

Under ground Armored optic fiber cable

GENERAL

1.1 SCOPE

This listed specification covers the design requirements and performance standard for the supply of optical fiber cable in the industry. Cable should also includes premium designed cable with optical, mechanical and geometrical characteristics

Cable Type	Application
GYTA53	directly buried installation

1.2 Cable Description

Cable should be possessed high tensile strength and flexibility in compact cable sizes. At the same time, it provides excellent optical transmission and physical performance.

1.3 Quality

Suppliers should ensure a continuing level of quality in our cable products through several quality control programs including ISO 9001.

1.4 Reliability

Both initial and periodic qualification testing are performed to assure the cable's performance and durability in the field environments. .

1.5 The cable are designed, manufactured and tested according to international standards as follow

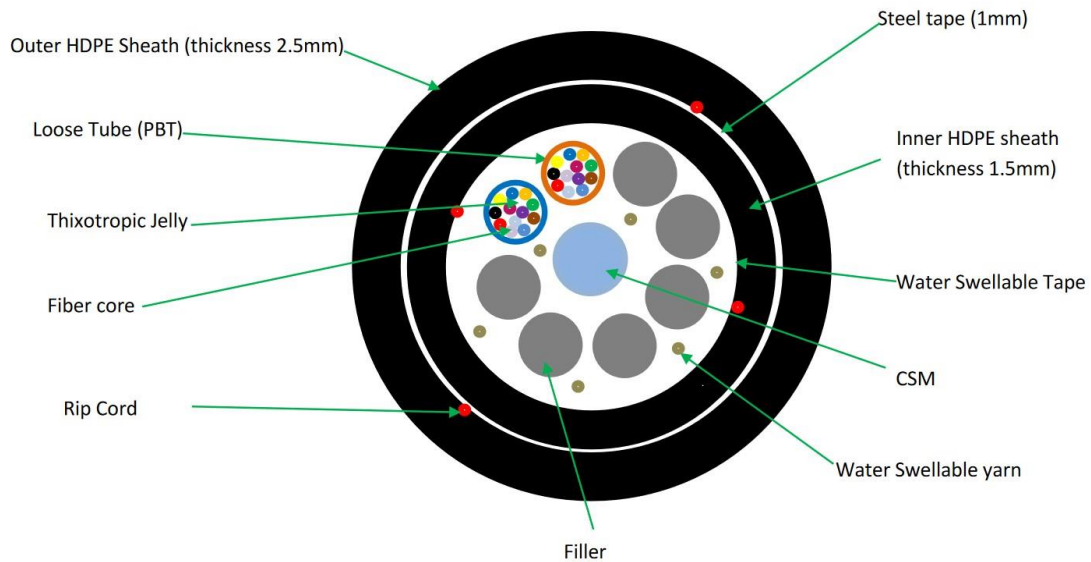
B1.3(G652D) single mode fiber

Optics Specifications		
Attenuation(dB/km)	@1310nm	≤ 0.35 db/km
	@1383nm (after hydrogen aging)	≤ 0.32 db/km
	@1550nm	≤ 0.21 db/km
	@1625nm	≤ 0.24 db/km
Dispersion	@1285nm~1340nm	-3.0~3.0ps/(nm*km)
	@1550nm	≤ 18 ps/(nm*km)
	@1625nm	≤ 22 ps/(nm*km)
Zero-Dispersion wavelength		1300~1324nm
Zero-Dispersion slope		≤ 0.092 ps/(nm ² *km)
Mode field diameter @ 1310nm		9.2 ± 0.4 μ m
Mode field diameter @ 1550nm		10.4 ± 0.8 μ m

PMD	Max. value for fiber on the reel	0.2ps/km 1/2
	Max. Designed value for link	0.08ps/km 1/2
Cable cutoff wavelength, λ_{cc}		$\leq 1260\text{nm}$
Effective group index(N_{eff})@1310nm		1.4675
Effective group index(N_{eff})@1550nm		1.4680
Macro-bend loss($\Phi 60\text{mm}$,100 turns)@1550nm		$\leq 0.05\text{db}$
Back scatter characteristic(@1310nm&1550nm)		
Point discontinuity		$\leq 0.05\text{db}$
Attenuation uniformity		$\leq 0.05\text{db/km}$
Attenuation coefficient difference for bi-directional measurement		$\leq 0.05\text{db/km}$
Geometrical characteristics		
Cladding diameter		$125\pm 1\mu\text{m}$
Cladding non-circularity		$\leq 1\%$
Core/cladding concentricity error		$\leq 0.4\mu\text{m}$
Fiber diameter with coating(uncolored)		$245\pm 5\mu\text{m}$
Cladding/coating concentricity error		$\leq 12.0\mu\text{m}$
Curl		$\geq 4\text{m}$
Mechanical characteristic		
Proof test		0.69GPa
Coating strip force(typical value)		1.4N
Dynamic stress corrosion susceptibility parameter(typical value)		≥ 20
Environmental characteristics(@1310nm&1550nm)		
Temperature induced attenuation(-60~+85°C)		$\leq 0.5\text{dB/km}$
Dry heat induced attenuation($85\pm 2^\circ\text{C}$,30days)		$\leq 0.5\text{dB/km}$
Water immersion induced attenuation($23\pm 2^\circ\text{C}$,30days)		$\leq 0.5\text{dB/km}$
Damp heat induced attenuation($85\pm 2^\circ\text{C}$,RH85%,30days)		$\leq 0.5\text{dB/km}$

