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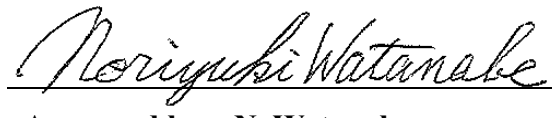
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**SPECIFICATION
FOR
SINGLE-MODE OPTICAL FIBER
(FutureGuide®-Ace)**


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FUJIKURA'S SPECIFICATION FOR SINGLE-MODE OPTICAL FIBER (Fujikura Designation : FutureGuide®-Ace)

1. General

This specification covers a single-mode optical fiber optimized at a wavelength of 1310nm and 1550nm region, but also can be used in the wavelength of 1380nm region, complying with the latest ITU-T recommendation G.652.D and G.657.A1.

Unless otherwise stated, the characteristics below are measured at ambient temperature ($23 \pm 5^{\circ}\text{C}$), following the latest IEC standards.

2. Structural specifications

Typical fiber structure is shown in Fig. 1.

No.	Item	Specified value	Reference standard
2.1	Fiber materials		
2.1.1	Core material	Silica (SiO_2) doped with germanium dioxide (GeO_2)	
2.1.2	Cladding material	Pure silica (SiO_2)	
2.1.3	Coating material	Dual layers of UV-cured acrylate (uncolored).	
2.2	Dimensions		
2.2.1	Mode field diameter at 1310nm at 1550nm	$9.2 \pm 0.4 \mu\text{m}$ $10.4 \pm 0.5 \mu\text{m}$	IEC60793-1-45
2.2.2	Cladding diameter	$125.0 \pm 0.7 \mu\text{m}$	IEC60793-1-20
2.2.3	Coating diameter (uncolored)	$240 \pm 5 \mu\text{m}$	IEC60793-1-21
2.2.4	Core concentricity error	$\leq 0.5 \mu\text{m}$	IEC60793-1-20
2.2.5	Cladding non-circularity	$\leq 0.7 \%$	IEC60793-1-20
2.2.6	Coating-Cladding concentricity error	$\leq 12 \mu\text{m}$	IEC60793-1-21
2.3	Fiber curl radius	$\geq 4.0 \text{ m}$	IEC60793-1-34
2.4	Coloring	Not applicable	

3. Optical specifications

No.	Item	Specified value	Reference standard
3.1	Attenuation		
3.1.1	Attenuation coefficient at 1310nm at 1383nm at 1550nm at 1625nm	≤ 0.32 dB/km ≤ 0.31 dB/km*1 ≤ 0.18 dB/km ≤ 0.20 dB/km	IEC60793-1-40
3.1.2	Attenuation vs. wavelength *2 1285 – 1330nm, ref. λ of 1310nm 1525 – 1575nm, ref. λ of 1550nm	$\alpha \leq 0.03$ dB/km $\alpha \leq 0.02$ dB/km	IEC60793-1-40
3.1.3	Macrobending *3 $\phi=50$ mm, 100 turns at 1310nm, 1550nm and 1625nm $\phi=30$ mm, 10 turn at 1550nm $\phi=30$ mm, 10 turn at 1625nm $\phi=20$ mm, 1 turn at 1550nm $\phi=20$ mm, 1 turn at 1625nm	≤ 0.01 dB ≤ 0.05 dB ≤ 0.30 dB ≤ 0.50 dB ≤ 1.5 dB	IEC60793-1-47
3.1.4	Point discontinuity	No point discontinuity greater than 0.05 dB at either 1310nm or 1550nm in the OTDR trace.	IEC60793-1-40
3.2	Cut off wavelength		
3.2.1	Cable cut-off wavelength λ_{cc}	$\lambda_{cc} \leq 1260$ nm	IEC60793-1-44
3.3	Chromatic dispersion		
3.3.1	Chromatic dispersion coefficient at 1285-1330nm at 1550nm at 1625nm	≤ 3.5 ps/(nm·km) ≤ 18 ps/(nm·km) ≤ 22 ps/(nm·km)	IEC60793-1-42
3.3.2	Zero-dispersion wavelength λ_0	$1302\text{nm} \leq \lambda_0 \leq 1324\text{nm}$	
3.3.3	Zero-dispersion slope S_0	$S_0 \leq 0.092$ ps/(nm ² ·km)	
3.4	Polarization mode dispersion (PMD) *4		
3.4.1	Uncabled fiber PMD coefficient	≤ 0.1 ps/ $\sqrt{\text{km}}$	IEC60793-1-48
3.4.2	Link design value PMD _Q	≤ 0.04 ps/ $\sqrt{\text{km}}$	

Notes:

- *1. The attenuation at 1383nm after hydrogen aging in accordance with IEC60793-2-50.
- *2. The attenuation in a given wavelength range does not exceed the attenuation of the reference wavelength (λ) by more than the value α .
- *3. The induced attenuation due to fiber wrapped around a mandrel of a specified diameter (ϕ).
- *4. This characteristic is guaranteed under the free tension condition only.

