

Tender No.	:	Spec. No.	: LGCE-20-OC1032-02
User / Customer	: KPN	Page No.	: 1 of 8
Tender Title	: Outdoor Direct Burial Dry Core High Rise Cable LSZH 2f		
Bidder	:		

Specification

For

Outdoor High Rise Installation Cable
Non-Metallic Dry Core
Low Smoke Zero Halogen Jacket

2	06-04-2021	Revision description / MFD / Sheath marking, PvE 7.1	HtB	Per	HtB
1	23-10-2020	Match of mechanical tests	HtB	Per	HtB
0	20-10-2020	Initial specification	HtB	LBA	Per
Rev. No.	Date	Descriptions	Prepared By	Reviewed By	Approved By

1. SCOPE

1.1 Application

This specification covers the general requirements of single mode central loose tube dry core fiber optic telecommunication cable used for outdoor direct burial application and vertical installation over distances more than 9 meters.

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 Enhanced Single Mode Fiber

ITEMS	UNITS	SPECIFICATION	
		G.657.A1	
Attenuation coefficient	dB/km	≤ 0.35 at 1310 nm ≤ 0.25 at 1550 nm ≤ 0.25 at 1625 nm	
Chromatic dispersion parameter	ps/(nm ² x km)	$\leq 3,5$ at 1285 nm ~ 1.330 nm ≤ 18 at 1550 nm	
Mode Field Diameter	μm	8.9 ± 0.4 at 1310 nm 10.4 ± 0.5 at 1550 nm	
Uncabled fibre macro bending loss	mm	R = 15, 10 turns:	R= 10, 1 turn:
	dB	$\leq 0,25$ at 1550 nm $\leq 1,0$ at 1625 nm	$\leq 0,75$ at 1550 nm $\leq 1,5$ at 1625 nm
PMD coefficient	ps/√km	≤ 0.20	
Cut-off Wavelength (λ _{cc} , Cabled fiber)	nm	≤ 1260	
Core/Cladding Concentricity Error	μm	≤ 0.5	
Cladding diameter	μm	125 ± 0.7	
Cladding non-circularity	%	$\leq 1,0$	
Coating diameter (uncolored)	μm	245 ± 5	
Proof test	GPa	≥ 0.69	

3. CABLE CONSTRUCTION

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

Table 2. Cable construction

ITEMS		DESCRIPTION
Number of Fibers		2
Type of Fiber		Single Mode G.657A1
Loose Buffer Tube	Material	PBT (Polybutylene Terephthalate)
	Diameter	Nom. 2.3 mm
Filling Compound in Loose Buffer Tube		Water Swellable Yarn
Peripheral strength members		High Modulus Aramid Yarns
Outer Sheath Strength members		Non-metallic anti-buckling FRP rod
Outer Jacket	Material	Orange LSZH (Low Smoke Zero Halogen)
	Thickness	Nom. 1,0mm

4. FIBER IDENTIFICATION

The color code of the individual fibers within the loose buffer tube shall be in accordance with Table 3.

Table 3. The Color Code of the Individual Fibers and Tubes

Fiber Nr.	Color	Tube Nr.	Color
1	Blue	1	Yellow
2	Green		

*The color code of the individual fibers within the loose tube buffer tube shall be in accordance with Table 3.

5. PHYSICAL/MECHANICAL/ENVIRONMENTAL PERFORMANCE AND TESTS

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.

Table 4. The Mechanical and Environmental Performance of the Cable

ITEMS	TEST METHOD AND ACCEPTANCE CRITERIA
Temperature cycling	# Test method: IEC 60794-1-22, Method F1 -. Temperature cycling schedule : 20°C → -40°C → 70°C → -40°C → 70°C → -40°C → 20°C -. Soak time at each temperature: 1 hours # Acceptance Criteria -. Attenuation increment: ≤ 0.05 dB / km
Cable bending	# Test method: IEC 60794-1-21, Method E11A -. Bend radius: 15 x D -. No. of cycles: 2 (each single-Helix turn) -. Selection of fibers to monitor: All fiber in unit # Acceptance Criteria -. Attenuation Increment: ≤ 0.05 dB after the test
Tensile force	# Test method: IEC 60794-1-21, Method E1 -. Short term tensile load: 1000 N -. Long term tensile load: 300 N # Acceptance Criteria -. Fiber strain: ≤ 0.6% -. Attenuation increment: ≤ 0.05 dB
Impact resistance	# Test method: IEC 60794-1-21, Method E4 -. Impact force: 5 Nm # Acceptance Criteria -. Attenuation increment: ≤ 0.05 dB
Repeated Bending	# Test Method: IEC 60794-1-21, Method E6 -. Applied load: 10 N -. Cycles: 25 -. Radius of roller: 20 x D # Acceptance criteria -. Attenuation increment: ≤ 0,05 dB

