

Tender No. :	Spec. No. : LSGS-25-OC0451-00
User / Customer :	Page No. : 1 of 7
Tender Title :	
Bidder : LGCE	

Document Title :

Specification

For

Fiber Optic Cable

Gel filled Loose Tube / Dry Core

Single Jacket / Non-Armored

Rev. No.	Date	Descriptions	Prepared By	Reviewed By	Approved By

1. SCOPE

This specification covers the general requirements of loose tube fiber optic telecommunication cables for outdoor applications.

2. OPTICAL FIBER

The optical, geometrical, mechanical and environmental performance of the optical fiber shall be in accordance with Table 1 below.

Table 1. Performance of the single mode fiber (ITU-T G.652.D)

ITEMS	UNITS	SPECIFICATION
Attenuation at 1310/1383/1550 nm	dB/km	$\leq 0.36 / \leq 0.35 / \leq 0.22$
CD ¹ at 1285~1330/1550 nm	ps/nm.km	$\leq 3.5 / \leq 18$
Zero Dispersion Wavelength	nm	1300 ~ 1324
Zero Dispersion Slope	ps/nm ² .km	0.073 ~ 0.092
Cable PMD (PMD _Q)	ps/√km	≤ 0.2 (20 section link)
Cut-off wavelength (λ_{cc})	nm	≤ 1260
Bending loss R30mm x 100 ²	dB	≤ 0.1 at 1625nm
MFD at 1310 / 1550nm	μm	$9.2 \pm 0.4 / 10.4 \pm 1.0$
Core/Cladding Concentricity Error	μm	≤ 0.6
Cladding Diameter	μm	125 ± 0.7
Cladding Non-circularity	%	≤ 1.0
Coating Diameter	μm	245 ± 10
Proof Test	GPa	≥ 0.69

3. CABLE CONSTRUCTION

The construction of the cable shall be in accordance with Table 2 below.

Table 2. Construction of the cable

ITEMS	DESCRIPTION
Number of fibers	48
No. of fibers per tube	12
Loose buffer tube	Thixotropic jelly filled PBT tube
No. of Tubes	4
No. of PE or PP Fillers	2
Central strength member	FRP (Non-metallic, PE over-coat, if necessary)
Water blocking material	Water blocking yarns around CSM
Peripheral Strength Member	Glass yarns ³ (Core Coverage: $\geq 120\%$) with W/B ⁴ Yarns
Ripcord	1 ripcord under the outer jacket
Outer jacket	Black PE, Nom. 1.5mm

¹ CD: Chromatic Dispersion

² 100 turns with radius 30mm

³ Glass yarns are not totally resistant to rodent attacks. Glass yarns wound in two directions. Note that one-direction winding improves anti-rodent effectiveness

⁴ W/B: Water Blocking

4. FIBER AND LOOSE BUFFER TUBE IDENTIFICATION

Color code of the loose buffer tubes and the individual fibers within each loose buffer tube shall be in accordance with Table 3 below

Table 3. Color code of the individual fibers and tubes

No.	Color	No.	Color	No.	Color
1	Red	5	White	9	Aqua
2	Green	6	Grey	10	Black
3	Blue	7	Brown	11	Orange
4	Yellow	8	Violet	12	Pink

5. PHYSICAL / MECHANICAL / ENVIRONMENTAL PERFORMANCE AND TESTS

5.1 Temperature Range

For the cables covered by this specification, the following temperature ranges apply:

- Operation : -40 °C to + 70 °C
- Installation : -30 °C to + 60 °C
- Storage/Shipping : -40 °C to + 70 °C

5.2 Mechanical and Environmental Performance of the Cable

The mechanical and environmental performance of the cable shall be in accordance with Table 4 below. Unless otherwise specified, all attenuation measurements required in this section shall be performed at 1550nm for single mode fiber (SMF).

Table 4. The Mechanical and Environmental Performance of the Cable

ITEMS	TEST METHOD AND ACCEPTANCE CRITERIA
Tensile Performance	▪ Test method: IEC 60794-1-21 Method E1 - Length under tension: Min. 50m - Mandrel diameter: 30D (D: cable diameter) - Load applied: 4,000N - Load duration: 10 minutes ▪ Acceptance criteria - Fiber strain: $\leq 0.60\%$ - Attenuation increment: ≤ 0.05 dB after the test
Crush	▪ Test method: IEC 60794-1-21 Method E3 - Load applied: 2,000N/10cm - Load duration: 1 minute - Number of tests: 3 with interval 500mm ▪ Acceptance criteria - Attenuation increment: ≤ 0.05 dB after the test - No jacket cracking and no fiber breakage

ITEMS	TEST METHOD AND ACCEPTANCE CRITERIA
Impact	▪ Test method: IEC 60794-1-21 Method E4 - Impact energy: 5J - Number of impacts: 3 with interval 500mm ▪ Acceptance criteria - Attenuation increment: ≤ 0.05 dB after the test - No jacket cracking and no fiber breakage
Torsion	▪ Test method: IEC 60794-1-21 Method E7 - Cable length twisted: 2m - No. of twist cycles: 10 cycles - Twist angle: $\pm 180^\circ$ ▪ Acceptance criteria - Attenuation increment: ≤ 0.05 dB after the test - No jacket cracking and no fiber breakage
Bend	▪ Test method: IEC 60794-1-21 Method E11A - Diameter of mandrel: 20D (D: cable diameter) - Method: Single helix - No. of turns: 4 - No. of cycles: 3 ▪ Acceptance criteria - Attenuation increment: ≤ 0.05 dB after the test - No jacket cracking and no fiber breakage
Temperature cycling	▪ Test method: IEC 60794-1-22 Method F1 - Temperature cycle sequence (2 cycles) : $23^\circ\text{C} \rightarrow -40^\circ\text{C} \rightarrow 70^\circ\text{C}$ - Soak time at each temperature: 24 hours ▪ Acceptance criteria - Attenuation increment: ≤ 0.10 dB/km
Water Penetration Test	▪ Test method: IEC 60794-1-22 Method F5B - Length of specimen: 3m - Height of pressure head: 1m - Test time: 24 hours ▪ Acceptance criteria - No water shall be detected at the unsealed end of the sample

6. CABLE PACKING AND MARKING

6.1 Cable marking

The outer surface of the cable shall be marked with white characters at intervals of one meter with the following information. Other markings are also available upon request.