4. Mechanical specifications

No.	Item	Specified Value	Reference Standard
4.1	Proof test*	$\geq 1\%$ (100kpsi or 0.69GPa)	IEC60793-1-30

Note:

- * The entire optical fiber length is tested with regard to the tensile strength.

5. Environmental specifications

No.	Item	Specified value	Reference standard
5.1	Environmental specifications	Induced attenuation at both 1310nm, 1550nm and 1625nm	
5.1.1	Temperature dependence * -60 to 85°C	≤ 0.05 dB/km	IEC60793-1-52
5.1.2	Water immersion at 23 ± 2°C	≤ 0.05 dB/km	IEC60793-1-53
5.1.3	Dry heat * at 85 ± 2°C	≤ 0.05 dB/km	IEC60793-1-51
5.1.4	Damp heat 85°C at 85%R.H.	≤ 0.05 dB/km	IEC60793-1-50

Note:

* Reference temperature = 23°C.

6. Performance characteristics

No.	Item	Typical value	Remark
6.1	Core diameter	8.3μm	
6.2	Zero dispersion wavelength	1315nm	
6.3	Zero dispersion slope	0.086 ps/(nm ² ·km)	
6.4	Dynamic stress corrosion susceptibility parameter (n _d)	≥ 20	IEC60793-1-33
6.5	Coating strippability F	1.3N ≤ F ≤ 8.9N	IEC60793-1-32

7. Packing

The available reel lengths are as follows.

Length(km)	8.4	12.6	16.8	21.0	25.2	29.4
	33.6	37.8	42.0	46.2	50.4	

The reel size is standardized by Fujikura Ltd. as shown in Fig. 2 and Fig. 3.

A Fujikura label(s) with the manufacture's name, the production No., the type of fiber and the fiber length are shown on each reel.

Other lengths are also available upon request.

8. Measurement data

If so requested by the customer, fiber data are transmitted electronically and precede each shipment.

