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**FutureFLEX<sup>®</sup>**  
**AIR-BLOWN FIBER<sup>®</sup> SOLUTIONS**

**SUMITOMO SPECIFICATION**

**SF-F04-020**

**FutureFLEX<sup>®</sup>**

**Multimode 50  $\mu$ m Core Optical Fiber (OM2, OM3, OM4 & OM5)  
Gigabit Grade**



**SUMITOMO ELECTRIC  
LIGHTWAVE**

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*Sumitomo Electric Lightwave reserves the right to improve or modify these specifications without notice.*

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## 1. GENERAL

This specification covers the design requirements and performance standards for the optical fiber described below. This fiber is used in Sumitomo's optical cables. The features described in this document are intended to provide information on the performance of Sumitomo Electric's optical fiber and aid in handling and use. Refer to the appropriate *cable* specification for details regarding the finished cable's performance.

### 1.1 Fiber Description

Sumitomo's Gigabit Grade 50/125  $\mu\text{m}$  Multimode (MM) optical fiber is a graded index fiber with glass core, glass cladding, and dual acrylate protective coatings. This TIA specified fiber is optimized for operation at both 850 and 1300 nm transmission (OM5 also operates at 953 nm). It is fully compatible with commercially available splicing and connector products and can be spliced to other commercially available 50  $\mu\text{m}$  MM fibers. 50  $\mu\text{m}$  MM fiber is ideal for data and local area networks and is available in four grades, based on maximum gigabit Ethernet link distance requirements (see Section 2.3).

### 1.2 Quality

Sumitomo ensures a high level of quality through ISO / TL 9000 registered Quality Management Systems and our commitment to continuous improvement. Guaranteed, high quality products have been manufactured at Sumitomo's facility in Research Triangle Park, North Carolina since 1984.

### 1.3 Reliability

Sumitomo ensures product reliability through rigorous qualification testing of each product family to meet or exceed industry standards. Both initial and periodic qualification testing are performed to assure the fiber's performance and durability in the field environment.

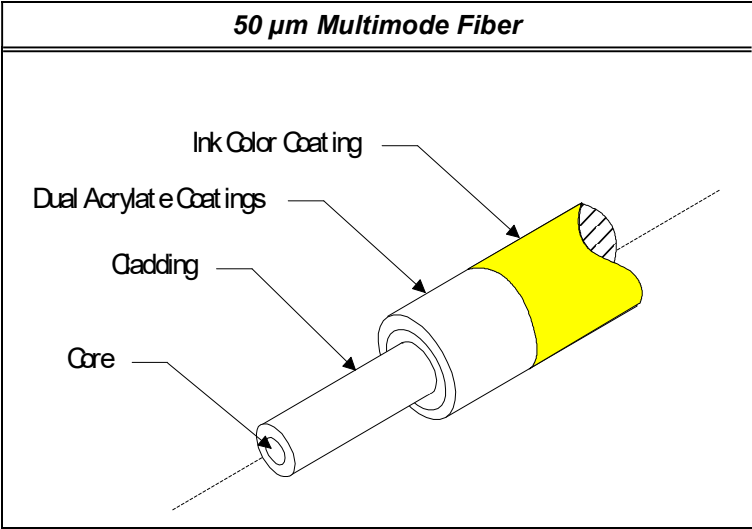
Sumitomo supports industry standards organizations such as Bell Communications Research (Telcordia), Telecommunications Industry Association (TIA), International Telecommunications Union (ITU), International Electrotechnical Commission (IEC), American Society for Testing and Materials (ASTM), Rural Utilities Service (RUS), The Institute of Electrical and Electronics Engineers (IEEE), and Insulated Cable Engineers Association (ICEA).

**2. Multimode Optical Fiber**

**2.1 General Design**

Sumitomo employs 50 μm Multimode (MM) optical fiber manufactured by chemical vapor deposition. This high quality glass has excellent geometry, high strength characteristics, high bandwidth, and low attenuation. The MM fiber is fully compatible with other commercially available MM fibers and is designed for transmission at 850 and 1300 nm wavelengths.

The 50 μm MM fiber is a graded index design. It's optical properties are achieved through a Germanium doped silica based core with a pure silica cladding. A dual acrylate protective coating is applied over the glass cladding to provide the necessary bending and tensile strength required for handling in the field and to ensure maximum fiber lifetime through increased reliability.



**2.2 Construction**

Fiber Region	Property	Test Procedure	Specification	
Glass Fiber	Core	Diameter Non-Circularity Core/Cladding Offset	EIA/TIA-455-58 EIA/TIA-455-45 EIA/TIA-455-45	50 ± 2.5 μm ≤ 5% ≤ 1.5 μm
	Cladding	Diameter Non-Circularity	EIA/TIA-455-45 EIA/TIA-455-45	125 ± 1.0 μm < 1.0 %
Coating	Buffer	Material Inked Diameter	EIA/TIA-455-55	UV-Acrylate 250 ± 15 μm

