FarBand® Ultra Low Loss and Large Effective Area Single-mode Fibre

Yangtze Optical Fibre and Cable Joint Stock Limited Company

YOFC
Smart Link Better Life.

For the next generation optical transmission network, lower attenuation or larger effective area of the fibre can help the system meet 3U (Ultra high speed, Ultra large capacity, Ultra long-haul) features. Now YOFC can deliver you larger effective area and lower attenuation within one fibre: FarBand® Ultra.

Advantages

- Larger effective area reduces nonlinear effect and enables higher signal power launched into the transmission system.
- Enable higher transmission speeds with more wavelengths over ultra long-haul distances.
- Lower attenuation level which meets the demand of extended long distance transmission
- Reduce number of repeaters and minimize CAPEX and OPEX.
- Lower bending induced loss to meet complicated deployment conditions and cable structures.

Norms

FarBand® Ultra fibre complies with or exceeds the ITU-T G.654.B/E recommendation and IEC 60793-2-50 B1.2 specification.

How to calculate the contribution of larger effective area and lower attenuation?

Based on the formula of OSNR, lower attenuation and larger effective area will increase OSNR of optical transmission system. And FOM (Figure of Merit) is established to calculate the contribution of effective area and attenuation. As shown in the table, YOFC ultra low loss and large effective area fibre can provide greater performance improvement than ultra low loss fibre below, or low loss and large effective fibre.

$$OSNR_{out} = \frac{P_{ch}}{S \cdot P_{ph} \cdot NF \cdot N_{Spans}}$$

$P_{ch} \propto A_{eff}/n_2$

$S \propto$ attenuation α (dB/km)

$$\text{Fiber FOM(dB)} = 10\log\left[\frac{A_{eff}/n_{2ref}}{A_{eff\,ref} \cdot n_2}\right] - [\alpha(\text{dB/km}) - \alpha_{ref}(\text{dB/km})] \cdot L - 10\log\left[\frac{L_{eff}}{L_{eff\,ref}}\right]$$

Increase A_{eff} | Lower Att. | Increase L_{eff}

$$L_{eff} - \frac{1-e^{-aT}}{\alpha}$$

$$\alpha = \frac{\ln 10}{10}\alpha_{dB/km}$$

Fibre Type	Att.	Aeff.	FOM
SSMF(Ref.)	0.2	80	/
LL	0.18	80	1.6
ULL	0.17	80	2.3
ULL	0.15	80	3.8
LL-LAF	0.18	130	4.9
ULL-LAF	0.16	110	5.8
ULL-LAF	0.16	130	6.4

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Characteristics		Conditions	Specified values		Units
Optical Specifications					
Nominal Effective Area		1550nm	110	125	[μm²]
Mode Field Diameter		1550nm	11.4-12.2	12.0-13.0	[μm]
Attenuation		1550nm	≤0.17		[dB/km]
		1625nm	≤0.20		[dB/km]
Attenuation vs. Wavelength Max. α Difference		1525-1575nm, in reference to 1550nm	≤0.02		[dB/km]
		1550-1625nm, in reference to 1550nm	≤0.03		[dB/km]
Dispersion Coefficient		1550nm	≤23		[ps/nm·km]
		1625nm	≤27		[ps/nm·km]
Dispersion Slope		1550nm	0.050- 0.070		[ps/nm²·km]
PMD	Maximum Individual Fibre	--	≤0.1		[ps/√km]
	Link Design Value (M=20, Q=0.01%)	--	≤0.06		[ps/√km]
	Typical Value	--	0.04		[ps/√km]
Cable Cutoff Wavelength (λ_{cc})		--	≤1520		[nm]
Effective Group Index of Refraction		1550nm	1.463	1.465	--
Point Discontinuities		1550nm	≤0.05		[dB]
Geometrical Specifications					
Cladding Diameter		--	125.0±1.0		[μm]
Cladding Non-Circularity		--	≤1.0		[%]
Coating Diameter		--	235- 255		[μm]
Coating-Cladding Concentricity		--	≤12		[μm]
Coating Non-Circularity		--	≤6		[%]
Core-Cladding Concentricity		--	≤0.6		[μm]
Fibre Curl (Radius)		--	≥4		[m]
Delivery Length[1]		--	Up to 25.2		[km/reel]
Environmental Specifications			**@1550nm & 1625nm**		
Temperature Dependence		-60°C to +85°C	≤0.05		[dB/km]
Temperature-Humidity Cycling		-10°C to +85°C, 98% RH	≤0.05		[dB/km]
Water Immersion		23°C, for 30 days	≤0.05		[dB/km]
Damp Heat		85°C , 85% RH, for 30 days	≤0.05		[dB/km]
Heat Aging		85°C, 30 days	≤0.05		[dB/km]
Mechanical Specificationss					
Proof Test[2]		--	≥9.0		[N]
		--	≥1.0		[%]
		--	≥100		[kpsi]
Macro-bend Induced Loss	100 Turns Around a Mandrel of 30 mm Radius	1550nm	≤0.10		[dB]
		1625nm	≤0.10		[dB]
Coating Strip Force		typical average force	1.5		[N]
		peak force	1.3- 8.9		[N]
Dynamic Fatigue Parameter (n_d)		--	≥20		--

Remark: 1.Other delivery lengths are available. 2.Higher proof test level is available.