20001787 TL
20004748 QM
20001787 UM
20001787 BSOH

TL 9000
ISO 9001
ISO 14001
OHSAS 18001

LS Cable & System

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Tender Title	:		
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Specification

For

Smooth sheath ABF

02	MAR. 09, 2016	Added 62.5MMF fiber specification	Kim, Jungmok	Jun, Youngho	Lee, YuHyoung
01	APR. 01, 2015	Added 12fiber	Kim, Jungmok	Jun, Youngho	Lee, YuHyoung
00	JAN. 16, 2015	Original Issue	Kim, Jungmok	Jun, Youngho	Lee, YuHyoung
Rev. No.	Date	Descriptions	Prepared By	Reviewed By	Approved By

LS Cable & System

1. SCOPE

1.1 Application

This specification covers the general requirements for smooth sheath ABF used for blowing installation.

2. OPTICAL FIBER

The optical, geometrical, mechanical and environmental performance of the optical fiber shall be in accordance with Table 1 and Table 2 below.

Table 1. Performance of the Multi Mode Fiber (50/125 MMF fiber)

ITEMS	UNITS	SPECIFICATION	
		OM3 Laser optimized MMF	**OM4 Laser optimized MMF**
Attenuation	dB/km	≤ 3.0 at 850nm ≤ 1.0 at 1300nm	≤ 3.0 at 850nm ≤ 1.0 at 1300nm
OFL1)Bandwidth	MHz.km	≥ 1500 at 850nm ≥ 500 at 1300nm	≥ 3500 at 850nm ≥ 500 at 1300nm
Effective Modal Bandwidth (Laser based sources)	MHz.km	≥ 2000 at 850nm	≥ 4700 at 850nm
Gigabit Ethernet Maximum Link Distance	m	≥ 300 at 850nm	≥ 550 at 850nm
Numerical Aperture	-	0.20 ± 0.015	0.20 ± 0.015
Core Diameter	μm	50 ± 3.0	50 ± 3.0
Core Non-circularity	%	≤ 6.0	≤ 6.0
Cladding Diameter	μm	125 ± 2.0	125 ± 2.0
Cladding Non-circularity	%	≤ 2.0	≤ 2.0
Core/Cladding Concentricity Error	μm	≤ 3.0	≤ 3.0
Coating Diameter	μm	245 ± 15	245 ± 15
Proof Test	kpsi	≥ 100	≥ 100

1) Overfilled Launch

*1000BASE-SX, 1000BASE-LX, 10GBASE-SR Link Length(meters) is according to IEE 802.3 Specification.

** Other performance value available upon request

Table 2. Performance of the Multi Mode Fiber (OM1 and OM2 fiber)

ITEMS	UNITS	SPECIFICATION	
		50 Multi Mode	**62.5 Multi Mode**
Attenuation	dB/km	≤ 3.0 at 850nm ≤ 1.0 at 1300nm	≤ 3.5 at 850nm ≤ 1.0 at 1300nm
Overfilled Launch Bandwidth (LED based sources)	MHz.km	≥ 500 at 850nm ≥ 500 at 1300nm	≥ 200 at 850nm ≥ 500 at 1300nm
Gigabit Ethernet Maximum Link Distance	m	≥ 500 at 850nm ≥ 500 at 1300nm	≥ 200 at 850nm ≥ 500 at 1300nm
Numerical Aperture	-	0.20 ± 0.015	0.275 ± 0.015
Core Diameter	μm	50 ± 3.0	62.5 ± 3.0
Core Non-circularity	%	≤ 6.0	≤ 6.0
Cladding Diameter	μm	125 ± 2.0	125 ± 2.0
Cladding Non-circularity	%	≤ 2.0	≤ 2.0
Core/Cladding Concentricity Error	μm	≤ 3.0	≤ 3.0
Coating Diameter	μm	245 ± 15	245 ± 15
Proof Test	Gpa	≥ 0.69	

3. ABF CONSTRUCTION

The construction of the smooth sheath ABF shall be in accordance with Table 3.