2. Cable structure

24c Underground Fiber cable, Cross sectional view



Technical Characteristics

Characteristics

- Excellent mechanical and temperature performance guaranteed by the accurate excess fiber length
 - Critical protection to fibers,
 - Excellent crush resistance and flexibility
 - The following measures are taken to ensure the water blocking performance of the cable:
 - Single steel wire used as the central strength member
 - Special water-blocking filling compound in the loose tube.
- PSP moisture barrier
- 100% cable core filling and water-blocking material

Fiber count	24
Max. No of loose tube / filler No.	2/6
Fiber No. per tube	12
Loose tube diameter	2.0±0.2mm
Central strength member diameter (Steel)	2.1±0.2mm
Outer & inner sheath thickness	2.5mm & 1.5mm HDPE Black
Cable OD mm	16.0
Cable weight kg/km	205
Armored	Steel tape (1 mm)
Operation temperature range	-40 °C to + 70 °C
Installation temperature range	-40 °C to + 70 °C
Transport and storage temperature range	-40 °C to + 70 °C
Allowable Tensile Load(N)	Short term:4000 Long term:3000
Crush resistance	Short term 3000 N/100mm Long term :1000N/100MM
Minimal installation bending radius	20 x OD
Minimal operation bending radius	10 x OD

The fibres shall be marked by a coloured coating with 12 different colours according to EIA/TIA 598:

1	2	3	4	5	6
7	8	9	10	11	12

TEST REQUIREMENTS

Approved by various professional optical and communication product institution. Suppliers should also conduct various in-house testing in its own Laboratory and Test Center.

The cable should be in accordance with applicable standard of cable and requirement of customer. The following test items are carried out according to corresponding reference.

Routine tests of optical fiber

<i>Mode field diameter</i>	<i>IEC 60793-1-45</i>
<i>Mode field Core/clad concentricity</i>	<i>IEC 60793-1-20</i>
<i>Cladding diameter</i>	<i>IEC 60793-1-20</i>
<i>Cladding non-circularity</i>	<i>IEC 60793-1-20</i>
<i>Attenuation coefficient</i>	<i>IEC 60793-1-40</i>
<i>Chromatic dispersion</i>	<i>IEC 60793-1-42</i>
<i>Cable cut-off wavelength</i>	<i>IEC 60793-1-44</i>

Test for outdoor cable

4.1 Tension Loading Test

Test Standard	IEC 60794-3-10
Sample length	No less than 50 meters
Load	Max. installation load
Duration time	1 hour
Test results	Additional attenuation:≤0.05dB No damage to outer jacket and inner elements

4.2 Crush/Compression Test

Test Standard	IEC 60794-3-10
Load	Crush load
Plate size	100mm length
Duration time	1 minute
Test number	1
Test results	Additional attenuation:≤0.05dB No damage to outer jacket and inner elements

4.3 Impact Resistance Test

Test Standard	IEC 60794-3-10
Impact energy	6.5J
Radius	12.5mm
Impact points	3
Impact number	2
Test result	Additional attenuation:≤0.05dB

4.4 Repeated Bending Test

Test Standard	IEC 60794-3-10
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Bending radius	20 X diameter of cable
Cycles	25 cycles
Test result	Additional attenuation: $\leq 0.05\text{dB}$ No damage to outer jacket and inner elements

4.5 Torsion/Twist Test

Test Standard	IEC 60794-3-10
Sample length	2m
Angles	± 180 degree
cycles	10
Test result	Additional attenuation: $\leq 0.05\text{dB}$ No damage to outer jacket and inner elements

4.6 Bend Test

Test Standard	IEC 60794-3-10
Mandrel diameter	20 X diameter of cable
Turn number	4
Number of cycles	3
Temperature	20°C
Test result	No damage to outer jacket and inner elements

4.7 Temperature cycling Test

Test Standard	IEC 60794-3-10
Temperature step	+20°C → -40°C → +85°C → +20°C
Time per each step	Transition from 0°C to -40°C:2hours; duration at -40°C:8 hours; Transition from -40°C to +85 °C:4hours; duration at +85°C:8 hours; Transition from +85°C to 0°C:2hours
Cycles	5
Test result	Attenuation variation for reference value (the attenuation to be measured before test at $+20 \pm 3^\circ\text{C}$) ≤ 0.05 dB/km

