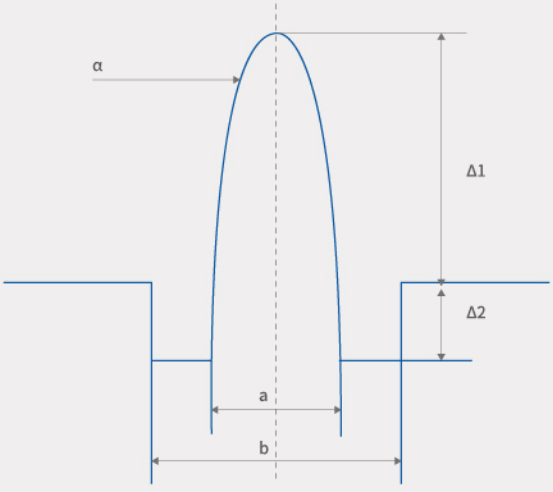
High Nonlinear Optical Fibre (HNLF)

The non-linear effects of optical fibre, such as stimulated Raman scattering (SRS), stimulated Brillouin scattering (SBS), and the optical Kerr effect, find numerous applications in the fields of communications and optical signal processing. In the Kerr effect, the refractive index of optical dielectric materials changes with optical power, triggering a series of secondary effects, such as self-phase modulation (SPM), cross phase modulation (XPM), four-wave mixing (FWM), and non-steady state modulation. The Kerr effect finds applications in optical parametric amplification, frequency conversion, phase coupling, pulse compression and generation, as well as optical soliton transmission.

When designing the high nonlinear optical fibre (HNLF), considerations shall include the following: First, ensure a higher nonlinear coefficient for sufficient non-linear effect. Second, ensure lower loss to increase the effective length (Leff). Third, align dispersion characteristics to cater to different applications. Finally, maintain low polarization mode dispersion (PMD) in the optical fibre. For silica-based HNLF, the design of the refractive index profile plays an important role in order to meet the aforementioned requirements. In the design of HNLF, it is essential to simultaneously implement a small core effective area (Aeff), a low dispersion slope, and much smaller cut-off wavelengths than the operating wavelength.

The HNLF is independently developed and produced by YOFC, featuring a high nonlinear coefficient and a very low dispersion slope. With a flexible W-type profile design, an inner cladding with a low refractive index is set around the step-index core.



Refractive index profile sketch

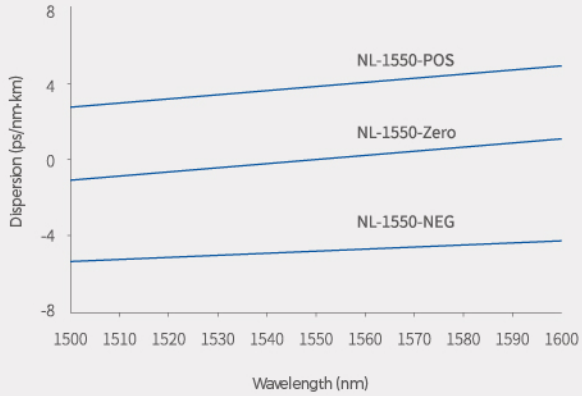
Features

- Higher nonlinear coefficient
- Adjustable zero dispersion wavelength in S-band, C-band and L-band
- Lower loss and dispersion slope
- Small additional loss in splicing with common single-mode optical fibre

Applications

- Parametric amplification
- Wavelength conversion
- Pulse compression
- Supercontinuum source
- Light regenerator
- Discrete type (or lumped type) Raman amplifier

Typical dispersion test curves for three types of HNLF



Specifications

Fibre type	NL 1550-POS	NL 1550-Zero	NL 1550-NEG
Part No.	NL1016-A	NL1016-B	NL1016-C
Optical properties			
Operating wavelength	C-Band	C-Band	C-Band
Dispersion slope @ 1,550 nm (ps/nm²·km)	<0.035	<0.035	<0.035
Dispersion @ 1,550 nm (ps/nm·km)	>1	0.0±1	<-1
Nonlinear coefficient @ 1,550 nm (W^{-1} km^{-1})	⩾10	⩾10	⩾10
Attenuation Coefficient @ 1550nm(dB/km)	⩽1.5	⩽1.5	⩽1.5
Fibre cutoff wavelength (nm)	<1480	<1480	<1480
NA (typical value)	0.35	0.35	0.35
Geometrical properties			
Cladding diameter (μm)	125.0±5.0	125.0±5.0	125.0±5.0
Cladding non-circularity (%)	⩽1.0	⩽1.0	⩽1.0
Core/Cladding concentricity error(μm)	⩽0.5	⩽0.5	⩽0.5
Coating diameter (μm)	245.0±10.0	245.0±10.0	245.0±10.0

- Provide optical fibre splicing support

- 010020 Version No. 202506