105 Micron Core
Power Delivery Fibers

Nufern’s specialty multimode step-index fibers are designed for compatibility with the majority of fiber-coupled, single-emitter, diode-laser packages and support the diode laser power delivery market. These power delivery fibers are available in 105/125 core/clad ratio in low and high NA versions. Other fiber diameters are available upon request.

**Typical Applications**
- Fiber coupled diode lasers
- Couplers and pump combiners

**Features & Benefits**
- 0.12, 0.15 and 0.22 NA — Compatible with majority of fiber-coupled, diode-laser packages
- Exceptional geometric uniformity and core/clad concentricity — Ease of coupling to pump diodes

**Optical Specifications**

<table>
<thead>
<tr>
<th>Model</th>
<th>Operating Wavelength (nominal)</th>
<th>Numerical Aperture (nominal)</th>
<th>OH Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>MM-S105-125-12A</td>
<td>800 – 1600 nm</td>
<td>0.12 ± 0.02</td>
<td>Low</td>
</tr>
<tr>
<td>MM-S105/125-15A</td>
<td>800 – 1600 nm</td>
<td>0.15 ± 0.02</td>
<td>Low</td>
</tr>
<tr>
<td>MM-S105/125-22A</td>
<td>800 – 1600 nm</td>
<td>0.22 ± 0.02</td>
<td>Low</td>
</tr>
</tbody>
</table>

**Geometrical & Mechanical Specifications**

<table>
<thead>
<tr>
<th>Model</th>
<th>Core Diameter</th>
<th>Clad Diameter</th>
<th>Coating Diameter</th>
<th>Core-Clad Concentricity</th>
<th>Coating Material</th>
<th>Short-Term Bend Radius</th>
<th>Long-Term Bend Radius</th>
<th>Proof Test Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>MM-S105-125-12A</td>
<td>105 ± 3 μm</td>
<td>125 ± 2 μm</td>
<td>246 ± 15 μm</td>
<td>&lt; 3 μm</td>
<td>UV Cured, Dual Acrylate</td>
<td>≥ 12 mm</td>
<td>≥ 25 mm</td>
<td>≥ 100 kpsi (0.7 GN/m²)</td>
</tr>
<tr>
<td>MM-S105/125-15A</td>
<td>105 ± 3 μm</td>
<td>125 ± 2 μm</td>
<td>245 ± 15 μm</td>
<td>&lt; 3 μm</td>
<td>UV Cured, Dual Acrylate</td>
<td>≥ 12 mm</td>
<td>≥ 25 mm</td>
<td>≥ 100 kpsi (0.7 GN/m²)</td>
</tr>
<tr>
<td>MM-S105/125-22A</td>
<td>105 ± 3 μm</td>
<td>125 ± 2 μm</td>
<td>245 ± 15 μm</td>
<td>&lt; 3 μm</td>
<td>UV Cured, Dual Acrylate</td>
<td>≥ 12 mm</td>
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</tr>
</tbody>
</table>

**Typical Applications**
- Fiber coupled diode lasers
- Couplers and pump combiners

**Features & Benefits**
- 0.12, 0.15 and 0.22 NA — Compatible with majority of fiber-coupled, diode-laser packages
- Exceptional geometric uniformity and core/clad concentricity — Ease of coupling to pump diodes
Nufern’s specialty multimode step-index fibers are designed for compatibility with the majority of fiber-coupled, bar and stack diode-laser packages and support the diode laser power delivery market. These power delivery fibers are available in 200/220 and 200/240 core/clad ratios in low and high NA versions. Other fiber diameters are available upon request.
**400 Micron Core Power Delivery Fibers**

Nufern’s specialty multimode step-index fibers are designed for compatibility with the majority of fiber-coupled, bar and stack diode-laser packages and support the diode laser power delivery market. These power delivery fibers are available in and 400/440 and 400/480 core/clad ratios in low and high NA versions. The 400/480 has a low refractive index fluoroacrylate coating for added power confinement. Other fiber diameters are available upon request.

**Typical Applications**
- Fiber coupled diode lasers
- Couplers and pump combiners

**Features & Benefits**
- 0.12 and 0.22 NA — Compatible with majority of fiber-coupled, diode-laser packages
- Exceptional geometric uniformity and core/clad concentricity — Ease of coupling to pump diodes

### Optical Specifications

<table>
<thead>
<tr>
<th>Product</th>
<th>Operating Wavelength (nominal)</th>
<th>Numerical Aperture (nominal)</th>
<th>Cladding Numerical Aperture</th>
<th>OH Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>MM-S400/440-12A</td>
<td>800–1600 nm</td>
<td>0.12 ± 0.02</td>
<td>NA</td>
<td>Low</td>
</tr>
<tr>
<td>MM-S400/440-22A</td>
<td>800–1600 nm</td>
<td>0.22 ± 0.02</td>
<td>NA</td>
<td>Low</td>
</tr>
<tr>
<td>MM-S400/480-22FA</td>
<td>800–1600 nm</td>
<td>0.22 ± 0.02</td>
<td>0.46 (nominal)</td>
<td>Low</td>
</tr>
</tbody>
</table>