4.8 Water penetration Test

Test Standard	IEC 60794-3-10
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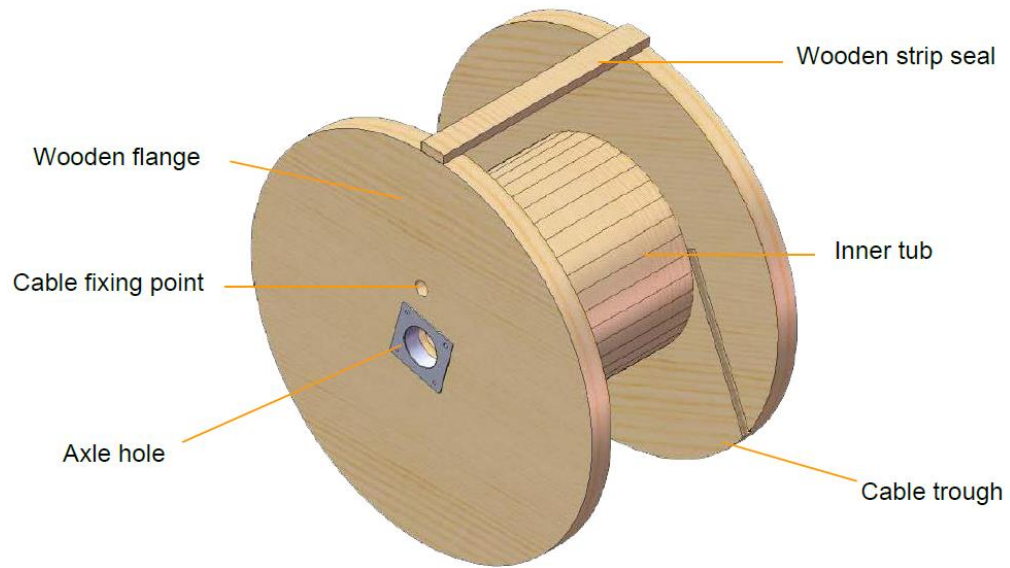
Height of water column	1m
Sample length	1m
Test time	1 hour
Test result	No water leakage from the opposite of the sample

4.9 Drip Test

Test Standard	IEC 60794-3-10
Sample length	0.3m
Temperature	70 °C
Duration	24 hrs
Test result	No filling compound shall drip from tubes

5.PACKING AND DRUM

T cables are packed in carton, coiled on Bakelite & wooden drum. During transportation, right tools should be used to avoid damaging the package and to handle with ease. Cables should be protected from moisture; kept away from high temperature and fire sparks; protected from over bending and crushing; protected from mechanical stress and damage.



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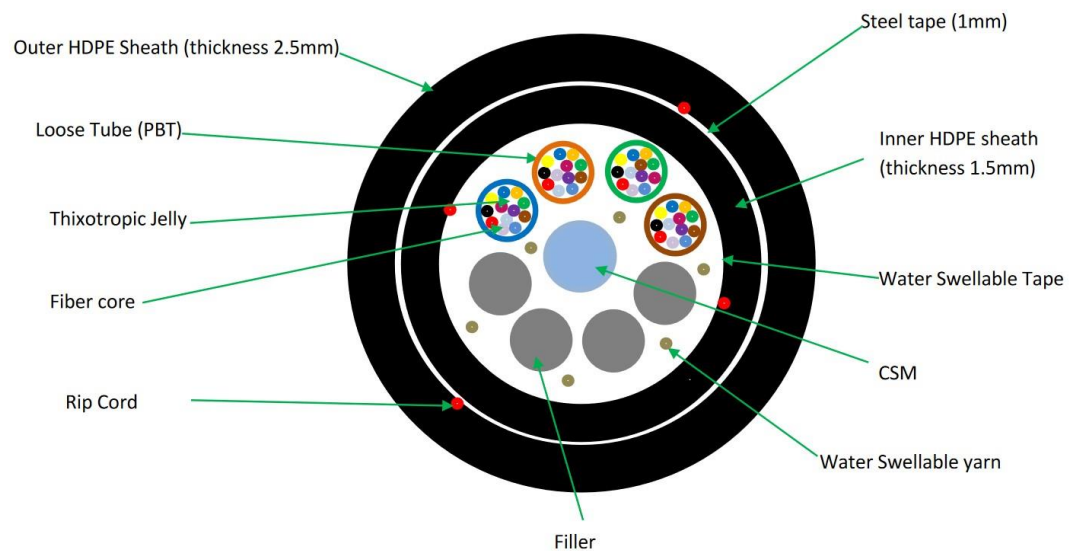
B1.3(G652D) single mode fiber

