

TECNICAL SPECIFICATION

1. GENERAL

1.1 SCOPE

Cable type	Application
Micro module	Duct installation cable

1.2 REFERENCE

The cable provided by SUMEC need to pass the following international specifications:

IEC 60793-1	Optical fiber Part 1: Generic specifications
IEC 60793-2	Optical fiber Part 2: Product specifications
IEC 60794-1	Optical fiber cable Part 1-2: Generic specification-basic optical cable test procedures
IEC 60794-3-10	Outdoor cables- family specification for duct and directly buried optical telecommunication cable
ITU-T G.650	Definition and test methods for the relevant parameters of single-mode fibers
ITU-T G.657	Characteristics of a bending-loss insensitive single-mode optical fiber
EIA/TIA 598	Color code of fiber optic cables

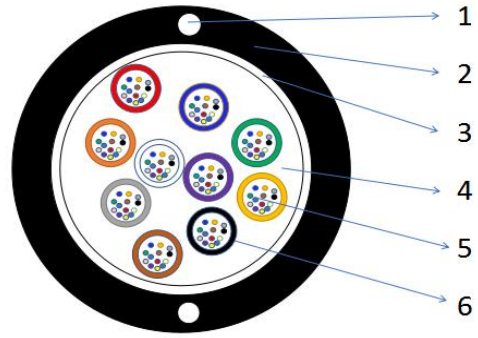
2. OPTICAL FIBER

ITU-T G.652.D		
Category	Description	Specifications
Optical Specifications	Attenuation @1310 nm	≤ 0.34 dB/km
	Attenuation @1550 nm	≤ 0.20 dB/km
	Zero Dispersion Wavelength	1300~1322 nm
	Chromatic dispersion @1310nm @1550nm @1625nm	≤ 3.5 ps/(nm·km) ≤ 18 ps/(nm·km) ≤ 22 ps/(nm·km)
	Zero Dispersion Slope	≤ 0.092 ps/nm ² ·km
	PMD _Q	≤ 0.2 ps/√km
	PMD individual value	≤ 0.2 ps/√km
	Cable Cutoff Wavelength (λ_{cc})	≤ 1260 nm
	Macro bending Loss (100 turns; $\Phi 60$ mm) @1625 nm	≤ 0.10 dB
	Mode Field Diameter @1310 nm	9.2 ± 0.4 μ m
Dimensional Specifications	Cladding Diameter	125 ± 1 μ m
	Coating diameter	245 ± 5 μ m
	Core/clad concentricity error	≤ 0.6 μ m
	Cladding Non-Circularity	$< 1.0\%$
Mechanical Specifications	Proof stress	≥ 0.69 Gpa

ITU-T G657A2		
Category	Description	Specifications
Optical Specifications	Attenuation @1310 nm	≤0.34 dB/km
	Attenuation @1550 nm	≤0.20 dB/km
	Zero Dispersion Wavelength	1300~1324 nm
	Zero Dispersion Slope	≤ 0.092 ps/nm ² ·km
	Cable Cutoff Wavelength (λ _{cc})	≤1260 nm
	Macro bending Loss (10 turns; Φ30 mm) @1550 nm	≤ 0.03 dB
	(10 turns; Φ30 mm) @1625 nm	≤ 0.1 dB
	(1 turns; Φ20 mm) @1550 nm	≤ 0.1 dB
(1 turns; Φ20 mm) @1625 nm	≤ 0.2 dB	
(1 turns; Φ15 mm) @1550 nm	≤ 0.5 dB	
(1 turns; Φ15 mm) @1625 nm	≤ 1.0 dB	
Mode Field Diameter @1310 nm	(8.6~9.2)±0.4μm	
Dimensional Specifications	Cladding Diameter	125±0.7μm
	Cladding non circularity	≤1.0%
	Core/clad concentricity error	≤0.5μm
Mechanical Specifications	Proof stress	≥0.69GPa

3. CABLE STRUCTURE

3.1 CABLE TYPE: Micro module cable



Features & Application

- Small diameter
- Semi-dry water blocking
- Perfect cable structure
- The inner sheath can be removed easily
- Saving the source of duct

Construction:

1. FRP*2
2. Outer sheath-PE/LSZH(Eca:en60332-1-2), **Black**
3. Water blocking tape
4. Glass yarns and water blocking yarns
5. Fiber and jelly
6. Inner tube

