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**SPECIFICATION
FOR
NON-ZERO DISPERSION SHIFTED
SINGLE-MODE OPTICAL FIBER
(FutureGuide[®]-LA)**

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**FUJIKURA'S SPECIFICATION
FOR
NON-ZERO DISPERSION-SHIFTED
SINGLE-MODE OPTICAL FIBER
(Fujikura Designation: FutureGuide[®]-LA)**

1. General

This specification covers a non-zero dispersion-shifted single-mode optical fiber optimized at a wavelength of 1550nm region complying with the subcategory G.655.D in the ITU-T recommendation G.655 November 2009.

Unless otherwise stated, the following characteristics are measured at ambient temperature ($25 \pm 5^\circ\text{C}$).

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 (Non-colored)	
2.2	Dimensions		
2.2.1	Mode field diameter at 1550nm	$9.6 \pm 0.4 \mu\text{m}$	IEC60793-1-45, First edition 2001-07
2.2.2	Cladding diameter	$125.0 \pm 0.7 \mu\text{m}$	IEC60793-1-20, First edition 2001-09
2.2.3	Coating diameter (non-colored)	$245 \pm 5 \mu\text{m}$	IEC60793-1-21, First edition 2001-08
2.3	Core concentricity error	$\leq 0.6 \mu\text{m}$	IEC60793-1-20, First edition 2001-09
2.4	Cladding non-circularity	$\leq 0.7 \%$	IEC60793-1-20, First edition 2001-09
2.5	Coating-Cladding concentricity error	$\leq 12 \mu\text{m}$	IEC60793-1-21, First edition 2001-08
2.6	Fiber curl radius	$\geq 4.0 \text{ m}$	IEC60793-1-34, Second edition 2006-03
2.7	Coloring	Not applicable	

3. Optical specifications

No.	Item	Specified value	Reference standard
3.1	Attenuation		
3.1.1	Attenuation coefficient at 1550nm at 1625nm	≤ 0.22 dB/km ≤ 0.24 dB/km	IEC60793-1-40, First edition 2001-07
3.1.2	Attenuation vs. wavelength *1 1525 – 1625nm, ref. λ of 1550nm	$\alpha \leq 0.05$ dB/km	IEC60793-1-40, First edition 2001-07
3.1.3	Macrobending *2 $\phi=60$ mm, 100 turns at 1550nm $\phi=60$ mm, 100 turns at 1625nm	≤ 0.05 dB ≤ 0.05 dB	IEC60793-1-47, Third edition 209-03
3.1.4	Attenuation uniformity	No point discontinuity greater than 0.05 dB at 1550nm in the OTDR trace.	IEC60793-1-40, First edition 2001-07
3.2	Cut off wavelength		
3.2.1	Cable cut-off wavelength λ_{cc}	$\lambda_{cc} \leq 1450$ nm	IEC60793-1-44, First edition 2001-07
3.3	Chromatic dispersion		
3.3.1	Chromatic dispersion coefficient at 1460nm (D_{1460}) at 1550nm (D_{1550}) at 1625nm (D_{1625})	$-4.20 \leq D_{1460} \leq 3.29$ ps/(nm·km) $2.80 \leq D_{1550} \leq 6.20$ ps/(nm·km) $5.77 \leq D_{1625} \leq 11.26$ ps/(nm·km)	IEC60793-1-42, Second edition 2007-04
3.3.2	Dispersion slope at 1550nm	≤ 0.092 ps/(nm ² ·km)	
3.4	Polarization mode dispersion (PMD)		
3.4.1	Uncabled fiber PMD coefficient *3	≤ 0.1 ps/ $\sqrt{\text{km}}$	IEC60793-1-48, Second edition 2007-06
3.4.2	Link design value PMD _Q	≤ 0.08 ps/ $\sqrt{\text{km}}$	

Notes:

- *1. The attenuation in a given wavelength range does not exceed the attenuation of the reference wavelength (λ) by more than the value α .
- *2. The induced attenuation due to fiber wrapped around a mandrel of a specified diameter (ϕ).
- *3. 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 0.7GPa)	IEC60793-1-30, Second edition 2010-05

Note:

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

5. Environmental specifications

No.	Item	Specified value	Reference standard
5.1	Environmental specifications	Induced attenuation at both 1550nm and 1625nm	
5.1.1	Temperature dependence * -60 to 85°C	≤ 0.05 dB/km	IEC60793-1-52, First edition 2001-07
5.1.2	Temperature-humidity cycling * -10 to 85°C and 4 to 98%R.H.	≤ 0.05 dB/km	IEC60793-1-52, First edition 2001-07
5.1.3	Water immersion at 23 ± 2°C	≤ 0.05 dB/km	IEC60793-1-53, First edition 2001-07
5.1.4	Dry heat * at 85 ± 2°C	≤ 0.05 dB/km	IEC60793-1-51, First edition 2001-07
5.1.5	Damp Heat * 85°C at 85%R.H.	≤ 0.05 dB/km	IEC60793-1-50, First edition 2001-07

Note:

* Reference temperature = 23°C.