### Geometrical & Mechanical Specifications

<table>
<thead>
<tr>
<th></th>
<th>Core Diameter</th>
<th>Clad Diameter</th>
<th>Coating Diameter</th>
<th>Core-Clad Concentricity</th>
<th>Coating Material</th>
<th>Proof Test Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>MM-S400/440-12A</td>
<td>400 ± 9 μm</td>
<td>440 ± 8 μm</td>
<td>625 ± 25 μm</td>
<td>&lt; 5 μm</td>
<td>UV Cured, Dual Acrylate</td>
<td>≥ 100 kpsi (0.7 GN/m²)</td>
</tr>
<tr>
<td>MM-S400/440-22A</td>
<td>400 ± 9 μm</td>
<td>440 ± 8 μm</td>
<td>625 ± 25 μm</td>
<td>&lt; 5 μm</td>
<td>UV Cured, Dual Acrylate</td>
<td>≥ 100 kpsi (0.7 GN/m²)</td>
</tr>
<tr>
<td>MM-S400/480-22FA</td>
<td>400 ± 9 μm</td>
<td>480 ± 8 μm</td>
<td>640 ± 25 μm</td>
<td>&lt; 5 μm</td>
<td>Low Index Polymer</td>
<td>≥ 100 kpsi (0.7 GN/m²)</td>
</tr>
</tbody>
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**Typical Applications**
- Fiber coupled diode lasers
- Couplers and pump combiners

**Features & Benefits**
- 0.12 and 0.22 NA — Compatible with majority of fiber-coupled, diode-laser packages
- Exceptional geometric uniformity and core/clad concentricity — Ease of coupling to pump diodes

**Nufern Standard Power Delivery Fibers**
# NuBEAM Large Core Delivery Fibers

Nufern’s specialty multimode step-index fibers are designed for compatibility with the majority of fiber interconnect systems. They also support the diode laser power delivery market. These power delivery fibers are available in many core/clad ratios and in low or high NA versions. The buffer can be a low refractive index fluoroacrylate coating for added power confinement, or traditional silicone. Other fiber diameters are available upon request.

## Optical Specifications
- **Operating Wavelength (nominal)**: 800 – 1600 nm
- **Numerical Aperture**: 0.22 ± 0.02
- **OH Level**: Low

## Geometrical & Mechanical Specifications
- **Core Diameter**: 204 ± 4 μm
- **Inner Clad Diameter (nominal)**: 235 μm
- **Outer Clad Diameter**: 675 ± 15 μm
- **Cladding Profile**: Depressed
- **Buffer Diameter (Silicone)**: 1100 ± 60 μm
- **Outer Buffer Diameter (Transparent Nylon)**: 780 ± 30 μm
- **Short Term Bend Radius**: > 33 mm
- **Long Term Bend Radius**: > 99 mm
- **Core Type**: Pure Silica Core
- **Proof Test Level**: > 70 kpsi (0.48 GN/m²)

## Typical Applications
- Fiber coupled diode lasers
- Couplers and pump combiners
- Beam delivery cables
- Spectroscopy and instrumentation

## Features & Benefits
- Compatible with majority of fiber interconnect systems & fiber-coupled, diode-laser packages
- Exceptional geometric uniformity and core/clad concentricity — Ease of assembly
- Clean room fiber draw — Eliminates coating “hot spots”

## NuBEAM Large Core Delivery Fibers

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Benefiting from an environmentally controlled facility and many years of experience, the engineers at Nufern have developed a new generation of beam delivery fibers designed to address the laser industries’ ever increasing need for greater power handling capability. The output power, beam quality and performance characteristics of many near-IR lasers has improved significantly in recent years. This ongoing technological advance requires fibers with attributes previously required only in telecom and space born environments. NuBEAM fibers, made with knowledge, experience, and controls developed by Nufern for these applications are unique in demonstrating levels of technology, quality, performance and life expectancy required for lowest life cycle cost and highest productivity.

Delivering Light Energy
**Optical Benefits**
- Nufern proprietary processes yield precision diameter control over very long fiber lengths resulting in the lowest level of fiber induced beam perturbation.
- Pure silica core technology results in high damage resistance and very low attenuation in the 800 nm to 1600 nm power transmission band.
- Nufern ultra clean and environmentally controlled draw room yields the most pristine glass/polymer boundary eliminating “hot spots” and point sources of thermal failure.
- Optical silicone free buffer technology uses Nufern proprietary fluoro-acrylate coating developed for the fiber laser market.

**Mechanical Benefits**
- Nufern process equipment is controlled by proprietary operating software that yields extremely high strength, highest fatigue failure resistant glass necessary for durable final products.
- 100% prooftest and clean room processing yields high-strength, long-life fibers suitable for use even in harsh mechanical environments.
- Tight process control parameters & specifications result in a minimum lot-to-lot variability, yielding lowest cost termination.

**Applications**
- Industrial / Military
  - Laser Pump diode pigtails
  - Laser Beam delivery for: Cutting, Welding, Soldering, Brazing, Directed Energy
  - Body in white and other mandatory “silicone free” environments
- Medical
  - Diagnostics
  - Photodynamic Therapy (PTD) delivery tools
  - Not designed for bio-compatibility (internal medicine) or sterilization
- Scientific
  - Spectroscopy
  - Sensors
  - Instrumentation: Plasma, Pyrometry, Semiconductor, Thomson Scattering

**Completion**
- Buffer
  - Available with industry standard silicone
  - Nufern proprietary HTA — a silicone free coating for critical applications such as in a paint shop.
- Jacket
  - Nylon
  - Tefzel
  - Acrylate

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**Fiber Construction Option Details**

- Pure Silica Core
- Pristine Core/Clad Boundary
- Fluorine Doped Silica Cladding
- Nufern Proprietary FA Coating
- Silicone Primary Coating
- Nufern Proprietary HTA Silicone-Free Coating
- Polymer Jacket