

OPTICAL FIBERS

Data-Sheets

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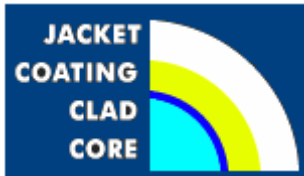
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AS...UV-FIBERS

FEATURES

- Higher transmission than PCS-Fibers between 180 nm and 300 nm
- High core to clad ratio available for high efficiency bundles
- Specialty coatings available for high temperatures, high vacuum and harsh chemicals environments
- Biocompatible materials
- Sterilizable by ETO, steam, e-beam, gamma radiation
- Radiation resistant
- Laser damage resistant



FIBER DESIGN

- Fiber design: Pure fused silica core (high OH⁻)
 Fluorine doped fused silica cladding
 Acrylate coating (-40°C to 85°C)
 Silicone resin coating (-40°C to 180°C)
 Polyimide coating (-190°C to 385°C)
- Jacket: Nylon (-40°C to 100°C)
 ETFE (-200°C to 150°C)
 Acrylate (-40°C to 85°C)

FIBER PROPERTIES

- Core/clad ratio: 1.1
- Numerical aperture: 0.22 ± 0.02
- Operation wavelength range: 180 nm to 1100 nm
- Proof test level (bend method): 70 kpsi
- Bend radius: momentary 100 times the fiber radius
 long term 600 times the fiber radius
- Laser damage threshold: > 50 mJ/mm² (XeCl, 25 ns pulse at 248 nm)
 > 150 mJ/mm² (XeCl, 30 ns pulse at 308 nm)
- Radiation induced attenuation: < 10 dB/km at dose values above 1 Mrad

OPTIONS

- Core/clad ratios 1.05, 1.07, 1.15, 1.20, 1.30, 1.40
- Numerical apertures 0.07 to 0.28
- Metal coating (-190°C to 750°C)
- Fiber bundles
- Tapered fibers
- Connectors (SMA, FC/PC, ST, DIN)
- AS-Fiber cables

AS...UV-FIBERS

FIBER SPECIFICATION

NYLON JACKETED FIBERS (-40°C to 85°C)

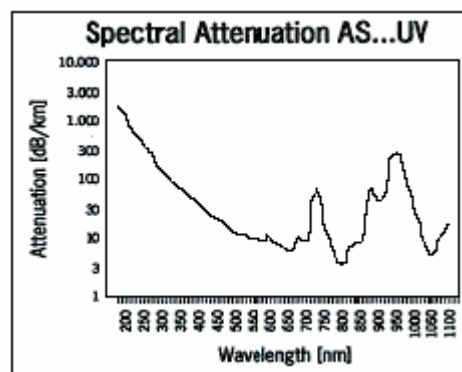
Product code	Core [μm] $\pm 2\%$	Clad [μm] $\pm 2\%$	Coating [μm] $\pm 5\%$	Coating Material	Jacket [μm] $\pm 5\%$
AS 100/110UVAN	100	110	180	Acrylate	300
AS 200/220UVAN	200	220	350	Acrylate	500
AS 300/330UVAN	300	330	500	Acrylate	700
AS 400/440UVAN	400	440	550	Acrylate	700
AS 600/660UVAN	600	660	800	Acrylate	1000
AS 800/880UVAN	800	880	1000	Acrylate	1200
AS 1000/1100UVAN	1000	1100	1250	Acrylate	1500
AS 1500/1650UVAN	1500	1650	1800	Acrylate	2000

For Silicone coating replace A with S in product code.

