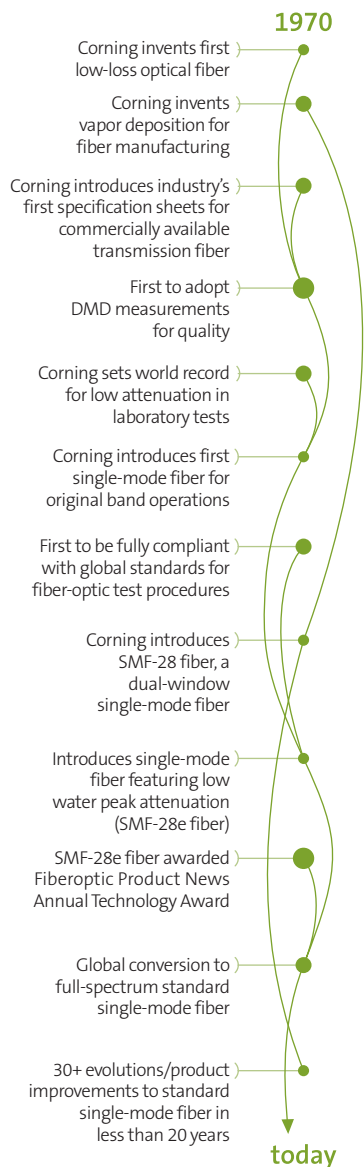


Corning® SMF-28e® Optical Fiber Product Information



Optical Fiber



Evolving Networks Now

At Corning Optical Fiber, we are continually pushing single-mode fiber to new performance levels. Building on our leadership position in the optical fiber industry, Corning is evolving our already formidable products to meet customer requirements like never before. As the first manufacturer to upgrade standard single-mode fiber worldwide, we're providing our customers with greater value today and in the future. Corning® SMF-28e® optical fiber is:

- * Corning's standard single-mode fiber offering, delivering optimized capability, network design flexibility and confidence in long-term performance
- * The world's most widely demanded full-spectrum fiber
- * In compliance with or exceeding the industry's most stringent requirements, including:
 - ITU-T G.652 (all tables)
 - IEC Specifications 60793-2-50 Type B1.3
 - TIA/EIA 492-CAAB
 - Telcordia's GR-20
- * The industry leader in comprehensive standard single-mode fiber specifications

As Corning's premier standard single-mode fiber, SMF-28e fiber is one in a long line of optical innovations. Corning SMF-28e optical fiber is expanding the capability of the world's most dynamic metropolitan and access networks.

Building on a Solid Foundation

Corning SMF-28e fiber has the same reliability, splicing performance and easily strippable coating that customers have trusted in Corning® SMF-28® fiber, the long-standing industry benchmark for quality and performance. SMF-28e fiber offers enhanced capabilities and specifications, while providing full compatibility and interoperability with legacy standard single-mode networks.

Our 30 years of experience is reflected in this evolution of standard single-mode fiber, which not only meets and exceeds the highest industry standards, but also provides an excellent combination of optical, environmental, dimensional and mechanical specifications.

Confidence for Today and the Future

SMF-28e fiber is optimized for metropolitan and access networks that support all broadband applications. SMF-28e fiber has been a qualified product offering since 2001 and has been successfully deployed in communications networks worldwide, proving its performance capabilities in diverse applications.

As the ideal fiber choice for rapidly growing and dynamically changing metropolitan and access networks, SMF-28e fiber provides immediate value to the customer. It is one of the easiest fibers to handle and install because of its world-class geometry, CPC® coating technology and bending specifications. Additionally, its full-spectrum capability enables flexible network designs, increases fiber capacity and prepares network infrastructures for emerging technologies and architectures.

Corning® Optical Fiber – The Measure of Trust

Corning's Service Advantage

Corning Optical Fiber delivers the world's most comprehensive package of innovative products and services, including:

- * Worldwide sales support and door-to-door customer service
- * Full range of fibers and special order capabilities
- * Specialized support from technical experts
- * Extensive fiber delivery capabilities with proven success rates
- * Real-time, Web-based customer information
- * Dedicated account support for our long-term supply customers
- * Fiber support services and technical information for end-customers

At Corning Optical Fiber, we strive to provide the best possible customer service and technical support – before, during and after the sale. As a customer, you'll benefit from our established and extensive support infrastructure that's ready to meet your specific needs.