Table 3. the smooth sheath ABF construction

ITEMS	DESCRIPTION				
Number of Fibers	2	4	6	8	12
Coating Material	UV curable Acrylate Resin				
Outer sheath	HDPE				
Outer Diameter (Nominal)	1.2 ± 0.1 mm		1.4 ± 0.1 mm		1.6 ± 0.1 mm
Unit Color	Orange				

4. FIBER IDENTIFICATION

The color code of the individual fibers within the smooth sheath ABF shall be in accordance with Table 4.

Table 4. The fiber color order of the smooth sheath ABF

	2 core	4 core	6 core	8 core	12 core
1	Red	Red	Red	Red	Red
2	White	White	White	White	White
3	Filler	Yellow	Yellow	Yellow	Yellow
4	Filler	Blue	Blue	Blue	Blue
5			Green	Green	Green
6			Violet	Violet	Violet
7			Filler	Brown	Brown
8			Filler	Black	Black
9					Orange
10					Turquoise
11					Rose
12					Grey

5. MECHANICAL / ENVIRONMENTAL PERFORMANCE

5.1 Mechanical and Environmental Performance of the the smooth sheath ABF

The mechanical and environmental performance of the smooth sheath ABF shall be in accordance with Table 5 below.

Table 5. The Mechanical Performance of the smooth sheath ABF

ITEMS	TEST METHOD AND ACCEPTANCE CRITERIA
Tensile Performance	# Test method: IEC 60794-1-21 : Method E1 -. Fixed Mandrel Diameter : ≥60mm -. Load Mandrel Diameter : ≥60mm -. Tensile Load : 9.81 X W (W : mass of 1km of component in kg) -. Unit Length : ≥10m -. Rate of extension : ≥20mm/min -. Duration Maximum Tension : 1 minute -. Selection of fibers to be monitors : All fibers in the unit # Acceptance Criteria -. Fiber strain at Max. load : ≤ 0.6% -. Change in Attenuation After test : ≤ 0.1dB -. No significant damage to unit component
Crush	# Test method: IEC 60794-1-21 : Method E3 -. Maximum Load: 100N/10cm -. Unit Length : ≥ 30m -. During of Maximum Load : 60 seconds -. Selection of fibers to be monitors : All fibers in the unit # Acceptance Criteria -. Change in Attenuation during test : To be recorded -. Change in Attenuation After test : ≤ 0.1dB -. No significant damage to unit component
Repeated bending	# Test method: IEC 60794-1-21 : Method E6 -. Bending diameter : 60mm -. Number of cycles : 25 # Acceptance Criteria -. No significant damage to unit component

Table 5. The Mechanical Performance of t the smooth sheath ABF (continued)

ITEMS	TEST METHOD AND ACCEPTANCE CRITERIA
Torsion	# Test method: IEC 60794-1-21 : Method E7 -. Test length : 300mm -. Load : adequate to assure test sample is straight at start of test # Acceptance Criteria -. Change in Attenuation After test : ≤ 0.1dB -. No significant damage to unit component
Kink	# Test method: IEC 60794-1-21 : Method E10 -. Minimum diameter : 60mm # Acceptance Criteria -. No significant damage to unit component
Bend	# Test method: IEC 60794-1-21 : Method E11 -. Mandrel Diameter : = 60mm -. Unit Sample Length : ≥ 30m -. Selection of fibers to be monitors : All fibers in the unit -. Number of cycles : 3 -. Number of turns : 4 # Acceptance Criteria -. Change in Attenuation After test : ≤ 0.1dB -. No significant damage to unit component
Temperature Cycle	# Test method: IEC 60794-1-2 Method F1 -. Length of unit to be tested : ≥ 1km -. Temperature T_A : = -40 °C -. Temperature T_B : = +60 °C -. Dwell time : ≥ 24 hours -. Number of Cycles : = 2 -. Selection of fibers to be monitors : All fibers in the unit # Acceptance Criteria -. Attenuation variation during and after test : ≤ 0.25dB/km
Water immersion	# Test method: IEC 60793-1-53 -. Length of unit to be tested : ≥ 1km -. Temperature of the water solution : +20°C ± 2.0°C -. Water : Distilled, demineralized or de-ionized water (PH 5.0~8.0) -. Dwell time : ≥ 30 days # Acceptance Criteria -. Attenuation variation : ≤ 0.1dB/km