## 2.3. Optical Characteristics

**50 MICRON MM OM2, OM3, OM4 FIBER & FIBER BUNDLE SPECIFICATIONS**

PROPERTY		SPECIFICATION	
Fiber Bundle Jacket material		Polyethylene Extruded Foam (PEF)	
Fiber Bundle Jacket color		White for OM2 fiber, Aqua for OM3 and OM4	
Core/Cladding diameter		50/125 micron	
Buffer / acrylate diameter		250 micron	
Maximum Attenuation at 850 / 1300 nm		< 2.5 / 1.0 dB/km	
Fiber Bandwidth at 850 / 1300 nm		≥ 500 / 500 MHz*km	
Standard Grade = OM2	Extended Grade = OM3	Maximum Grade = OM4	
Min. Bandwidth (overfilled launch)	Std. Grade	850 nm 1300 nm	500 MHz*km 500 MHz*km
	Ext. Grade	850 nm 1300 nm	1500 MHz*km 500 MHz*km
	Max. Grade	850 nm 1300 nm	3500 MHz*km 500 MHz*km
Min. Gigabit Ethernet Distance	Std. Grade	850 nm 1310 nm	550 m 550 m
	Ext. Grade	850 nm 1310 nm	1000 m 600 m
	Max. Grade	850 nm 1310 nm	1000 m 600 m
Min. 10-Gigabit Ethernet Distance	Std. Grade	850 nm 1310 nm	N/A N/A
	Ext. Grade	850 nm 1310 nm	300 m 300 m
	Max. Grade	850 nm 1310 nm	550 m 300 m
Group Index of Refraction EIA/TIA-455-44 Test Procedure		850 nm 1300 nm	1.483 1.479
Laser EMB @ 850 nm (MHz*km)	Std. Grade	850 nm 1310 nm	N/A N/A
	Ext. Grade	850 nm 1310 nm	2000 m 500 m
	Max. Grade	850 nm 1310 nm	4700 m 500 m
Operation Temperature Range		-40° F to +158° F (-40° C to +70° C) (ICEA 640)	
Minimum Fiber Bundle Bend Radius 2,4, 6, 12, 24		1.5"	
Minimum Fiber Bundle Bend Radius for 48 fiber bundle		2.0"	

**50 MICRON MM OM5 FIBER & FIBER BUNDLE SPECIFICATIONS**

PROPERTY	SPECIFICATION		
Fiber Bundle Jacket material	Polyethylene Extruded Foam (PEF)		
Fiber Bundle Jacket color	Lime Green for OM5 fibers		
Core diameter - micron	50 ±2.5		
Cladding diameter - micron	125 ±1.0		
Buffer / acrylate diameter - micron	250 ±5		
Attenuation (dB / km)	850nm	953nm	1300nm
	≤2.4	≤1.8	≤0.6
Numerical Aperture	0.200 ±0.015		
Overfilled Launch Bandwidth (OFL) MHz-km	850nm	953nm	1300nm
	≥3500	≥1850	≥500
Effective Modal Bandwidth EMB (MHz*km)	850nm	953nm	
	≥4700	≥2470	
Group Index of Refraction (Typ.)	850nm	1300nm	
	1.482	1.477	
Fiber Capacity	100Gbps WDM2		150
	40Gbps WDM2		440
	40GBASE-SR4 / 100GBASE-SR4		200
Operation Temperature Range	-40° F to +158° F (-40° C to +70° C) (ICEA 640)		
Minimum Fiber Bundle Bend Radius 2,4, 6, 12, 24	1.5"		
Minimum Fiber Bundle Bend Radius for 48 fiber bundle	2.0"		

## 2.4 Mechanical Characteristics

<i>50 <math>\mu</math>m Multimode Fiber</i>		
Property	Test Procedure	Specification
Proof-test Stress	EIA/TIA-455-31	100 kpsi
Minimum Bend Radius	Short Term	16.0 mm
	Long Term	37.5 mm

## 3. Testing and Inspection

The optical properties of all fibers are measured prior to cable manufacturing and remain traceable throughout the manufacturing process and the lifetime of the cable.

After cabling, we use statistical process control techniques along with periodic verification to insure 100% compliance to attenuation requirements in each length of cable with bi-directional OTDR at all operating wavelengths. Cable dimensional measurements are also made at final inspection and recorded.

## 4. Installation / Handling Practices

Sumitomo has incorporated a wide range of technical support and training services for our fiber optic cable products into our Technical Support Services (TSS) program. TSS offers training in the areas of cable installation sheath entry, splicing, testing, and system troubleshooting. The services are available in a variety of media formats and can be customized to better accommodate individual training needs. The TSS program consists of an extensive series of recommended procedure documents, training courses with classroom and hands-on instruction, as well as demonstration video tapes. Please contact Sumitomo's Customer Service department for more information.

## 5. Ordering Information

To learn more about Sumitomo's cables or to place an order, call, fax, e-mail, or write us at:

Sumitomo Electric Lightwave Corp  
 201 South Rogers Lane  
 Suite 100, Raleigh, NC 27610  
 Attn: Customer Service Department  
 Phone: 800-358-7378  
       919-541-8100  
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Sumitomo Electric Lightwave reserves the right to improve, enhance, or modify the cable's features and specifications. For special requirements different than those shown above, please contact our Inside Sales Department. Each Sumitomo Electric Lightwave Corp. optic cable and/or its manufacture may be covered by one or more of the following US Patents: 4,715,677 4,729,629 4,763,983 4,770,489 4,828,349 4,953,945 5,043,037 5,082,347 5,165,003 D331,567 5,247,599 5,410,901 5,471,555 5,642,452.