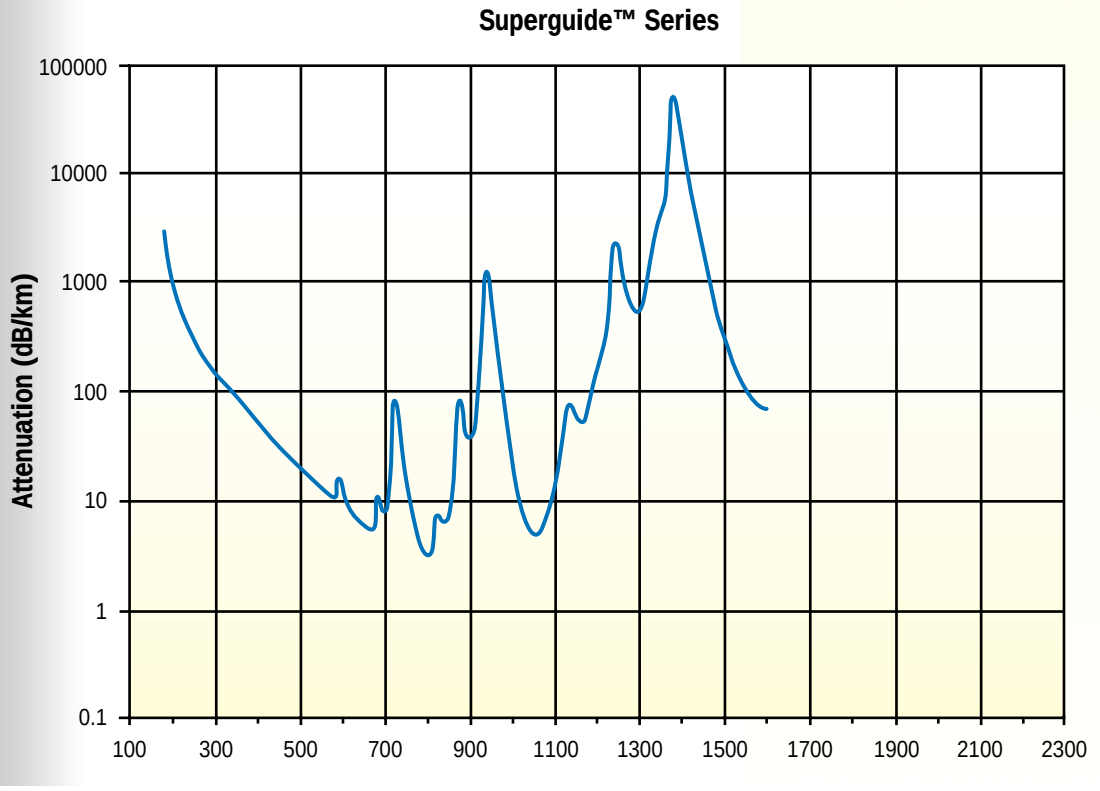
TYPICAL EXAMPLES





SPECTRAL ATTENUATION (Typical)



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Step Index, Multimode,
Graded Index, Single Mode

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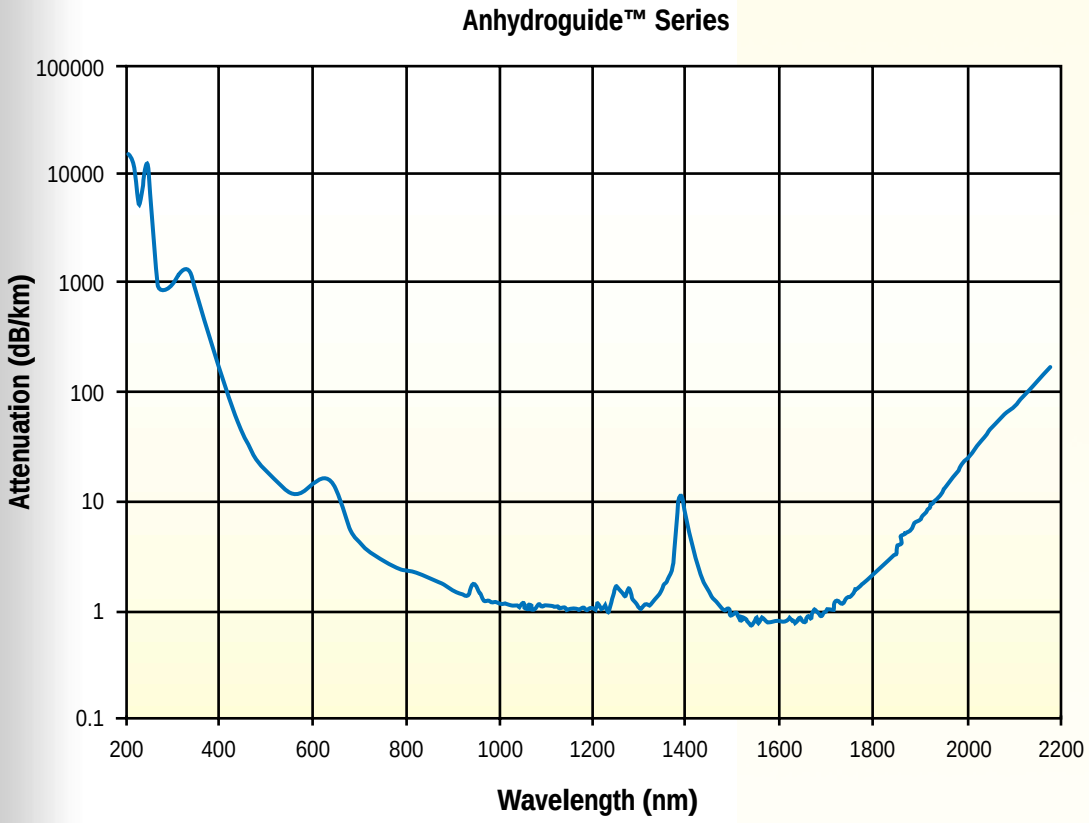
SPECTRAL ATTENUATION
(Typical)