6. PACKAGING AND MARKING

6.1 Standard length of cable shall be 1km. Other cable length is also available if required by customer.

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

1) Cable type (ex, EPSU)
2) Fiber type and counts (ex, OM3 6F)
3) Name of the manufacturer (" LS Cable & System")
4) Year of manufacture
5) Length marking

6.2 Standard length of cable shall be 4km. Other cable length is also available if required by customer.

6.3 Unit Storage Pan

1) The fiber unit shall be supplied in its storage pan. Fiber units shall be laid in the pans in the format of resetted coils

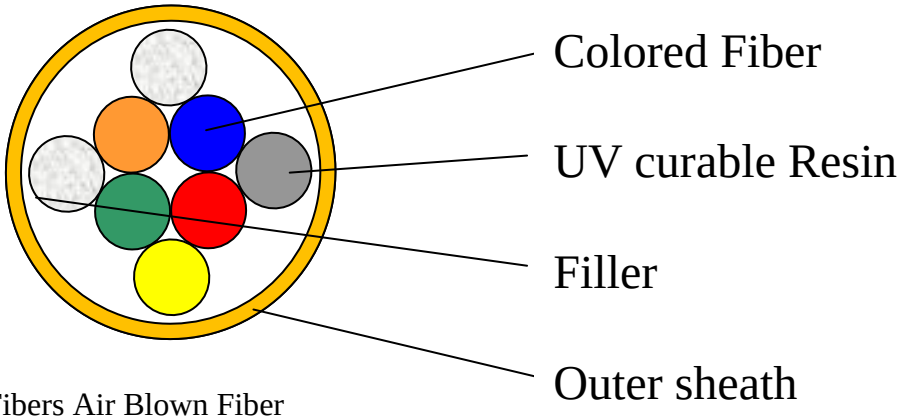
6.4 Cable Reel

6.4.1 The sticker information on the spool

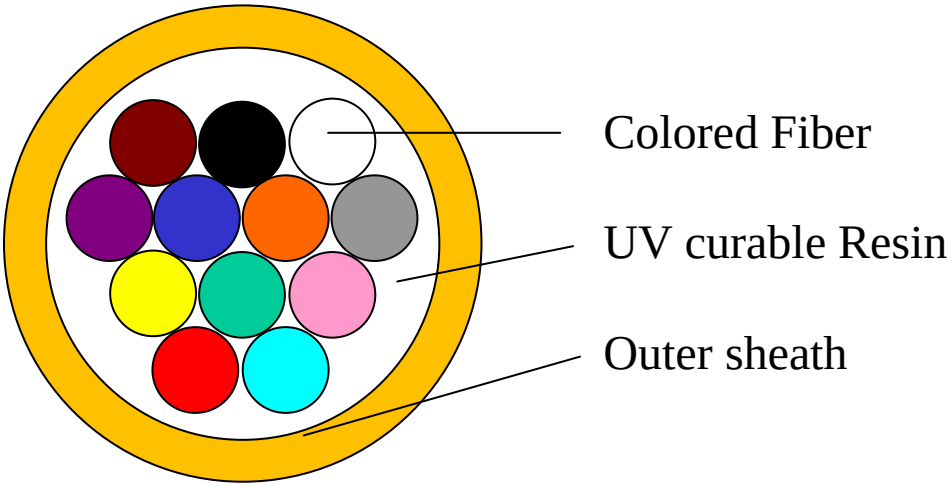
(1) Cable type and fiber counts
(2) Length of cable in meters
(3) Gross weight in kilograms
(4) Reel number
(5) Year of manufacture

< Cross-sectional Drawing of Cable >

1. Smooth sheath ABF



6-Fibers Air Blown Fiber



12-Fibers Air Blown Fiber

2. Diameter, Weight and Minimum Bending Radius

No. of Fibers	Nominal Diameter (mm)	Approx. Cable Weight (kg/km)	Minimum Bending Radius (mm) (Handling)
2, 4	1.2 ± 0.1	1.4 ± 0.1	60
6, 8	1.4 ± 0.1	1.6 ± 0.1	60
12	1.6 ± 0.1	2.0 ± 0.1	60

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

== ***End of Specification*** ==