



LSWC series Central Loose Tube Steel Wire Armored Cable

Fire Performances

General

Flame Retardant	IEC60332-1, IEC60332-2, IEC60332-3
Low smoke capacity	Low Smoke Zero Halogen (LSZH)
Oxygen Index Testing Method	ASTMD-2863
Halogen Free	IEC60754-1

Specifications

General

Flame Rating	LSZH	
Fiber Category	Singlemode / Multimode	
Fiber Count	6 - 24	
Temperature Range :	Installation	-20°C to +50°C
	Operation	-40°C to +60°C
	Storage	-50°C to +70°C
Cable bending radius	10 x cable diameter (static)	
	20 x cable diameter (dynamic)	
Cable Design		
Tube diameter	Φ 3.2 mm	
Steel wire diameter	12*Φ 1.0 mm	
Sheath thickness (nominal*)	2.0 mm	
Cable diameter (nominal**)	Φ 10.1 mm	
Outer Jacket Colour	Black or dark grey or dark blue	

* The nominal sheath thickness may vary by ±0.2mm.

** The nominal outer diameter may vary by ±0.4mm.

Fiber Specifications (Singlemode)

Characteristics		G652D	G657A1	G657A2
Optical Characteristics				
Attenuation	1310nm	≤ 0.40 dB/km	≤ 0.40 dB/km	≤ 0.40 dB/km
	1383nm*	≤ 0.34 dB/km	≤ 0.35 dB/km	≤ 0.35 dB/km
	1460nm*	-	≤ 0.25 dB/km	≤ 0.25 dB/km
	1490nm*	-	-	≤ 0.23 dB/km
	1550nm	≤ 0.30 dB/km	≤ 0.30 dB/km	≤ 0.30 dB/km
	1625nm*	≤ 0.23 dB/km	≤ 0.23 dB/km	≤ 0.23 dB/km
	1285-1330nm*	≤ 0.03 dB/km	≤ 0.03 dB/km	≤ 0.03 dB/km
Max. α difference	1525-1575nm*	≤ 0.02 dB/km	≤ 0.02 dB/km	≤ 0.02 dB/km
Dispersion coefficient	1285-1340nm	≥ -3.4 ≤ 3.4 ps/(nm · km)	≥ -3.4 ≤ 3.4 ps/(nm · km)	-
	1550nm	≤ 18 ps/(nm · km)	≤ 18 ps/(nm · km)	-
	1625nm	≤ 22 ps/(nm · km)	≤ 22 ps/(nm · km)	-
Zero dispersion wavelength		1312±12 nm	1300-1324 nm	1300-1324 nm
Zero dispersion slope		≤ 0.091 ps/nm ² · km	≤ 0.092 ps/nm ² · km	≤ 0.092 ps/nm ² · km
Typical value		0.086 ps/nm ² · km	0.086 ps/nm ² · km	0.04 ps/nm ² · km
PMD				
Maximum Individual Fibre		≤ 0.1 ps/√km	≤ 0.1 ps/√km	≤ 0.1 ps/√km
Link Design Value(M=20,Q=0.01%)		≤ 0.06 ps/√km	≤ 0.06 ps/√km	≤ 0.06 ps/√km
Typical value		0.04 ps/√km	0.04 ps/√km	0.04 ps/√km
Cable cutoff wavelength λ _{cc}		≤ 1260 nm	≤ 1260 nm	≤ 1260 nm
Mode field diameter(MFD)	1310nm	8.7-9.5 μm	8.4-9.2 μm	8.4-9.2 μm
	1550nm	9.9-10.9 μm	9.3-10.3 μm	9.3-10.3 μm
Effective group index of refraction(Neff)	1310nm	1.466	1.466	1.466
	1550nm	1.467	1.467	1.467
Point discontinuities	1310nm	≤ 0.05 dB	≤ 0.05 dB	≤ 0.05 dB
	1550nm	≤ 0.05 dB	≤ 0.05 dB	≤ 0.05 dB
Geometrical Characteristics				
Fiber Core Diameter		9 +/-1μm	9 +/-1μm	9 +/-1μm
Cladding diameter		125.0±0.7 μm	125.0±0.7 μm	125.0±0.7 μm
Cladding non-circularity		≤ 1.0 %	≤ 0.7 %	≤ 0.7 %
Coating diameter		245.0±7 μm	245.0±5 μm	245.0±5 μm
Coating-cladding concentricity error		≤ 12.0 μm	≤ 12.0 μm	≤ 12.0 μm
Coating non-circularity		≤ 6.0 %	≤ 6.0 %	≤ 6.0 %
Core-cladding concentricity error		≤ 0.6 μm	≤ 0.5 μm	≤ 0.5 μm
Curl(radius)		≥ 4 m	≥ 4 m	≥ 4 m
Delivery length		2.1 to 50.4 km/reel	2.1 to 50.4 km/reel	2.1 to 50.4 km/reel

*Attenuation loss of barefiber

Fiber Specifications (Multimode)