6. Performance characteristics

No.	Item	Typical value	Remark
6.1	Effective Area	65-72 μm^2	ITU-T G.650.2 2007-07
6.2	Effective group index of refraction N_{eff} at 1550nm	1.4691	
6.3	Dynamic stress corrosion susceptibility parameter (n_d)	≥ 20	IEC60793-1-33, First edition 2001-08
6.4	Coating strippability F	$1.3\text{N} \leq F \leq 8.9\text{N}$	IEC60793-1-32, Second edition 2010-05

7. Packing

The available reel lengths are as follows.

Length(km)	4.2	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 shall be standardized by Fujikura Ltd. as shown in Fig. 3 and Fig. 4.

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

Other lengths are also available upon request.

8. Measurement data

If so requested by the customer, fiber data shall be transmitted electrically and precede each shipment.

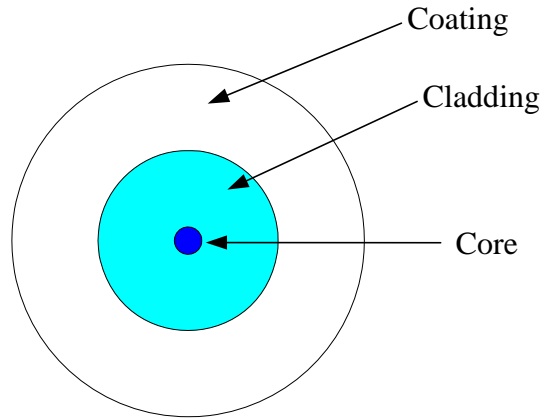


Fig.1 Structure of UV-cured acrylate fiber

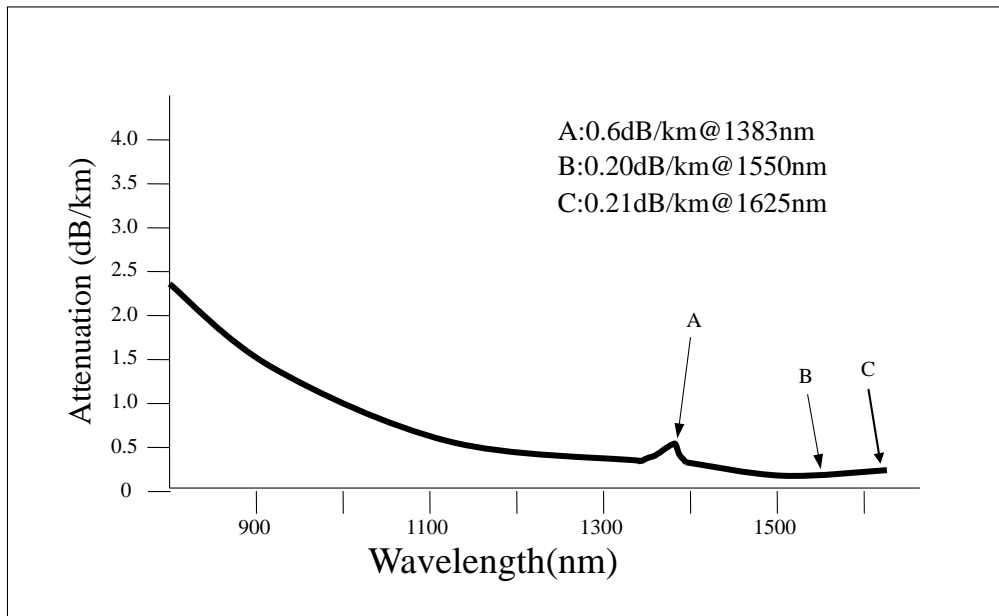


Fig.2 Spectral attenuation (Typical fiber)