Corning's Product Advantage

Our enhanced, dual acrylate CPC® coatings provide excellent protection. Designed to be mechanically stripped, with an outside diameter of 245 µm, they are optimized for many single- and multi-fiber cable designs, including loose tube, ribbon, slotted core and tight buffer cables.

Corning is committed to product excellence and meeting the evolving needs of our customers. As updates to fiber characteristics or performance specifications become available, they will be posted on the Corning Optical Fiber website at www.corning.com/opticalfiber

Optical Specifications

Fiber Attenuation

Maximum Attenuation

Wavelength (nm)	Maximum Value* (dB/km)
1310	0.33 – 0.35
1383**	0.31 – 0.35
1550	0.19 – 0.20
1625	0.20 – 0.23

*Maximum specified attenuation value available within the stated ranges.

**Attenuation values at this wavelength represent post-hydrogen aging performance.

Alternate attenuation offerings available upon request.

Attenuation vs. Wavelength

Range (nm)	Ref. λ (nm)	Max. α Difference (dB/km)
1285 – 1330	1310	0.03
1525 – 1575	1550	0.02

The attenuation in a given wavelength range does not exceed the attenuation of the reference wavelength (λ) by more than the value α .

Attenuation with Bending

Mandrel Diameter (mm)	Number of Turns	Wavelength (nm)	Induced Attenuation* (dB)
32	1	1550	≤ 0.05
50	100	1310	≤ 0.05
50	100	1550	≤ 0.05
60	100	1625	≤ 0.05

*The induced attenuation due to fiber wrapped around a mandrel of a specified diameter.

Point Discontinuity

Wavelength (nm)	Point Discontinuity (dB)
1310	≤ 0.05
1550	≤ 0.05

Cable Cutoff Wavelength (λ_{ccf})

$$\lambda_{ccf} \leq 1260 \text{ nm}$$

Mode-Field Diameter

Wavelength (nm)	MFD (μm)
1310	9.2 ± 0.4
1550	10.4 ± 0.5

Dispersion

Wavelength (nm)	Dispersion Value [ps/(nm•km)]
1550	≤ 18.0
1625	≤ 22.0

Zero Dispersion Wavelength (λ_0): $1302 \text{ nm} \leq \lambda_0 \leq 1322 \text{ nm}$

Zero Dispersion Slope (S_0): $\leq 0.089 \text{ ps}/(\text{nm}^2 \cdot \text{km})$

Polarization Mode Dispersion (PMD)

	Value (ps/√km)
PMD Link Design Value	$\leq 0.08^*$
Maximum Individual Fiber	≤ 0.2

*Complies with IEC 60794-3: 2001, Section 5.5, Method 1, September 2001.

The PMD link design value is a term is used to describe the PMD of concatenated lengths of fiber (also known as PMD_Q). This value represents a statistical upper limit for total link PMD. Individual PMD values may change when cabled. Corning's fiber specification supports network design requirements for a 0.5 ps/√km maximum PMD.

Dimensional Specifications

Glass Geometry

Fiber Curl	$\geq 4.0 \text{ m}$ radius of curvature
Cladding Diameter	$125.0 \pm 0.7 \mu\text{m}$
Core-Clad Concentricity	$\leq 0.5 \mu\text{m}$
Cladding Non-Circularity	$\leq 0.7\%$

Coating Geometry

Coating Diameter	$245 \pm 5 \mu\text{m}$
Coating-Cladding Concentricity	$< 12 \mu\text{m}$

Environmental Specifications

Environmental Test	Test Condition	Induced Attenuation 1310 nm, 1550 nm & 1625 nm (dB/km)
Temperature Dependence	-60°C to $+85^\circ\text{C}^*$	≤ 0.05
Temperature Humidity Cycling	-10°C to $+85^\circ\text{C}^*$ up to 98% RH	≤ 0.05
Water Immersion	$23^\circ \pm 2^\circ\text{C}$	≤ 0.05
Heat Aging	$85^\circ \pm 2^\circ\text{C}^*$	≤ 0.05

*Reference temperature = $+23^\circ\text{C}$

Operating Temperature Range: -60°C to $+85^\circ\text{C}$

Mechanical Specifications

Proof Test

The entire fiber length is subjected to a tensile stress ≥ 100 kpsi (0.7 GPa)*.