Characteristics		62.5/125 (OM1)	50/125 (OM2)	OM3/OM4	OM5
Geometry Characteristics					
Core Diameter		62.5±2.5 μm	50±2.5 μm	50±2.5 μm	50±2.5 μm
Core Non-circularity		≤ 5.0 %	≤ 5.0 %	≤ 5.0 %	≤ 5.0 %
Cladding Diameter		125.0±1.0 μm	125.0±1.0 μm	125.0±1.0 μm	125.050±1.0 μm
Cladding Non-circularity		≤ 1.0 %	≤ 1.0 %	≤ 0.6 %	≤ 0.6 %
Coating Diameter		245±7 μm	245±7 μm	245±7 μm	245±7 μm
Coating/Cladding Concentricity Error		≤ 10.0 μm	≤ 10.0 μm	≤ 10.0 μm	≤ 10.0 μm
Coating Non-circularity		≤ 6.0 %	≤ 6.0 %	≤ 6.0 %	≤ 6.0 %
Core/Cladding Concentricity Error		≤ 1.5 μm	≤ 1.5 μm	≤ 1.0 μm	≤ 1.0 μm
Delivery Length		up to 17.6 km/reel	up to 17.6 km/reel	up to 8.8 km/reel	up to 8.8 km/ reel
Optical Characteristics					
Attenuation	850nm	≤ 3.5 dB/km	≤ 3.5 dB/km	≤ 3.5 dB/km	≤ 3.5 dB/km
	953nm*	-	-	-	≤ 1.7 dB/km
	1300nm	≤ 1.5 dB/km	≤ 1.5 dB/km	≤ 1.5 dB/km	≤ 1.5 dB/km
Overfilled Modal Bandwidth	850nm	≥ 200 MHz · km	≥ 500 MHz · km	≥ 1500/ ≥ 3500 MHz · km	≥ 3500 MHz · km
	953nm	-	-	-	≥ 1850 MHz · km
	1300nm	≥ 500 MHz · km	≥ 500 MHz · km	≥ 500/ ≥ 500 MHz · km	≥ 500 MHz · km
Effective Modal Bandwidth	850nm	-	-	≥ 2000/ ≥ 4700 MHz · km	≥ 4700 MHz · km
	953nm	-	-	-	≥ 2470 MHz · km
10Gb/sWDM		-	-	-100/150 m	150 m
40Gb/sWDM		-	-	300/500 m	440 m
40GBASE-SR4 / 100GBASE SR10	850nm	-	-	1000/1100 m	200 m
10GBASE-SR	850nm	-	-	-	-
1000BASE-SR	850nm	-	-	-	-
DMD Specification					
Numerical Aperture		0.275±0.015	0.200±0.015	0.200±0.015	0.200±0.015
Group Refractive index		1,496	1,482	1,482	1,482
		1,491	1,477	1,477	1,477
Zero Dispersion Wavelength, λ ₀		1320-1365 nm	1295-1340 nm	1295-1340 nm	1297-1328 nm
Zero Dispersion Slope,S ₀		-	-	-	≤ 4(-103)/(840λ√840) ⁴)
		-	-	-	ps/nm ² · km
Zero Dispersion Slope,S ₀₁	1295nm ≤ λ ₀ ≤ 1310nm	-	≤ 0.105 ps/nm ² · km	≤ 0.105 ps/nm ² · km	-
	1310nm ≤ λ ₀ ≤ 1340nm	-	≤ 0.000375/(1590-λ ₀) ps/nm ² · km	-	-
	1320nm ≤ λ ₀ ≤ 1348nm	≤ 0.11 ps/nm ² · km	-	≤ 0.000375/(1590-λ ₀)ps/nm ² · km	-
	1348nm ≤ λ ₀ ≤ 1365nm	≤ 0.001(1458-λ ₀) ps/nm ² · km	-	-	-

*Attenuation loss of barefiber

Fiber Color Code

Fiber Color Code per loose tube for 6-24 core cable

No .	1	2	3	4	5	6
Color	Blue	Orange	Green	Brown	Gray	White
No .	7	8	9	10	11	12
Color	Red	Black	Yellow	Violet	Pink	Aqua
No .	13	14	15	16	17	18
Color	Blue +M	Orange +M	Green +M	Brown +M	Gray+M	White +M
No .	19	20	21	22	23	24
Color	Red +M	Natural+M	Yellow +M	Violet +M	Pink+M	Aqua +M

* "M" means marking

Mechanical & Environmental Characteristics

Item	Test Method	Acceptance Condition
Tensile Strength	Load: 3,000 N	Loss change \leq 0.1 dB @1550 nm
IEC 794-1-E1	Length of cable under load: 50 m	No fiber break and no sheath damage
Crush Test	Load: 2,000 N/100 mm	Loss change \leq 0.1 dB @1550 nm
IEC 794-1-E3	Load time: \geq 1min	No fiber break and no sheath damage.
Impact Resistance	Points of impact: 5	Loss change \leq 0.1 dB @1550 nm
IEC 794-1-E4	Times of per point: 5	No fiber break and no sheath damage.
	Impact energy: 4.5 nm	
	Radius of hammer head: 12.5mm	
	Impact rate: 2 sec/cycle	
Repeated Bending	Bending radius: 20 x cable dia.	Loss change \leq 0.1 dB @1550 nm
IEC 794-1-E6	Load: 150 N	No fiber break and no sheath damage.
	Flexing rate: 3 sec/cycle	
	No. of cycle: 30	
Torsion	Length: 1 m	Loss change \leq 0.1 dB @1550 nm
IEC 794-1-E7	Load: 150 N	No fiber break and no sheath damage.
	Twist rate: 1 min/cycle	
	Twist angle: \pm 180°	
	No. of cycle: 10	
Water Penetration Test	Height of water: 1 m	No water shall have leaked
IEC 794-1-F5B	Sample length: 3 m	from the opposite end of cable.
	Test time: 24 hours	
Temperature Cycling	Temperature step:	Loss change \leq 0.1 dB @1550 nm
Test	+20°C \rightarrow -40°C \rightarrow +60°C \rightarrow +20°C	No fiber break and no sheath damage.
IEC 794-1-F1	Time per each step: 12 hrs	
	Number of cycles: 2	
Compound Flow	Sample length: 30 cm	No compound flow
IEC 794-1-E14	Temp: 70°C \pm 2°C	
	Time: 24 hours	
Sheath High Voltage	On line test	No sheath breakdown
Test	9t KV (t-sheath thickness)	

Ordering Information

* Ordering Code Example