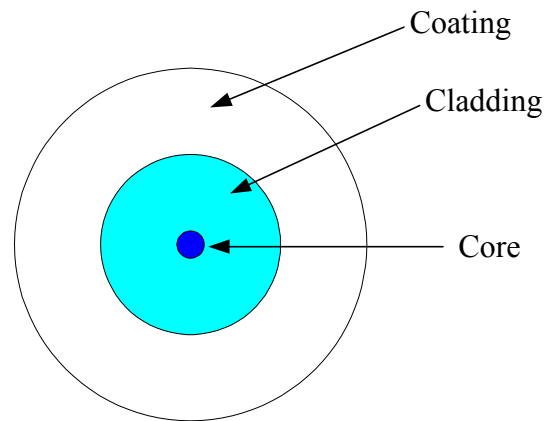


Fig. 1 Structure of UV-cured acrylate fiber

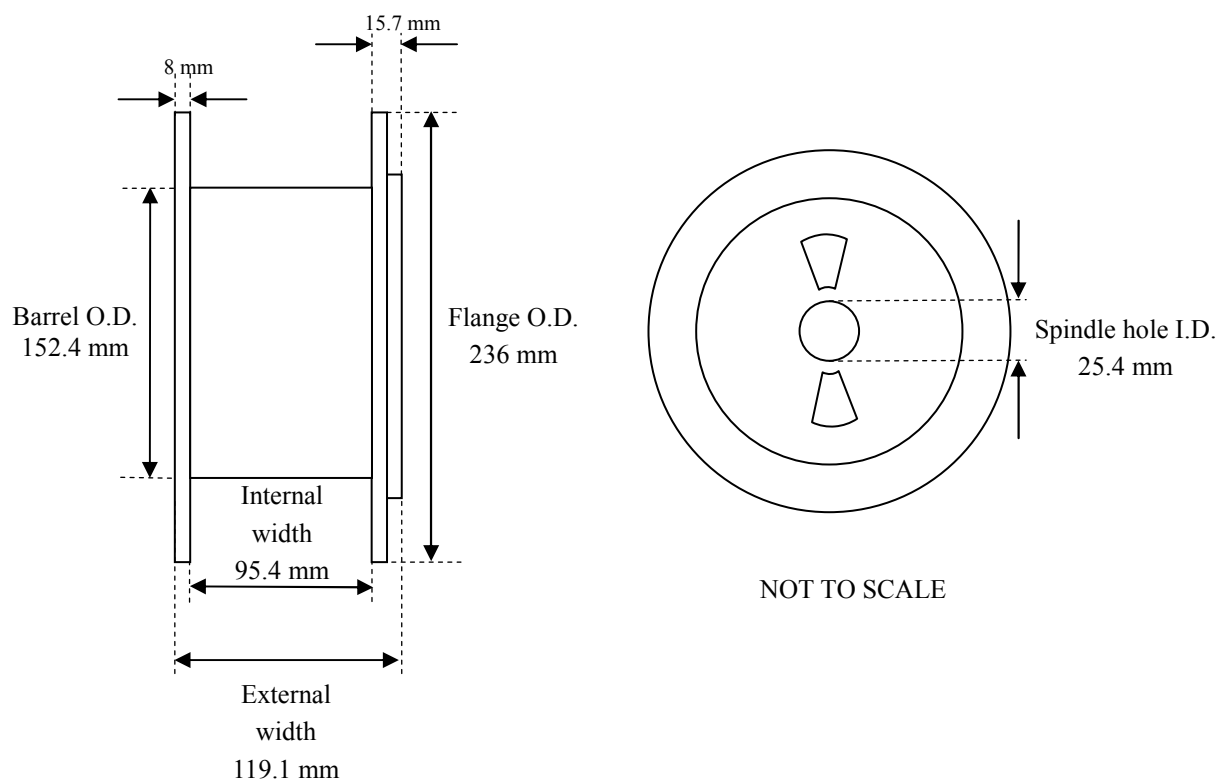


Fig. 2 Fiber Reel (for up to 25.2 km)

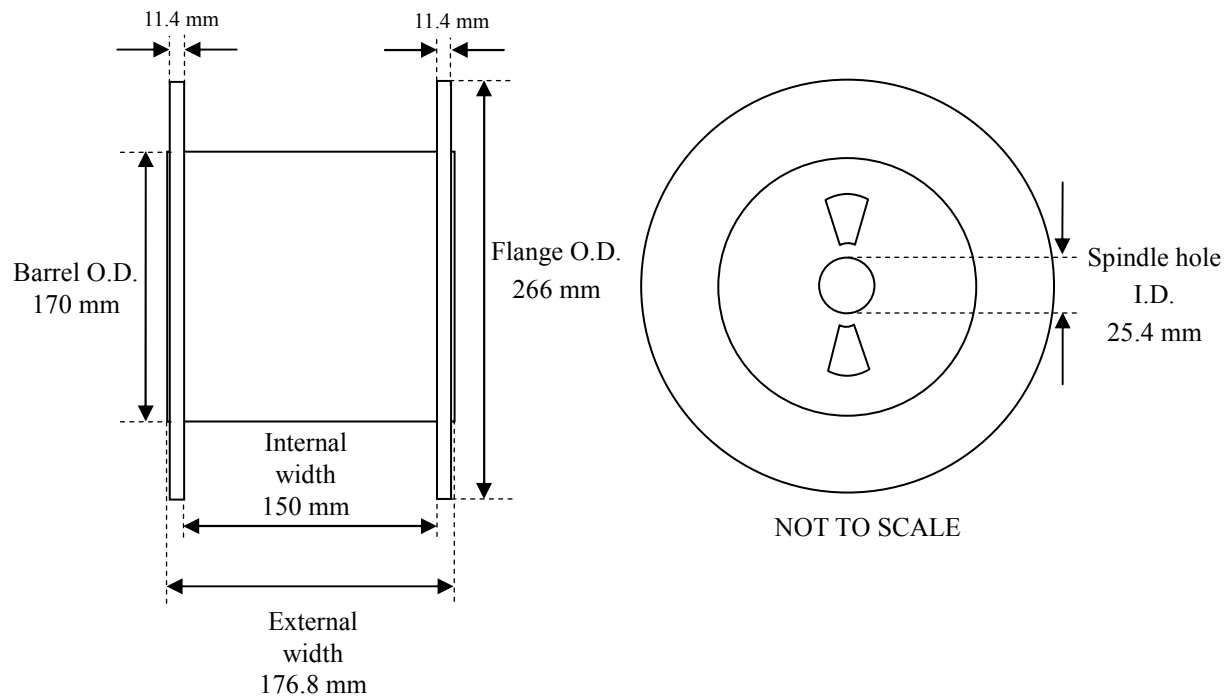


Fig. 3 Fiber Reel (for up to 50.4 km)

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