

Specialty Fibre for Harsh Environment



Radiation Resistant Fibre

Radiation Resistant Single-mode Fibre

In order to meet the special application requirements of optical fibre in the radiation environment, YOFC has developed radiation resistant single-mode fibres by adjusting the glass composition of optical fibre and improving the process technology. Such fibres feature fully optimized waveguide characteristics at the 1,310nm and 1,550nm operating wavelengths, as well as very low attenuation and dispersion.

Product Process

- YOFC optical fibres are manufactured using the PCVD process. Due to a special glass composition and post-treatment process, these optical fibres exhibit excellent radiation resistance at the 1,310nm and 1,550nm operating wavelengths. The radiation resistant single-mode fibre manufactured using the PCVD process features a precise refractive index profile, ensuring excellent geometric, attenuation, and dispersion characteristics of the optical fibre.

Features

- Low attenuation and low dispersion, meeting the operating requirements of communication window
- Excellent protection properties and excellent strip force stability of the coating
- Accurate geometrical parameters, ensuring low splicing loss and high splicing efficiency
- Low radiation induced attenuation

Applications

- Atomic energy
- Medical care
- Petroleum
- Natural gas
- Scientific research

Specifications

Fibre type	Wavelength (nm)	Condition	RD1310-G2 (HT)	RDSM-G3	RDSM-G3(YH)	RDSM-G3(HD)
Part No.			RD1311-D	RD1012-A	RD1012-B	RD1012-C
Optical properties						
Attenuation (dB/km)	1310	-	≤0.45	≤0.4	≤0.4	≤0.4
	1550	-	≤0.3	≤0.3	≤0.3	≤0.3
Zero dispersion wavelength (nm)	-	-	1287 ~ 1337	1300 ~ 1324	1300 ~ 1324	1300 ~ 1324
Zero dispersion slope (ps/(nm ² ·km))	-	-	≤0.1	≤0.091	≤0.091	≤0.091
Maximum value of a single fibre (ps/km)	-	-	≤0.2	≤0.2	≤0.2	≤0.2
Fibre link design value (M=20, Q=0.01%)(ps/km)	-	-	≤0.2	≤0.2	≤0.2	≤0.2
Cable cutoff wavelength (λ _{cc}) (nm)	-	-	≤1290	≤1260	≤1260	≤1260
Mode field diameter (μm)	1310	-	7.5 ~ 9.5	8.6 ~ 9.6	8.6 ~ 9.5	8.6 ~ 9.5
	1550	-	8.0 ~ 10.0	9.6 ~ 10.9	9.9 ~ 10.9	9.6 ~ 10.9
Geometrical properties						
Cladding diameter (μm)	-	-	125±1.0	125±1.0	124.5±0.4	125±1.0
Cladding non-circularity (%)	-	-	≤0.7	≤1.0	≤1.0	≤1.0
Coating diameter (μm)	-	-	245.0±10.0	245.0±10.0	250.0±5.0	245.0±10.0
Coating/cladding concentricity error (μm)	-	-	≤12.0	≤12.0	≤8.0	≤12.0
Coating non-circularity (%)	-	-	≤6.0	≤6.0	≤6.0	≤6.0
Core/cladding concentricity error (μm)	-	-	≤0.6	≤1.0	≤0.6	≤1.0
Curl (radius) (m)	-	-	≥2.0	≥2.0	≥2.0	≥2.0
Environmental properties						
Temperature-humidity cycling induced attenuation (dB/km)	1310, 1550	-10°C-85°C, 98% RH	≤0.1	≤0.1	≤0.1	≤0.1
Temperature dependence induced attenuation (dB/km)		-65°C~+85°C	≤0.1	≤0.1	≤0.1	≤0.1
Watersoak dependence induced attenuation (dB/km)		23°C, 30 days	≤0.1	≤0.1	≤0.1	≤0.1
Damp heat dependence induced attenuation (dB/km)		85°C, 85% RH, 30 days	≤0.1	≤0.1	≤0.1	≤0.1
Dry heat aging (dB/km)		85°C, 30 days	≤0.1	≤0.1	≤0.1	≤0.1
Temperature shock test (dB/km)		-70°C~+125°C, ≥40°C/min, 5 cycles	-	-	≤0.3	-
Storage temperature test (dB/km)		120 hours at -70°C; 120 hours at 125°C	-	-	≤0.3	-
Temperature cycle test (dB/km)		-70°C~+125°C, 2~5°C/min, 5 cycles	-	-	≤0.3	-
Macro-bending performance						
Bending radius	-	Number of turns	-	-	-	-
30mm	1310	100	-	≤0.1	≤0.1	≤0.1
	1550		-	≤0.5	≤0.5	≤0.5
Mechanical performance						
Proof test level (kpsi)	-	Off-line	≥100	≥100	≥100	≥100
Coating strip force (N)	-	Average value	1.0 ~ 5.0	1.0 ~ 5.0	1.0 ~ 5.0	1.0 ~ 5.0
	-	Peak value	1.3 ~ 8.9	1.3 ~ 8.9	1.3 ~ 8.9	1.3 ~ 8.9
Dynamic fatigue parameter (n _f)	-	-	≥20	≥20	≥20	≥20
Radiation resistance						
Test according to TIA/EIA 455-64 (dB/100m)	1310	Induced attenuation under continuous radiation conditions with a total dose of 50 Krad and a dose rate of 0.1 rad/s (at 25°C)	-	≤0.3	≤0.3	≤0.3
	1310, 1550	Induced attenuation under continuous radiation conditions with a total dose of 2,000 Gy and a dose rate of 0.5 Gy/s (at 25°C)	≤0.9	≤0.8	≤0.8	≤0.5
	1310	Induced attenuation under continuous radiation conditions with a total dose of 200,000 Gy and a dose rate of 0.5 Gy/s (at 25°C)	≤2.0	≤1.5	≤1.5	≤1.0
	1550	Induced attenuation under continuous radiation conditions with a total dose of 200,000 Gy and a dose rate of 0.5 Gy/s (at 25°C)	≤2.5	≤2.0	≤2.0	≤1.5
	1310	Induced attenuation under continuous radiation conditions with a total dose of 1 MCy and a dose rate of 1.25 Gy/s (at 25°C)	-	-	-	~ 1.2
	1550	Induced attenuation under continuous radiation conditions with a total dose of 1 MCy and a dose rate of 1.25 Gy/s (at 25°C)	-	-	-	~ 1.8