*Higher proof test levels available.

Length

Fiber lengths available up to 50.4* km/spool.

*Longer spliced lengths available.

Performance Characterizations

Characterized parameters are typical values.

Core Diameter	8.2 μm
Numerical Aperture	0.14 <i>NA is measured at the one percent power level of a one-dimensional far-field scan at 1310 nm.</i>
Zero Dispersion Wavelength (λ_0)	1313 nm
Zero Dispersion Slope (S_0)	0.086 ps/(nm ² •km)
Refractive Index Difference	0.36%
Effective Group Index of Refraction (N_{eff})	1310 nm: 1.4677 1550 nm: 1.4682
Fatigue Resistance Parameter (N_d)	20
Coating Strip Force	Dry: 0.6 lbs. (3N) Wet, 14-day room temperature: 0.6 lbs. (3N)
Rayleigh Backscatter Coefficient (for 1 ns Pulse Width)	1310 nm: -77 dB 1550 nm: -82 dB

Formulas

Dispersion

$$\text{Dispersion} = D(\lambda) \approx \frac{S_0}{4} \left[\lambda - \frac{\lambda_0^4}{\lambda^3} \right] \text{ps}/(\text{nm} \cdot \text{km}),$$

for $1200 \text{ nm} \leq \lambda \leq 1625 \text{ nm}$

λ = Operating Wavelength

Cladding Non-Circularity

$$\text{Non-Circularity} = \left[1 - \frac{\text{Min. Cladding Diameter}}{\text{Max. Cladding Diameter}} \right] \times 100$$

How to Order

Contact your sales representative, or call the Optical Fiber Customer Service Department:
Ph: 607-248-2000 (U.S. and Canada)
+44-1244-287-437 (Europe)
Email: opticalfibres@corning.com
Please specify the fiber type, attenuation and quantity when ordering.

Corning Incorporated www.corning.com/opticalfiber

One Riverfront Plaza
Corning, NY 14831
U.S.A.

Ph: 800-525-2524 (U.S. and Canada)
607-786-8125 (International)

Fx: 800-539-3632 (U.S. and Canada)
607-786-8344 (International)

Email: cotic@corning.com

Europe

Ph: 00 800 6620 6621 (U.K., Ireland, Italy, France, Germany, The Netherlands, Spain and Sweden)
+1 607 786 8125 (All Other Countries)

Fx: +1 607 786 8344

Asia Pacific

Australia
Ph: 1-800-148-690
Fx: 1-800-148-568

Indonesia
Ph: 001-803-015-721-1261
Fx: 001-803-015-721-1262

Malaysia
Ph: 1-800-80-3156
Fx: 1-800-80-3155

Philippines
Ph: 1-800-1-116-0338
Fx: 1-800-1-116-0339

Singapore
Ph: 800-1300-955
Fx: 800-1300-956

Thailand
Ph: 001-800-1-3-721-1263
Fx: 001-800-1-3-721-1264

Latin America

Brazil
Ph: 000817-762-4732
Fx: 000817-762-4996

Mexico
Ph: 001-800-235-1719
Fx: 001-800-339-1472

Venezuela
Ph: 800-1-4418
Fx: 800-1-4419

Greater China

Email: GCCofic@corning.com

Beijing
Ph: (86) 10-6505-5066
Fx: (86) 10-6505-5077

Hong Kong
Ph: (852) 2807-2723
Fx: (852) 2807-2152

Shanghai
Ph: (86) 21-3222-4668
Fx: (86) 21-6288-1575

Taiwan
Ph: (886) 2-2716-0338
Fx: (886) 2-2716-0339

Corning, SMF-28, SMF-28e and CPC are registered trademarks of Corning Incorporated, Corning, N.Y.

Any warranty of any nature relating to any Corning optical fiber is only contained in the written agreement between Corning Incorporated and the direct purchaser of such fiber.

©2004, Corning Incorporated