Optics Specifications		
Attenuation(dB/km)	@1310nm	≤0.35db/km
	@1383nm (after hydrogen aging)	≤0.32db/km
	@1550nm	≤0.21db/km
	@1625nm	≤0.24db/km
Dispersion	@1285nm~1340nm	-3.0~3.0ps/(nm*km)
	@1550nm	≤18ps/(nm*km)
	@1625nm	≤22ps/(nm*km)
Zero-Dispersion wavelength		1300~1324nm
Zero-Dispersion slope		≤0.092ps/(nm ² *km)
Mode field diameter @ 1310nm		9.2±0.4μm
Mode field diameter @ 1550nm		10.4±0.8μm
PMD	Max. value for fiber on the reel	0.2ps/km 1/2
	Max. Designed value for link	0.08ps/km 1/2
Cable cutoff wavelength,λ cc		≤1260nm

Effective group index(Neff)@1310nm	1.4675
Effective group index(Neff)@1550nm	1.4680
Macro-bend loss(Φ 60mm,100 turns)@1550nm	≤ 0.05 db
Back scatter characteristic(@1310nm&1550nm)	
Point discontinuity	≤ 0.05 db
Attenuation uniformity	≤ 0.05 db/km
Attenuation coefficient difference for bi-directional measurement	≤ 0.05 db/km
Geometrical characteristics	
Cladding diameter	$125 \pm 1 \mu\text{m}$
Cladding non-circularity	$\leq 1\%$
Core/cladding concentricity error	$\leq 0.4 \mu\text{m}$
Fiber diameter with coating(uncolored)	$245 \pm 5 \mu\text{m}$
Cladding/coating concentricity error	$\leq 12.0 \mu\text{m}$
Curl	$\geq 4\text{m}$
Mechanical characteristic	
Proof test	0.69GPa
Coating strip force(typical value)	1.4N
Dynamic stress corrosion susceptibility parameter(typical value)	≥ 20
Environmental characteristics(@1310nm&1550nm)	
Temperature induced attenuation(-60~+85°C)	≤ 0.5 dB/km
Dry heat induced attenuation($85 \pm 2^\circ\text{C}$,30days)	≤ 0.5 dB/km
Water immersion induced attenuation($23 \pm 2^\circ\text{C}$,30days)	≤ 0.5 dB/km
Damp heat induced attenuation($85 \pm 2^\circ\text{C}$,RH85%,30days)	≤ 0.5 dB/km

3.Cable structure

48c Underground Fiber cable, Cross sectional view



Technical Characteristics

Characteristics

- Excellent mechanical and temperature performance guaranteed by the accurate excess fiber length
 - Critical protection to fibers,
 - Excellent crush resistance and flexibility
 - The following measures are taken to ensure the water blocking performance of the cable:
 - Single steel wire used as the central strength member
 - Special water-blocking filling compound in the loose tube.
- PSP moisture barrier
- 100% cable core filling and water-blocking material

Fiber count	48
Max. No of loose tube / filler No.	4/4
Fiber No. per tube	12
Loose tube diameter	2.0±0.2mm
Central strength member diameter (Steel)	2.1±0.2mm
Outer & inner sheath thickness	2.5mm & 1.5mm HDPE Black
Cable OD mm	16.0
Cable weight kg/km	205
Armored	Steel tape (1 mm)
Operation temperature range	-40 °C to + 70 °C
Installation temperature range	-40 °C to + 70 °C
Transport and storage temperature range	-40 °C to + 70 °C
Allowable Tensile Load(N)	Short term:4000 Long term:3000
Crush resistance	Short term 3000 N/100mm Long term :1000N/100MM
Minimal installation bending radius	20 x OD
Minimal operation bending radius	10 x OD

The fibres shall be marked by a coloured coating with 12 different colours according to EIA/TIA 598:

1	2	3	4	5	6
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TEST REQUIREMENTS

Approved by various professional optical and communication product institution. Suppliers should also conduct various in-house testing in its own Laboratory and Test Center.