ETFE JACKETED FIBERS (-40°C to 150°C)

Product code	Core [μm] $\pm 2\%$	Clad [μm] $\pm 2\%$	Coating [μm] $\pm 5\%$	Coating Material	Jacket [μm] $\pm 5\%$
AS 100/110UVSE	100	110	180	Silicone	300
AS 200/220UVSE	200	220	350	Silicone	500
AS 300/330UVSE	300	330	500	Silicone	700
AS 400/440UVSE	400	440	550	Silicone	700
AS 600/660UVSE	600	660	800	Silicone	1000
AS 800/880UVSE	800	880	1000	Silicone	1200
AS 1000/1100UVSE	1000	1100	1250	Silicone	1500
AS 1500/1650UVSE	1500	1650	1800	Silicone	2000

For Acrylate coating replace S with A in product code



AS...UV-FIBERS

POLYIMIDE COATED FIBERS (-190°C to 385°C)

Product code	Core [μm] ± 2 %	Clad [μm] ± 2 %	Coating [μm] ± 3 %
AS 100/110UVPI	100	110	120
AS 200/220UVPI	200	220	235
AS 300/330UVPI	300	330	345
AS 400/440UVPI	400	440	460
AS 600/660UVPI	600	660	680

Other specifications upon request.

BUNDLES FIBER SPECIFICATIONS

Product code	Core [μm] ± 2 %	Clad [μm] ± 2 %	Coating [μm] ± 3 %	Coating Material
AS27/30UVW	27	30		Wet coating
AS46/50UVPI	46	50	58	Polyimide
AS46/50UVW	46	50		Wet coating
AS64/70UVPI	64	70	78	Polyimide
AS64/70UVW	64	70		Wet coating
AS100/110UVPI	100	110	120	Polyimide
AS100/110UVW	100	110		Wet coating
AS200/220UVPI	200	220	235	Polyimide

Other specifications upon request.

AS...IR-FIBERS

FEATURES

- Higher transmission than PCS-Fibers between 1500 nm and 2600 nm
- Broad useful spectral transmission range
- Specialty coatings available for high temperatures, high vacuum and harsh chemicals environments
- Biocompatible materials
- Sterilizable by ETO, steam, e-beam, gamma radiation
- Radiation resistant
- Laser damage resistant



FIBER DESIGN

- Fiber design: Pure fused silica core (low OH)
 - Fluorine doped fused silica cladding
 - Acrylate coating (-40°C to 85°C)
 - Silicone resin coating (-40°C to 180°C)
 - Polyimide coating (-190°C to 385°C)
- Jacket:
 - Nylon (-40°C to 100°C)
 - ETFE (-200°C to 150°C)
 - Acrylate (-40°C to 85°C)

FIBER PROPERTIES

- Core/clad ratio: 1.1, 1.2, 1.4
- Numerical aperture: 0.22 ± 0.02
- Operation wavelength range: 350 nm to 2600 nm
- Proof test level (bend method): 70 kpsi
- Bend radius:
 - momentary 100 times the fiber radius
 - long term 600 times the fiber radius
- Laser damage threshold: $> 5 \text{ J/mm}^2$ (Nd:YAG, 1ms pulse at 1060 nm)
 $> 1.3 \text{ kW/mm}^2$ (Nd:YAG, cw at 1060 nm)

OPTIONS

- Core/clad ratios 1.15, 1.30,
- Numerical apertures 0.07 to 0.28
- Metal coating (-190°C to 750°C)
- Fiber bundles
- Tapered fibers
- Connectors (SMA, FC/PC, ST, DIN)
- AS-Fiber cables

AS...IR-FIBERS

FIBER SPECIFICATIONS

NYLON JACKETED FIBERS (-40°C to 85°C)