Radiation Resistant Multi-mode Fibre(RRF)

In order to meet the special application requirements of optical fibre in the radiation environment, YOFC has developed radiation resistant multi-mode fibres by adjusting the glass composition of optical fibre and improving the process technology. Such fibres feature fully optimized waveguide characteristics at the 850nm and 1300nm operating wavelengths, as well as very low attenuation and high bandwidth.

Product process

- YOFC optical fibres are manufactured using the PCVD process. Due to a special glass composition and post-treatment process, these optical fibres exhibit excellent radiation resistance at the 850nm and 1,300nm operating wavelengths. The radiation resistant multi-mode fibre manufactured using the PCVD process features a precise refractive index profile, ensuring excellent geometric, attenuation, and bandwidth characteristics of the optical fibre.

Product Standard

- The YOFC radiation resistant multi-mode fibre meets or is superior to ITU-T.G651 and IEC60793-2-10 type A1a optical fibre specifications.

Features

- Very stable loss in the radiation environment
- High bandwidth and low attenuation at 850 nm and 1,300 nm
- Excellent strip force stability and splicing performance
- Suitable for various cabling structures, favorable for tight/loose tubes

Applications

- Atomic energy industry
- Oil and submarine prospecting
- Medical equipment
- Basic research

Specifications

Fibre type			RDG 50/125
Part No.			RD2011-A
Optical propertiesaa			
Attenuation @ 850/1300 nm (dB/km)			≤2.5/≤1.0
Bandwidth @ 850/1300 nm (MHzkm)			≥500/≥500
NA			0.200±0.015
Geometrical properties			
Core diameter of optical fibre (μm)			50.0±2.5
Cladding diameter (μm)			125.0±1.0
Coating diameter (μm)			245.0±10.0
Core/cladding concentricity error (μm)			≤1.5
Core non-circularity (%)			≤6
Coating/cladding concentricity error (μm)			≤12.0
Cladding non-circularity (%)			≤1.0
Delivery length (km)			1.1 ~ 8.8
Material			
Core material			F-doped glass
Cladding material			F-doped glass
Coating material			Dual-layer, UV-cured acrylate
Environmental properties			
Item	Wavelength (nm)	Condition	-
Temperature-humidity cycling induced attenuation (dB/km)	850, 1300	-10°C ~ 850°C, 98%RH	≤0.2
Temperature dependence induced attenuation (dB/km)		-60°C ~ 85°C	≤0.2
Watersoak dependence induced attenuation (dB/km)		23°C, 30 days	≤0.2
Damp heat dependence induced attenuation (dB/km)		85°C, 85% RH, 30 days	≤0.2
Dry heat aging (dB/km)		85°C, 30days	≤0.2
Mechanical properties			
Proof test level (kpsi)		Off-line	≥75
Coating strip force (N)		Average value	1.0 ~ 5.0
		Peak value	1.3 ~ 8.9
Dynamic fatigue parameter (n _d)		-	≥20
Radiation resistance			
• Test according to TIA/EIA 455-64 (dB/100m)	Wavelength (nm)	Condition	-
	1300	Induced attenuation under continuous radiation conditions with a total dose of 310 KGy and a dose rate of 750 Gy/s (at 25°C)	≤2.5

^aRelative humidity "X1%" means that the humidity data at -10°C is uncontrollable.

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