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<i>Cladding diameter</i>	<i>IEC 60793-1-20</i>
<i>Cladding non-circularity</i>	<i>IEC 60793-1-20</i>
<i>Attenuation coefficient</i>	<i>IEC 60793-1-40</i>
<i>Chromatic dispersion</i>	<i>IEC 60793-1-42</i>
<i>Cable cut-off wavelength</i>	<i>IEC 60793-1-44</i>

Test for outdoor cable

4.1 Tension Loading Test

Test Standard	IEC 60794-3-10
Sample length	No less than 50 meters
Load	Max. installation load
Duration time	1 hour
Test results	Additional attenuation:≤0.05dB No damage to outer jacket and inner elements

4.2 Crush/Compression Test

Test Standard	IEC 60794-3-10
Load	Crush load
Plate size	100mm length
Duration time	1 minute
Test number	1
Test results	Additional attenuation:≤0.05dB No damage to outer jacket and inner elements

4.3 Impact Resistance Test

Test Standard	IEC 60794-3-10
Impact energy	6.5J
Radius	12.5mm
Impact points	3
Impact number	2
Test result	Additional attenuation:≤0.05dB

4.4 Repeated Bending Test

Test Standard	IEC 60794-3-10
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Bending radius	20 X diameter of cable
Cycles	25 cycles
Test result	Additional attenuation: $\leq 0.05\text{dB}$ No damage to outer jacket and inner elements

4.5 Torsion/Twist Test

Test Standard	IEC 60794-3-10
Sample length	2m
Angles	± 180 degree
cycles	10
Test result	Additional attenuation: $\leq 0.05\text{dB}$ No damage to outer jacket and inner elements

4.6 Bend Test

Test Standard	IEC 60794-3-10
Mandrel diameter	20 X diameter of cable
Turn number	4
Number of cycles	3
Temperature	20°C
Test result	No damage to outer jacket and inner elements

4.7 Temperature cycling Test

Test Standard	IEC 60794-3-10
Temperature step	+20°C → -40°C → +85°C → +20°C
Time per each step	Transition from 0°C to -40°C:2hours; duration at -40°C:8 hours; Transition from -40°C to +85 °C:4hours; duration at +85°C:8 hours; Transition from +85°C to 0°C:2hours
Cycles	5
Test result	Attenuation variation for reference value (the attenuation to be measured before test at $+20 \pm 3^\circ\text{C}$) ≤ 0.05 dB/km

4.8 Water penetration Test

Test Standard	IEC 60794-3-10
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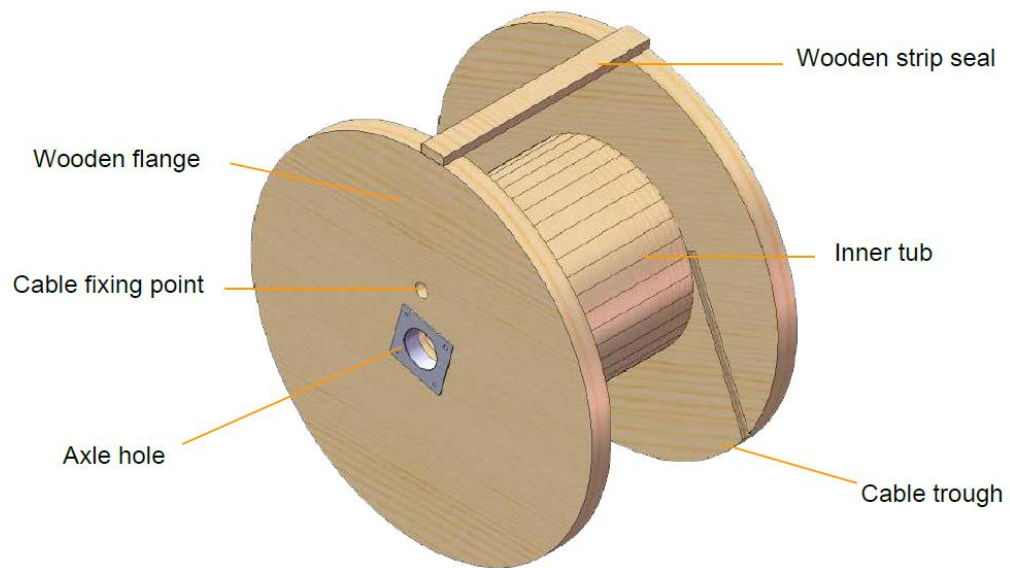
Height of water column	1m
Sample length	1m
Test time	1 hour
Test result	No water leakage from the opposite of the sample

4.9 Drip Test

Test Standard	IEC 60794-3-10
Sample length	0.3m
Temperature	70 °C
Duration	24 hrs
Test result	No filling compound shall drip from tubes

6.PACKING AND DRUM

T cables are packed in carton, coiled on Bakelite & wooden drum. During transportation, right tools should be used to avoid damaging the package and to handle with ease. Cables should be protected from moisture; kept away from high temperature and fire sparks; protected from over bending and crushing; protected from mechanical stress and damage.