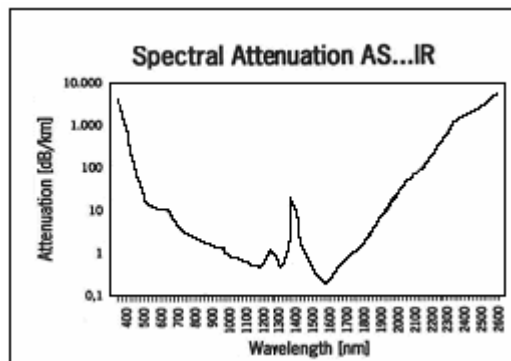
Product code	Core [μ m] $\pm 2\%$	Clad [μ m] $\pm 2\%$	Coating [μ m] $\pm 5\%$	Coating Material	Jacket [μ m] $\pm 5\%$
AS 100/140IRAN	100	140	200	Acrylate	500
AS 200/220IRAN	200	220	350	Acrylate	500
AS 200/280IRAN	200	280	500	Acrylate	700
AS 300/330IRAN	300	330	500	Acrylate	700
AS 400/440IRAN	400	440	550	Acrylate	700
AS 600/660IRAN	600	660	800	Acrylate	1000
AS 800/880IRAN	800	880	1000	Acrylate	1200
AS 1000/1100IRAN	1000	1100	1250	Acrylate	1500
AS 1500/1650IRAN	1500	1650	1800	Acrylate	2000

For Silicone coatings replace A with S in product code.

ETFE JACKETED FIBERS (-40°C to 150°C)

Product code	Core [μ m] $\pm 2\%$	Clad [μ m] $\pm 2\%$	Coating [μ m] $\pm 5\%$	Coating Material	Jacket [μ m] $\pm 5\%$
AS 100/110IRSE	100	110	180	Silicone	300
AS 200/220IRSE	200	220	350	Silicone	500
AS 200/280IRSE	200	280	500	Silicone	700
AS 300/330IRSE	300	330	500	Silicone	700
AS 400/440IRSE	400	440	550	Silicone	700
AS 600/660IRSE	600	660	800	Silicone	1000
AS 800/880IRSE	800	880	1000	Silicone	1200
AS 1000/1100IRSE	1000	1100	1250	Silicone	1500
AS 1500/1650IRSE	1500	1650	1800	Silicone	2000

For Acrylate coating replace S with A in product code



AS...IR-FIBERS

POLYIMIDE COATED FIBERS (-190°C to 385°C)

Product code	Core [μm] ± 2 %	Clad [μm] ± 2 %	Coating [μm] ± 3 %
AS 100/140IRPI	100	140	155
AS 200/220IRPI	200	220	235
AS 200/280IRPI	200	280	295
AS 300/330IRPI	300	330	345
AS 400/440IRPI	400	440	460
AS 600/660IRPI	600	660	680

Other specifications upon request.

BUNDLES FIBER SPECIFICATIONS

Product code	Core [μm] ± 2 %	Clad [μm] ± 2 %	Coating [μm] ± 3 %	Coating Material	Wavelength Range [nm]
AS 50/70IRW	50	70		Wet coating	350 to 2600
AS 50/70IRPI	50	70	78	Polyimide	350 to 2600
AS 58/70IRW	58	70		Wet coating	350 to 1500
AS 58/70IRPI	58	70	78	Polyimide	350 to 1500
AS 100/110IRW	100	110		Wet coating	350 to 1500
AS 100/110IRPI	100	110	120	Polyimide	350 to 1500
AS 100/120IRW	100	120		Wet coating	350 to 2600
AS 100/120IRPI	100	120	130	Polyimide	350 to 2600
AS 125/150IRPI	125	150	160	Polyimide	350 to 2600
AS 150/165IRPI	150	165	180	Polyimide	350 to 1800
AS 200/220IRPI	200	220	235	Polyimide	350 to 2600

Other specifications upon request.