ITEMS	TEST METHOD AND ACCEPTANCE CRITERIA
Crush resistance	# Test method: IEC 60794-1-21, Method E3 -. Applied load: 1500 N / 10x10 cm -. Duration of loading: 30 seconds -. Applied long term load: 1000 N / 10x10 cm -. Duration of loading: 10 minutes # Acceptance Criteria -. Attenuation Increment: ≤ 0.05 dB after the test
Torsion resistance	# Test method: IEC 60794-1-21, Method E7 -. Rotating angle: 360° -. No. of cycles: 3 -. Sample length: 2 m -. Weight: 1 kg # Acceptance Criteria -. Attenuation Increment: ≤ 0.05 dB after the test
Water penetration	# Test method: IEC 60794-1-22, Method F5B -. Water head: 1 m -. Duration: 24 hours -. Sample length: 3 m # Acceptance Criteria -. No leakage
Flame test	# Test method: IEC 60332-1-2
CPR classification	Not applicable and therefor "Fca". Outer sheath: Low Smoke Zero Halogen

5.1 Temperature range

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

- Storage/Shipping temperature range : -10 to 50 °C
- Operating temperature range : -20 to 60 °C
- Installation temperature range: -10 to 50 °C

5.2 Crush and Tensile Strength

For the cables covered by this specification, the following characteristics apply:

- Crush: ≥ 1000 N / 10 cm
- Tensile strength: ≥ 300 N

5.3 Conformation KPN Reggefiber PvE 7.1:

The mechanical and environmental performance of the cable is fully compliant with the KPN Reggefiber Programma van Eisen 7v1 BII Bijlage 10 and 13.

6. PACKING AND MARKING

6.1 Cable Marking

The jacket shall be marked with white characters at intervals of one meter with following information. Other marking is also available if requested by customer.

- 1) "Reggefiber FttH Tel. Nr. 088-0063700"
- 2) Cable type and fiber number (Ex. "2v Outdoor DB Dry Core High Rise GVK G.657A1")
- 3) Name of supplier/manufacturer (Ex: "LGCE")
- 4) Batchcode ("Ex. 1234")
- 5) Length marking

Ex.1) For 2-fiber Indoor cable

0001m Reggefiber FttH Tel. nr. 088-0063700 2v Outdoor DB Dry Core High Rise LSZH GVK
G.657A1 LGCE 1234 0002m

6.2 Cable Packing

- 6.2.1 Standard length of cable shall be 4000 meters + 5%. Other cable length is also available if required by customer.
- 6.2.2 Each length of the cable shall be wound on a wooden drum.
- 6.2.3 Both ends of the cable shall be sealed with a suitable plastic cap to prevent the entry of moisture during shipping, handling and storage.
- 6.2.4 The cable ends shall be securely fastened to the reel to prevent the cable from becoming loose in transit or during placing operations.
- 6.2.5 The inner end of the cable is housed on the side of the reel without extra cable length for testing.
- 6.2.6 Wood-fiber or plastic board shall be secured with steel bands to protect the cable during normal handling and shipping.

6.3 Cable Reel

6.3.1 Details given below shall be distinctly marked with a weather proof material on the both outer sides of the reel flange. Other shipping mark is also available if requested by customer.

- 1) Cable type and fiber counts
- 2) Length of cable in meter
- 3) Gross weight in kilogram
- 4) Reel number
- 5) Name of manufacturer/supplier
- 6) Year of manufacture
- 7) Arrow showing the direction the drum shall be rolled

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

7. SAFETY

7.1 RoHS DIRECTIVE

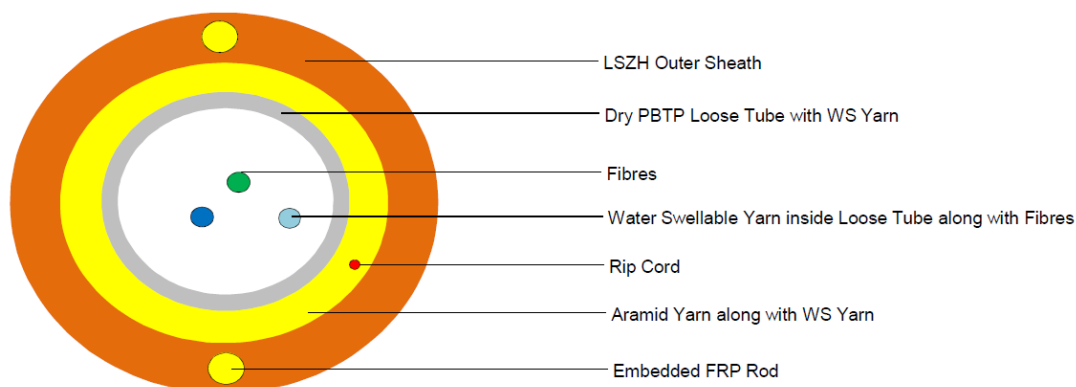
All cables and any associated packing and labeling materials shall meet RoHS(Restriction of the use of certain Hazardous Substances) regulation as appropriate.

7.2 ISPM 15 DIRECTIVE

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

< Cross-sectional Drawing of Cable >

1. 2-Fiber Cable (LSZH Jacket)



*The drawing appearing on this page is not a warranty, and may be subject to change or modification without any prior notice

2. Diameter, Weight and Minimum Bending Radius

No. of Fibers	Nom. Cable Diameter	Approx. Weight	Minimum Bending Radius	
	(mm)		During Installation	Installed
2	5,9	38	20 x OD	15 x OD

*) Actual values for cable weight and diameter may deviate from the calculated values given in the table above.

== End of Specification ==