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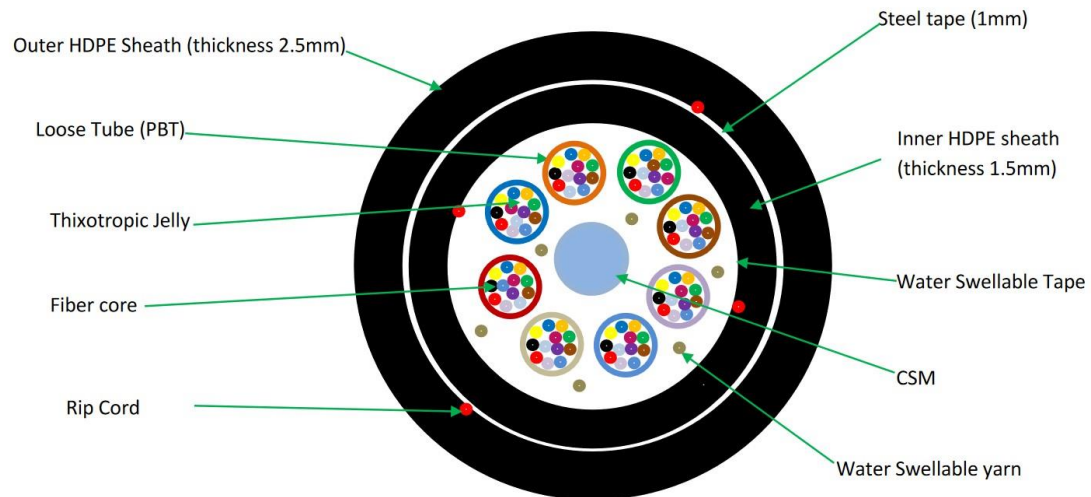
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B1.3(G652D) single mode fiber

Optics Specifications		
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	@1383nm (after hydrogen aging)	≤0.32db/km
	@1550nm	≤0.21db/km
	@1625nm	≤0.24db/km
Dispersion	@1285nm~1340nm	-3.0~3.0ps/(nm*km)
	@1550nm	≤18ps/(nm*km)
	@1625nm	≤22ps/(nm*km)
Zero-Dispersion wavelength		1300~1324nm
Zero-Dispersion slope		≤0.092ps/(nm ² *km)
Mode field diameter @ 1310nm		9.2±0.4μm
Mode field diameter @ 1550nm		10.4±0.8μm
PMD	Max. value for fiber on the reel	0.2ps/km 1/2
	Max. Designed value for link	0.08ps/km 1/2
Cable cutoff wavelength,λ cc		≤1260nm
Effective group index(Neff)@1310nm		1.4675
Effective group index(Neff)@1550nm		1.4680
Macro-bend loss(Φ 60mm,100 turns)@1550nm		≤0.05db
Back scatter characteristic(@1310nm&1550nm)		
Point discontinuity		≤0.05db
Attenuation uniformity		≤0.05db/km
Attenuation coefficient difference for bi-directional measurement		≤0.05db/km
Geometrical characteristics		
Cladding diameter		125±1μm
Cladding non-circularity		≤1%
Core/cladding concentricity error		≤0.4μm
Fiber diameter with coating(uncolored)		245±5μm
Cladding/coating concentricity error		≤12.0μm
Curl		≥4m
Mechanical characteristic		
Proof test		0.69GPa
Coating strip force(typical value)		1.4N
Dynamic stress corrosion susceptibility parameter(typical value)		≥20
Environmental characteristics(@1310nm&1550nm)		
Temperature induced attenuation(-60~+85°C)		≤0.5dB/km
Dry heat induced attenuation(85±2°C,30days)		≤0.5dB/km
Water immersion induced attenuation(23±2°C,30days)		≤0.5dB/km
Damp heat induced attenuation(85±2°C,RH85%,30days)		≤0.5dB/km

4.Cable structure

96c Underground Fiber cable, Cross sectional view



Technical Characteristics

Characteristics

- Excellent mechanical and temperature performance guaranteed by the accurate excess fiber length
 - Critical protection to fibers,
 - Excellent crush resistance and flexibility
 - The following measures are taken to ensure the water blocking performance of the cable:
 - Single steel wire used as the central strength member
 - Special water-blocking filling compound in the loose tube.
- PSP moisture barrier
- 100% cable core filling and water-blocking material

Fiber count	96
Max. No of loose tube / filler No.	8/0
Fiber No. per tube	12
Loose tube diameter	1.9±0.2mm
Central strength member diameter (FRP)	2.1±0.2mm
Outer & inner sheath thickness	2.5mm & 1.5mm HDPE Black
Cable OD mm	16.5
Cable weight kg/km	229
Armored	Steel tape (1mm)
Operation temperature range	-40 °C to + 70 °C
Installation temperature range	-40 °C to + 70 °C
Transport and storage temperature range	-40 °C to + 70 °C
Allowable Tensile Load(N)	Short term:4000 Long term:3000
Crush resistance	Short term 3000 N/100mm Long term :1000N/100MM
Minimal installation bending radius	20 x OD
Minimal operation bending radius	10 x OD

The fibres shall be marked by a coloured coating with 12 different colours according to EIA/TIA 598:

1	2	3	4	5	6
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TEST REQUIREMENTS

Approved by various professional optical and communication product institution. Suppliers should also conduct various in-house testing in its own Laboratory and Test Center.