PCS-FIBERS

FEATURES

- Cost effective alternative to All silica fibers (AS)
- Better UV and IR transmission than Hard clad silica fibers
- High numerical aperture
- Biocompatible materials
- Sterilizable by ETO, steam, e-beam, gamma radiation
- Radiation resistant



FIBER DESIGN

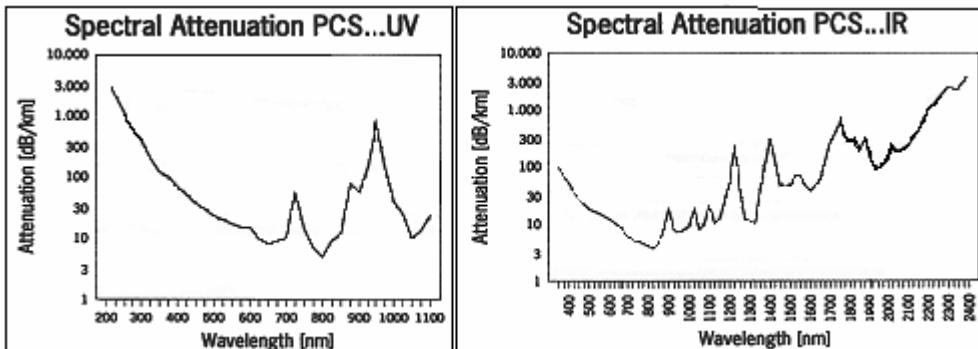
- Fiber design: Pure fused silica core
 - Silicone resin coating (-40°C to 180°C)
 - Polyimide coating (-190°C to 385°C)
- Jacket:
 - Nylon (-40°C to 100°C)
 - ETFE (-200°C to 150°C)

FIBER PROPERTIES

- Numerical aperture:
 - 0.40 (2 meters)
 - 0.30 (steady state)
- Operation wavelength range:
 - 220 nm to 1100 nm (PCS-UV)
 - 350 nm to 2400 nm (PCS-IR)
- Proof test level (bend method): 70 kpsi
- Bend radius:
 - momentary 100 times the core radius
 - long term 600 times the core radius
- Laser damage threshold: > 1.3 kW/mm² (Nd:YAG, cw at 1060 nm)

OPTIONS

- Special jacket materials
- PCS-Fiber bundles
- Tapered fibers
- Connectors (SMA, FC/PC, DIN)
- PCS-Fiber cables





PCS-FIBERS

FIBER SPECIFICATION

NYLON JACKETED FIBERS (-40°C to 85°C)

Product code	Core [μm] ± 2 %	Clad [μm] ± 5 %	Jacket [μm] ± 5 %
PCS 100UVN	100	200	500
PCS 200UVN	200	350	600
PCS 300UVN	300	450	900
PCS 400UVN	400	550	900
PCS 600UVN	600	800	1200
PCS 800UVN	800	1000	1400
PCS 1000UVN	1000	1200	1600
PCS 1300UVN	1300	1500	1900
PCS 1500UVN	1500	1700	2100
PCS 2000UVN	2000	2200	2600

ETFE JACKETED FIBERS (-40°C to 150°C)

Product code	Core [μm] ± 2 %	Clad [μm] ± 5 %	Jacket [μm] ± 5 %
PCS 200UVE	200	350	600
PCS 400UVE	400	550	900
PCS 600UVE	600	800	1200
PCS 800UVE	800	1000	1400
PCS 1000UVE	1000	1200	1600

For PCS - IR fiber, replace UV with IR in product code.

Other specifications upon request.

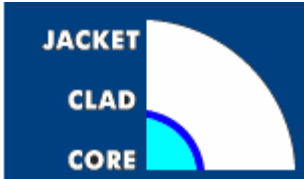
BUNDLES FIBER SPECIFICATIONS

Product code	Core [μm] ± 2 %	Clad [μm] ± 5 %	Coating [μm] ± 5 %
PCS 200UV	200	240	No Jacket
PCS 200IR	200	240	No Jacket

Other specifications upon request.