Dimensions and Properties

Physical	Fiber type	G657A2 or G652D												
	Fiber count	6	12	24	36	48	72	96	144	288	432	576	720	
	Fiber No. per tube	6	12											
	Tube No.	1	1	2	3	4	6	8	12	24	36	48	60	
	Inner tube diameter(mm)	1.1±0.1	1.4±0.1											
	Cable D(mm)±0.4mm	6.2	6.3	7.0	7.7	8.1	9.5	10.7	11.5	14.4	16.5	18.0	19.4	
	Cable weight(kg/km)	28	30	37	44	50	66	81	97	147	198	231	283	
Properties	Operation temperature range	-30 °C to + 60 °C												
	Installation temperature range	-10 °C to + 40 °C												
	Transport and storage temperature range	-30 °C to + 60 °C												
	Max. tensile load(N)	800	800	800	1000	1000	1600	2200	2200	2700	2700	2700	3000	
	Crush resistance(N/10cm)	2000												
Minimal installation bending radius	20*D													
Minimal operation bending radius	10*D													

*Note :

D =cable diameter

Color code scheme:

Fiber color											
1	2	3	4	5	6	7	8	9	10	11	12
Red	Blue	Green	Yellow	Violet	White	Orange	Grey	Brown	Black	Aqua	Pink
Inner tube color											
1	2	3	4	5	6	7	8	9	10	11	12
Red	Blue	Green	Yellow	Violet	White	Orange	Grey	Brown	Black	Aqua	Pink
13	14	15	16	17	18	19	20	21	22	23	24
Red*	Blue*	Green*	Yellow*	Violet*	White*	Orange*	Grey*	Brown*	Light green**	Aqua*	Pink*
25	26	27	28	29	30	31	32	33	34	35	36
Red	Blue	Green	Yellow	Violet	White	Orange	Grey	Brown	Light green***	Aqua	Pink
37	38	39	40	41	42	43	44	45	46	47	48
Red*	Blue*	Green*	Yellow*	Violet*	White*	Orange*	Grey*	Brown*	Light green****	Aqua*	Pink*
49	50	51	52	53	54	55	56	57	58	59	60
Red*	Blue*	Green*	Yellow*	Violet*	White*	Orange*	Grey*	Brown*	Light green*****	Aqua*	Pink*

Note: Black stripes will be used after more than 12 colors of tubes

4. TEST REQUIREMENTS

Fiber test standard

Mode field diameter	IEC 60793-1-45
Mode field Core/clad concentricity	IEC 60793-1-20
Cladding diameter	IEC 60793-1-20
Cladding non-circularity	IEC 60793-1-20
Attenuation coefficient	IEC 60793-1-40
Chromatic dispersion	IEC 60793-1-42

Cable cut-off wavelength	IEC 60793-1-44
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Performance Testing List

4.1 Tension Loading Test

Test Standard	IEC 60794-1-21 E1
Sample length	No less than 50 meters
Load	MAT
Duration time	1 minutes
Test results	After test, additional attenuation $\leq 0.05\text{dB}$
	No damage to outer jacket and inner elements

4.2 Crush/Compression Test

Test Standard	IEC 60794-1-21 E3
Load	2000N
Duration time	1minute
Test number	3
Test results	After test, additional attenuation $\leq 0.05\text{dB}$
	No damage to outer jacket and inner elements under short term load

4.3 Impact Resistance Test

Test Standard	IEC 60794-1-21 E4
Impact energy	5J
Radius	12.5mm
Impact points	5
Impact number	1
Test result	After test, additional attenuation $\leq 0.05\text{dB}$
	No damage to outer jacket and inner elements

4.4 Bend Test

Test Standard	IEC 60794-1-21 E11
Mandrel diameter	20*D
Turn number	3

Cycles	4
Test result	After test, additional attenuation $\leq 0.05\text{dB}$
	No damage to outer jacket and inner elements

4.5 Torsion/Twist Test

Test Standard	IEC 60794-1-21 E7
Sample length	1m
Angles	± 180 degree
Load	150N
Cycles	10
Test result	Additional attenuation $\leq 0.10\text{dB}$
	No damage to cable elements

4.6 Abrasion

Test Standard	IEC 60794-1-21 E2B
Experiment method	The wool felt should be thoroughly impregnated with water
Frequency	6-12cycles/min
Load	20N
Cycles	10
Test result	The marking should be legible after test

4.7 Water penetration Test

Test Standard	IEC 60794-1-22 F5
Height of water column	1m
Sample length	3m
Test time	24 hour
Test result	No water seepage from the opposite end of the sample

4.8 Temperature cycling Test

Test Standard	IEC 60794-1-22 F1
Temperature step	$+20^{\circ}\text{C} \rightarrow -30^{\circ}\text{C} \rightarrow +60^{\circ}\text{C} \rightarrow 20^{\circ}\text{C}$
Time per each step	12 hours
Cycles	2
Test result	Attenuation variation for reference value (the attenuation to be measured before test at $+20 \pm 3^{\circ}\text{C}$) $\leq 0.10\text{dB/km}$

4.9 Environmental performance

Test Standard	RoHS
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Test result	Pass the test.
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Remark: The test wavelength is 1550 nm.