The cable is in accordance with applicable standard of cable and requirement of customer.

The following test items are carried out according to corresponding reference.

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<i>Cladding diameter</i>	<i>IEC 60793-1-20</i>
<i>Cladding non-circularity</i>	<i>IEC 60793-1-20</i>
<i>Attenuation coefficient</i>	<i>IEC 60793-1-40</i>
<i>Chromatic dispersion</i>	<i>IEC 60793-1-42</i>
<i>Cable cut-off wavelength</i>	<i>IEC 60793-1-44</i>

Test for outdoor cable

4.1 Tension Loading Test

Test Standard	IEC 60794-3-10
Sample length	No less than 50 meters
Load	Max. installation load
Duration time	1 hour
Test results	Additional attenuation: $\leq 0.05\text{dB}$ No damage to outer jacket and inner elements

4.2 Crush/Compression Test

Test Standard	IEC 60794-3-10
Load	Crush load
Plate size	100mm length
Duration time	1 minute
Test number	1
Test results	Additional attenuation: $\leq 0.05\text{dB}$ No damage to outer jacket and inner elements

4.3 Impact Resistance Test

Test Standard	IEC 60794-3-10
Impact energy	6.5J
Radius	12.5mm
Impact points	3
Impact number	2
Test result	Additional attenuation: $\leq 0.05\text{dB}$

4.4 Repeated Bending Test

Test Standard	IEC 60794-3-10
Bending radius	20 X diameter of cable
Cycles	25 cycles
Test result	Additional attenuation: $\leq 0.05\text{dB}$ No damage to outer jacket and inner elements

4.5 Torsion/Twist Test

Test Standard	IEC 60794-3-10
Sample length	2m
Angles	± 180 degree
cycles	10
Test result	Additional attenuation: $\leq 0.05\text{dB}$ No damage to outer jacket and inner elements

4.6 Bend Test

Test Standard	IEC 60794-3-10
Mandrel diameter	20 X diameter of cable
Turn number	4
Number of cycles	3
Temperature	20°C
Test result	No damage to outer jacket and inner elements

4.7 Temperature cycling Test

Test Standard	IEC 60794-3-10
Temperature step	+20°C → -40°C → +85°C → +20°C
Time per each step	Transition from 0°C to -40°C:2hours; duration at -40°C:8 hours; Transition from -40°C to +85 °C:4hours; duration at +85°C:8 hours; Transition from +85°C to 0°C:2hours
Cycles	5
Test result	Attenuation variation for reference value (the attenuation to be measured before test at $+20 \pm 3^\circ\text{C}$) ≤ 0.05 dB/km

4.8 Water penetration Test

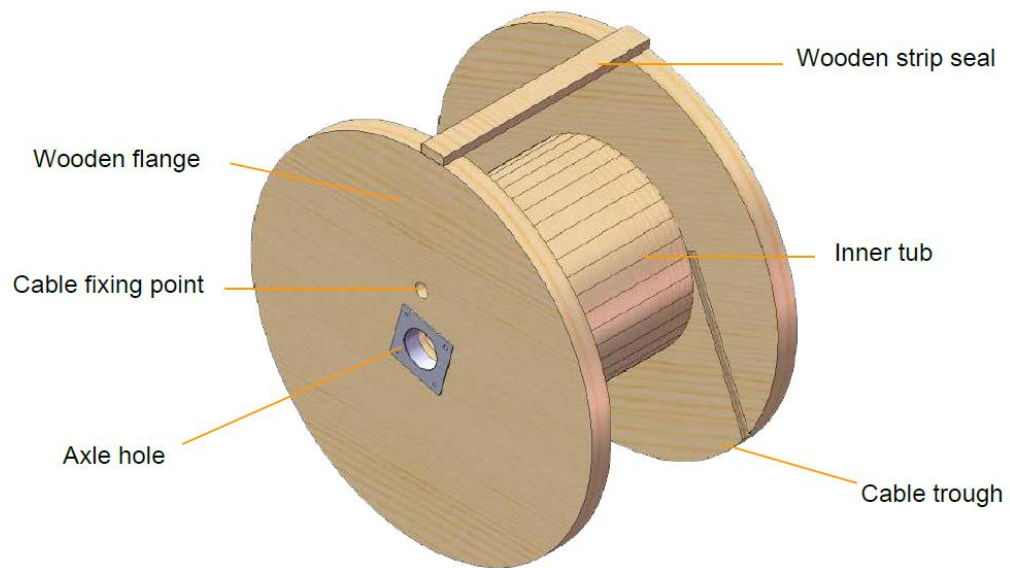
Test Standard	IEC 60794-3-10
Height of water column	1m
Sample length	1m
Test time	1 hour
Test result	No water leakage from the opposite of the sample