HPCS-FIBERS **FEATURES**

- High numerical aperture fiber for fiber bundles and short haul data transmission
- Cost effective
- High core to clad ratio
- Biocompatible materials
- Sterilizable by ETO, e-beam, gamma radiation
- Radiation resistant
- Excellent chemical and abrasion resistance



FIBER DESIGN

- Fiber design: Pure fused silica core
 Polymer cladding (-50°C to 120°C)
- Jacket: ETFE (-200°C to 150°C)

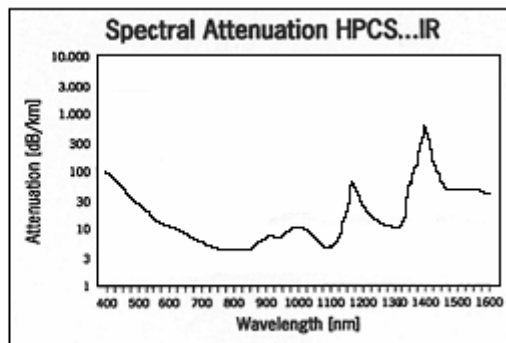
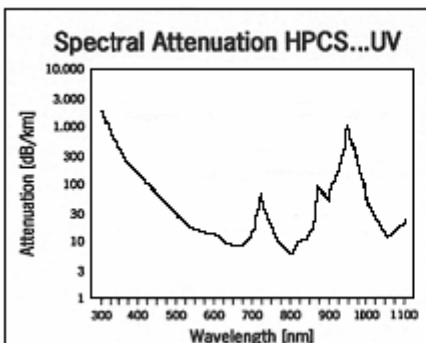
FIBER PROPERTIES

- Numerical aperture: 0.55 (2 meters)
- Operation wavelength range: 300 nm to 1100 nm (HPCS-UV)
 400 nm to 1600 nm (HPCS-IR)
- Proof test level (bend method): 70 kpsi
- Bend radius: momentary 100 times the core radius
 long term 600 times the core radius

FIBER SPECIFICATIONS

Product code	Core [μm] ± 2 %	Clad [μm] ± 5 %	Jacket [μm] ± 5 %
HPCS50UV	50	58	
HPCS70UV	70	78	
HPCS100UV	100	110	
HPCS125UV	125	140	500
HPCS200UV	200	230	500

For HPCS-IR fiber, replace UV with IR in product code.
 Other specifications upon request.



CAPILLARIES

FEATURES

- High strength capillaries
- Pressure resistant
- Specialty coating for high temperature and harsh chemicals
- Sterilizable by ETO, steam, e-beam, gamma radiation
- UV and IR optical quality available

CAPILLARY DESIGN

- Capillary Design: Pure fused silica tube
Polyimide coating (to 385°C)
uncoated (to 950°C, to 1150°C upon request)

CAPILLARY PROPERTIES

- Inner diameters: 2 μm to 2000 μm
- Wall thickness: 10 μm to 1000 μm
- Length: 1 m to 10 km (depends on diameter)
- Standard tolerances: $\pm 1\%$ (Inner diameter)
- Proof test level (bend method): 70 kpsi

OPTIONS

- Coating: Acrylate (-40°C to 85°C)
Silicone resin (-40°C to 180°C)
Metal (-190°C to 750°C)
- Inner coating
- Capillary bundles
- Tapered capillaries



CAPILLARIES

SPECIFICATIONS

Product code	Inner Diameter [μm] ± 1 %	Outer Diameter [μm] ± 3 %	Coating Diameter [μm] ± 3 %	Coating Material
CAP10/50PI	10	50	60	Polyimide
CAP10/100PI	10	100	120	Polyimide
CAP20/100PI	20	100	120	Polyimide
CAP20/200PI	20	200	220	Polyimide
CAP30/72PI	30	72	85	Polyimide
CAP30/150PI	30	150	170	Polyimide
CAP40/95PI	40	95	110	Polyimide
CAP40/200PI	40	200	220	Polyimide
CAP50/85PI	50	85	100	Polyimide
CAP50/120PI	50	120	140	Polyimide
CAP80/130PI	80	130	150	Polyimide
CAP100/125PI	100	125	145	Polyimide
CAP100/165PI	100	165	185	Polyimide
CAP128/160PI	128	160	180	Polyimide
CAP128/210PI	128	210	230	Polyimide
CAP170/215PI	170	215	235	Polyimide
CAP170/280PI	170	280	300	Polyimide
CAP250/315PI	250	315	335	Polyimide
CAP250/410PI	250	410	430	Polyimide
CAP420/530PI	420	530	550	Polyimide
CAP420/700	420	700		
CAP550/700	550	700		
CAP550/900	550	900		
CAP800/1000	800	1000		
CAP800/1320	800	1320		
CAP950/1200	950	1200		
CAP950/1570	950	1570		

For Silicone coating replace PI with S in product code.
 For Acrylate coating replace PI with A in Product code.