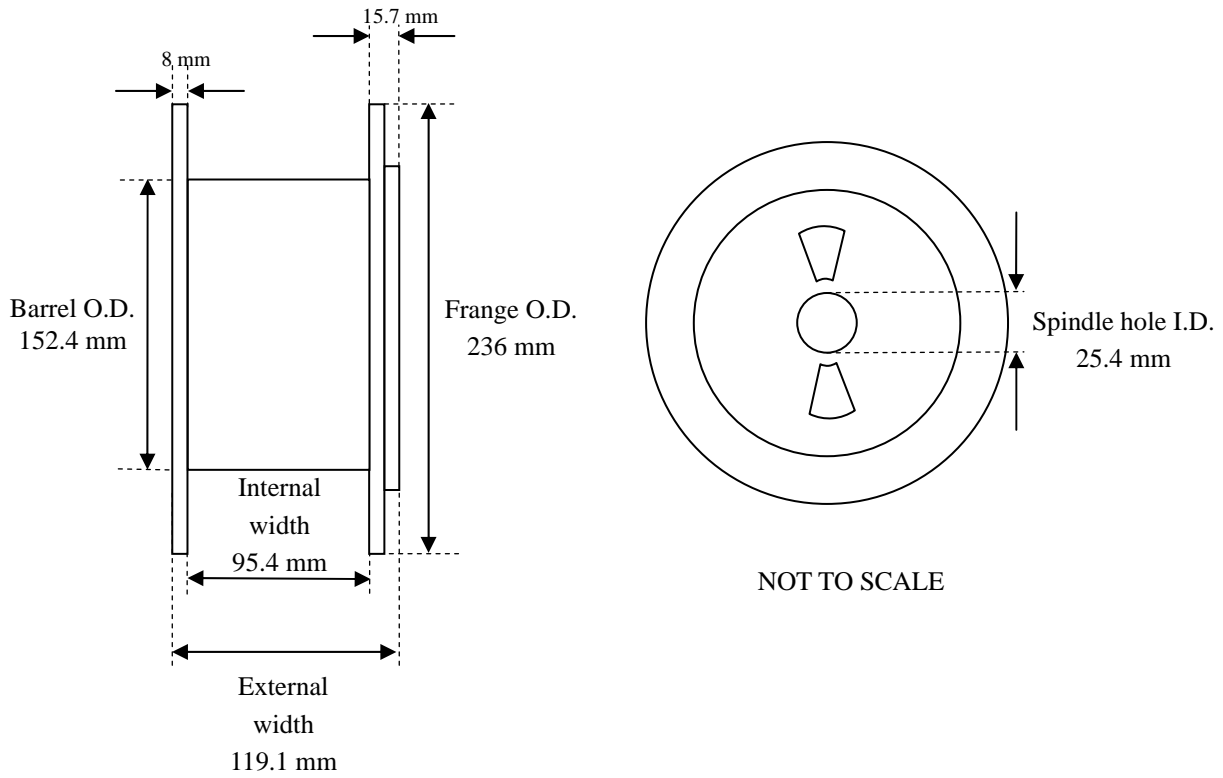


Fig. 3. Fiber Reel (for up to 25.2km)

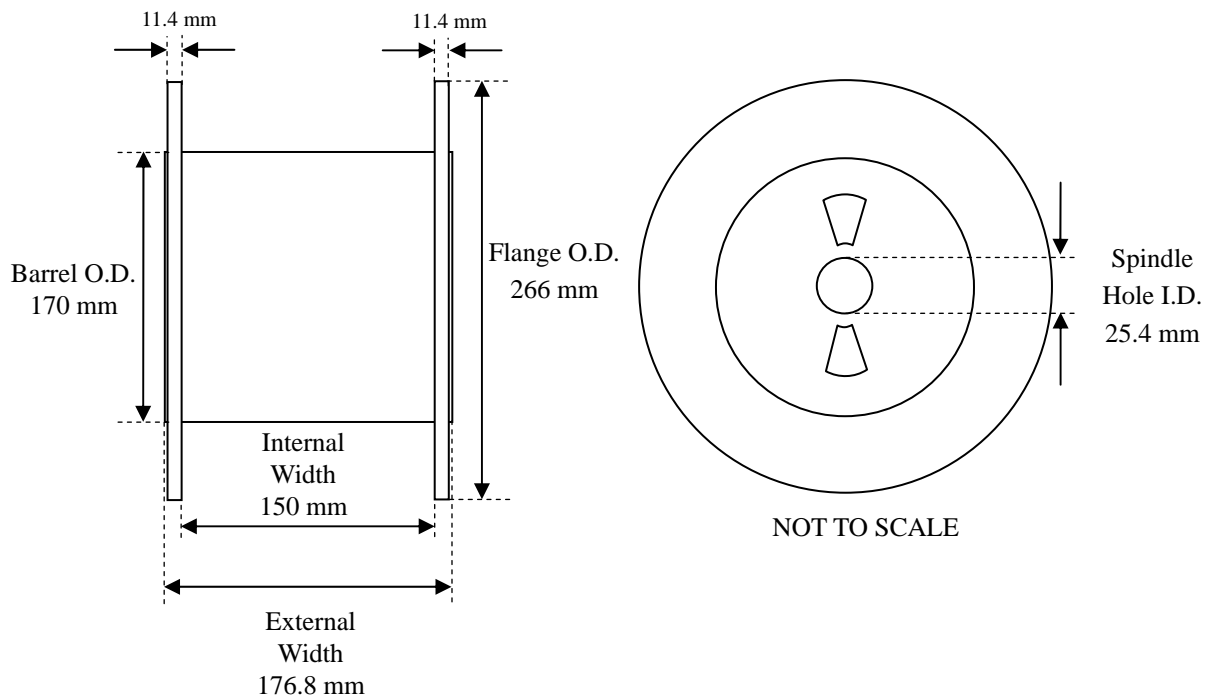


Fig. 4. Fiber Reel (for up to 50.4 km)

++ END OF SPECIFICATION ++