- 1) Cable type (ex, “ SJNA ”)
- 2) Fiber type and counts (ex, “ SM48F ”)
- 3) Name of the manufacturer (“ LGCE
- 4) Year of manufacture
- 5) Length marking

6.2 Cable remarking

Remarking shall be applied at a different position on the outer cable jacket and preferably use yellow characters. Any cable that contains two sets of cable markings shall indicate which color should be used.

6.3 Cable packing

- 6.3.1 Standard length of the cable shall be 2,000m and 4,000m. Other cable lengths are also available upon customer request.
- 6.3.2 Each length of the cable shall be wound on a separate wooden reel or plywood reel.
- 6.3.3 Both ends of the cable shall be sealed with suitable plastic caps to prevent the entry of moisture during shipping, handling and storage.
- 6.3.4 The cable ends shall be securely fastened to the reel to prevent the cable from becoming loose in transit or during placing operations.
- 6.3.5 Circumference battens or wood-fiber board shall be secured with bands to protect the cable during normal handling and shipping.

6.4 Cable reel

6.4.1 Details given below shall be distinctly marked with a weatherproof material on both outer sides of the reel flange:

- 1) Purchaser's name
- 2) Cable type and fiber counts
- 3) Length of cable in meters
- 4) Gross weight in kilograms
- 5) Reel number
- 6) Name of manufacturer
- 7) Year of manufacture
- 8) Arrow showing the direction drum shall be rolled

* Other shipping mark is also available upon request.

6.4.2 The cable shall be shipped on reels designed to prevent damage to the cable during shipment and installation.

6.4.3 The arbor holes provided in the reels shall be at least 65 mm and at most 120 mm in diameter.

7. ENVIRONMENT, HEALTH AND SAFETY

7.1 RoHS Directive

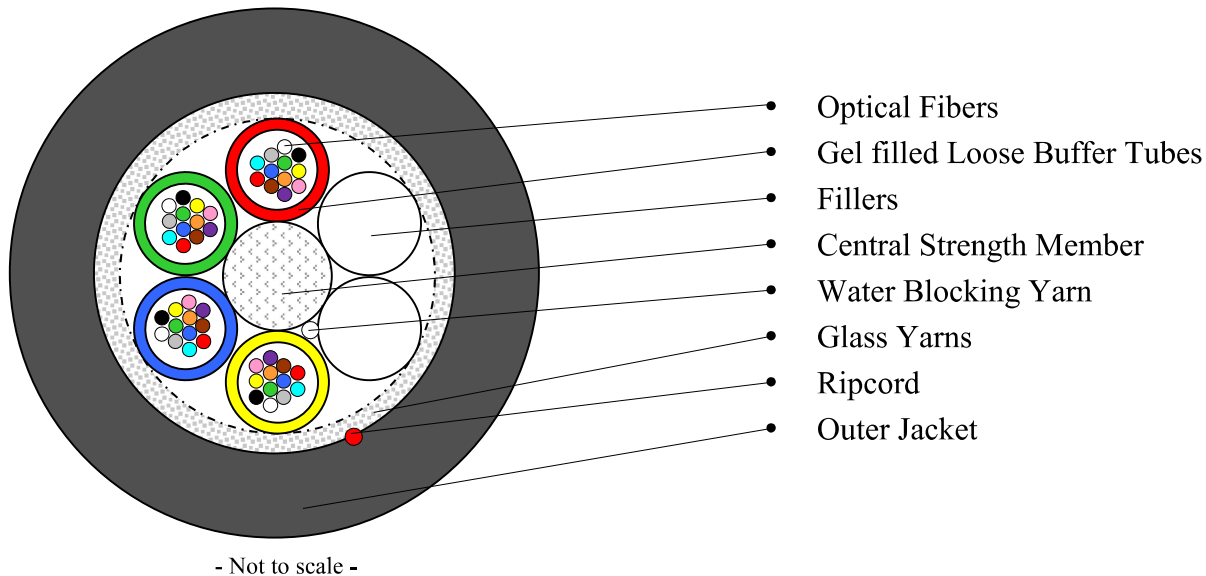
All cables and any associated packing and labeling materials shall meet RoHS (Restriction of the Use of certain Hazardous Substances) regulations as appropriate.

7.2 ISPM 15

All wooden packing materials shall meet ISPM (International Standards for Phytosanitary Measures) regulations as appropriate.

8. CROSS-SECTIONAL DRAWING OF CABLE

Ex. 48 fiber cable



Cable Type	Fiber counts	Cable dia. [mm]	Approx. cable weight [kg/km]	Minimum bending radius [mm]	
				Under load	No load
SJNA	48	9.4 ± 0.5	75	190	95

* Actual values may deviate from the calculated values given in the table above.

= End of Specification =