Other specifications upon request.

MEDICAL LASER DELIVERY SYSTEMS

FEATURES

- Medical fiber systems for high power laser applications (Standard: Nd:YAG)
- Cooled and bare fiber design available
- Biocompatible materials
- Sterilizable by ETO, gamma radiation
- High mechanical reliability
- Cost effective for disposable use

PROPERTIES

- Fiber types: PCS...IR, AS...IR
- Numerical aperture: 0.40 (PCS, 2 meters)
0.22 ± 0.02 (AS)
- Operation wavelength range: 350 nm to 2400 nm
- Proof test level (bend method): 70 kpsi
- Bend radius: momentary 100 times the fiber radius
long term 600 times the fiber radius
- Output power: > 100 W (Nd:YAG, cw; 600 μm fiber)

OPTIONS

- High OH fiber for UV/VIS transmission
- Ball, spherical or tapered tips
- SMA connector
- Disposable or reusable handpieces
- Sterilized
- Stripping tools and fiber cleaver

SINGLE-MODE FIBERS

FEATURES

- Single mode transmission at a range of standard wavelength between 400 nm and 1550 nm
- All fibers available with 125 μm diameter to allow the use of standard connectors
- High NA fibers available
- Specialty coatings available for high temperatures, high vacuum and harsh chemicals environments
- Radiation resistant type available
- Standard communication fibers available

FIBER DESIGN

- Type: "Matched cladding"
- Fiber diameter: $(125 \pm 2) \mu\text{m}$
- Numerical aperture: 0.12 ± 0.02
- Proof test level (Screen test): 50 kpsi

OPTIONS

- Numerical apertures 0.10 to 0.35
- Metal coating (-190°C to 750°C)
- Connectors (DIN, FC/PC, ST, SMA)
- Single-mode fiber cables



SINGLE-MODE FIBERS

FEATURES

ACRYLATE COATED FIBERS (-40°C TO 85°C)

Product code	Nominal Core Diameter [μm]	MFD [μm]	Coating Diameter [μm]	Operation Wavelength [nm]	Cutoff Wavelength [nm]	Max. Attenuation [dB/km]
SM400/125A	2.2	2.7	250 ± 15	400	340 ± 50	65
SM488/125A	2.7	3.2	250 ± 15	488, 514	420 ± 50	30
SM633/125A	3.7	4.4	250 ± 15	633	580 ± 30	12
SM780/125A	4.6	5.5	250 ± 15	780	720 ± 40	5
SM850/125A	4.9	5.9	250 ± 15	850	770 ± 50	4
SM1060/125A	6.2	7.4	250 ± 15	1060	970 ± 60	2
SM1310/125A	8.0	9.5	250 ± 15	1310, 1550	1260 ± 60	0.36, 0.22

POLYIMIDE COATED FIBERS (-190°C TO 385°C)

Product code	Nominal Core Diameter [μm]	MFD [μm]	Coating Diameter [μm]	Operation Wavelength [nm]	Cutoff Wavelength [nm]	Max. Attenuation [dB/km]
SM400/125PI	2.2	2.7	145 ± 3	400	340 ± 50	65
SM488/125PI	2.7	3.2	145 ± 3	488, 514	420 ± 50	30
SM633/125PI	3.7	4.4	145 ± 3	633	580 ± 30	12
SM780/125PI	4.6	5.5	145 ± 3	780	720 ± 40	6
SM850/125PI	4.9	5.9	145 ± 3	850	770 ± 50	5
SM1060/125PI	6.2	7.4	145 ± 3	1060	970 ± 60	3
SM1310/125PI	8.0	9.5	145 ± 3	1310, 1550	1260 ± 60	0.8, 0.5

Other specifications upon request.