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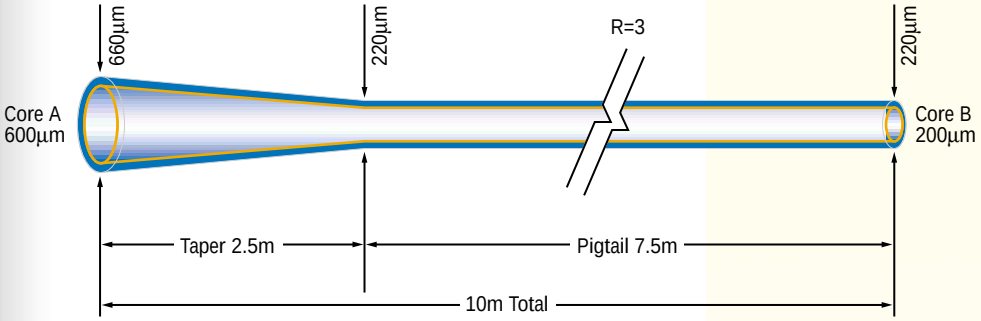
TAPERED OPTICAL FIBER EXAMPLE



NUMERICAL APERTURE

A fiber optic taper is a numerical aperture (N.A.) converter which converts the input beam N.A. by the following formula; however the maximum output N.A. is the pigtail N.A.

$NA_0 = (R * NA_i)$

Where: NA_i = Input N.A.
NA_0 = Output N.A.
R = Ratio of taper input diameter to output diameter

FIBER SPECIFICATIONS

- Standard Numerical Aperture (N.A.): 0.22 ± 0.02 (Full Acceptance Angle 25°)
- Available Numerical Apertures: 0.12 (Full Acceptance Angle 14°), 0.26 (Full Acceptance Angle 30°)
- Standard Core-to-Clad Ratio 1.1
- Available Core-to-Clad Ratios 1.2 and 1.4 (Please Contact Our Customer Department)
- Buffer Material: Acrylate
- Input-to-Output Ratios: Up to 3:1
- Input Core Diameters: 100µ to 600µ
- Taper Lengths:
  - Tapered Lengths: 1 to 3 Meters
  - Pigtail Lengths: Any Specified Length ≤ 50 Meters
  - Overall Length: 3 to 10 Meters (Typical)
- For Sizes Not Found Please Contact Our Customer Service Department

Note: The fibers in the following table carry a designation "SFT" standing for "Superguide series Fiber Taper" and "AFT" standing for "Anhydroguide series Fiber Taper" followed by the large core diameter and small core diameter (in microns) and concluding with the suffix "Y" designating Acrylate buffer/coating.

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FIBER SPECIFICATIONS

Standard OH Plastic Coated Silica/Silica

Product Code	SFT100TO50Y	SFT200TO100Y	SFT300TO100Y
Core A Diameter	100µm ± 2%	200µm ± 2%	300µm ± 2%
Core B Diameter	50µm ± 2%	100µm ± 2%	100µm ± 2%
Operating Wavelength	180nm - 1100nm	180nm - 1100nm	180nm - 1100nm

Standard OH Plastic Coated Silica/Silica

Product Code	SFT400TO200Y	SFT600TO200Y
Core A Diameter	400µm ± 2%	600µm ± 2%
Core B Diameter	200µm ± 2%	200µm ± 2%
Operating Wavelength	180nm - 1100nm	180nm - 1100nm

Low OH Plastic Coated Silica/Silica

Product Code	AFT100TO50Y	AFT200TO100Y	AFT300TO100Y
Core A Diameter	100µm ± 2%	200µm ± 2%	300µm ± 2%
Core B Diameter	50µm ± 2%	100µm ± 2%	100µm ± 2%
Operating Wavelength	400nm - 2400nm	400nm - 2400nm	400nm - 2400nm

Low OH Plastic Coated Silica/Silica

Product Code	AFT400TO200Y	AFT600TO200Y
Core A Diameter	400µm ± 2%	600µm ± 2%
Core B Diameter	200µm ± 2%	200µm ± 2%
Operating Wavelength	400nm - 2400nm	400nm - 2400nm

Note: Fiberguide can also furnish taper assemblies with custom machined ferrules or industry standard connectors and a wide variety of jackets designed for your specific application.