GRADED-INDEX FIBERS

FEATURES

- Standard communication fibers for 850 nm and 1300 nm
- Low loss, high bandwidth
- Laser power transmission fibers up to 600 μm core diameter
- Better beam profile than step index fibers
- Specialty coatings for high temperatures, high vacuum and harsh chemicals environments
- Radiation resistant type

FIBER DESIGN

- | | |
|----------------------------|--|
| Communication fibers: | Doped fused silica core (graded-index)
Pure fused silica cladding
Dual layer Acrylate coating (-40°C to 85°C) |
| Power transmission fibers: | Doped fused silica core (graded-index)
Pure fused silica cladding
Acrylate coating (-40°C to 85°C)
Silicone resin coating (-40°C to 150°C)
Polyimide coating (-190°C to 385°C) |

FIBER PROPERTIES

- | | |
|----------------------------------|--|
| -Proof test level (Screen test): | 50 kpsi (Communication fibers) |
| -Proof test level (Bend method): | 70 kpsi (Fiber diameter > 200 μm) |
| -Bend radius: | momentary 100 times the fiber radius
long term 600 times the fiber radius |

OPTIONS

- Core/clad ratios 1.1, 1.2
- Metal coating (-190°C to 750°C)
- Jacket: Nylon (-40°C to 100°C)
 ETFE (-200°C to 150°C)
- Connectors (DIN, FC/PC, ST, SMA)
- Graded-index fiber cables





GRADED-INDEX FIBERS

FIBER SPECIFICATIONS

ACRYLATE COATED FIBERS (-40°C TO 85°C)

Product code	Core [μm] $\pm 2\%$	Clad [μm] $\pm 2\%$	Coating [μm] $\pm 5\%$	Coating Material	NA ± 0.015
G100/140A	100	140	200	Acrylate	0.290
G200/280A	200	280	450	Acrylate	0.290
G400/560A	400	560	700	Acrylate	0.290
G600/840A	600	840	1000	Acrylate	0.290

For Silicone coating replace A with S in product code.

POLYIMIDE COATED FIBERS (-190°C TO 385°C)

Product code	Core [μm] $\pm 3\ \mu\text{m}$	Clad [μm] $\pm 3\ \mu\text{m}$	Coating [μm] $\pm 3\ \mu\text{m}$	NA ± 0.015	Attenuation 850/1300 nm [dB/km]	Bandwidth 850/1300 nm [MHz*km]
G 50/125PI	50	125	140	0.200	<2.8/0.9	>400/1200
G62.5/125PI	62.5	125	140	0.275	<3.3/1.0	>200/600
G 85/125PI	85	125	140	0.260	<3.3/1.0	>200/200
G 100/140PI	100	140	155	0.290	<4.0/1.5	>200/200
G 200/280PI	200	280	300	0.290		
G 400/560PI	400	560	580	0.290		

COMMUNICATION FIBERS

Product code	Core [μm] $\pm 3\ \mu\text{m}$	Clad [μm] $\pm 3\ \mu\text{m}$	Coating [μm] $\pm 3\ \mu\text{m}$	NA ± 0.015	Attenuation 850/1300 nm [dB/km]	Bandwidth 850/1300 nm [MHz*km]
G 50/125	50	125	250	0.200	<2.5/0.6	>400/1200
G62.5/125	62.5	125	250	0.275	<3.0/0.7	>200/600
G 85/125	85	125	250	0.260	<3.0/0.7	>200/200
G 100/140	100	140	250	0.290	<3.5/1.0	>200/200

Other specifications upon request.