4.9 Drip Test

Test Standard	IEC 60794-3-10
Sample length	0.3m
Temperature	70 °C
Duration	24 hrs
Test result	No filling compound shall drip from tubes

7.PACKING AND DRUM

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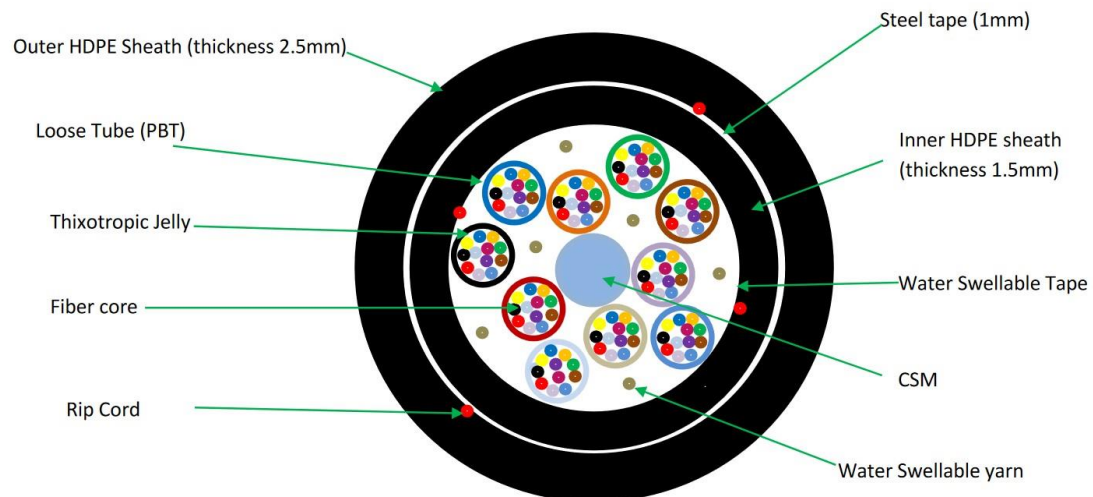
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	@1383nm (after hydrogen aging)	≤0.32db/km
	@1550nm	≤0.21db/km
	@1625nm	≤0.24db/km
Dispersion	@1285nm~1340nm	-3.0~3.0ps/(nm*km)
	@1550nm	≤18ps/(nm*km)
	@1625nm	≤22ps/(nm*km)
Zero-Dispersion wavelength		1300~1324nm
Zero-Dispersion slope		≤0.092ps/(nm ² *km)
Mode field diameter @ 1310nm		9.2 ± 0.4μm
Mode field diameter @ 1550nm		10.4 ± 0.8μm
PMD	Max. value for fiber on the reel	0.2ps/km 1/2
	Max. Designed value for link	0.08ps/km 1/2
Cable cutoff wavelength,λ cc		≤1260nm
Effective group index(Neff)@1310nm		1.4675
Effective group index(Neff)@1550nm		1.4680
Macro-bend loss(Φ 60mm,100 turns)@1550nm		≤0.05db
Back scatter characteristic(@1310nm&1550nm)		
Point discontinuity		≤0.05db
Attenuation uniformity		≤0.05db/km
Attenuation coefficient difference for bi-directional measurement		≤0.05db/km
Geometrical characteristics		
Cladding diameter		125±1μm
Cladding non-circularity		≤1%
Core/cladding concentricity error		≤0.4μm
Fiber diameter with coating(uncolored)		245±5μm
Cladding/coating concentricity error		≤12.0μm
Curl		≥4m
Mechanical characteristic		
Proof test		0.69GPa
Coating strip force(typical value)		1.4N
Dynamic stress corrosion susceptibility parameter(typical value)		≥20
Environmental characteristics(@1310nm&1550nm)		
Temperature induced attenuation(-60~+85°C)		≤0.5dB/km
Dry heat induced attenuation(85 ± 2°C,30days)		≤0.5dB/km
Water immersion induced attenuation(23 ± 2°C,30days)		≤0.5dB/km
Damp heat induced attenuation(85 ± 2°C,RH85%,30days)		≤0.5dB/km

5.Cable structure

120c Underground Fiber cable, Cross sectional view



Technical Characteristics

Characteristics

- Excellent mechanical and temperature performance guaranteed by the accurate excess fiber length
- Critical protection to fibers,
- Excellent crush resistance and flexibility
- The following measures are taken to ensure the water blocking performance of the cable:

- Single steel wire used as the central strength member
- Special water-blocking filling compound in the loose tube.

PSP moisture barrier

- 100% cable core filling and water-blocking material

Fiber count	120
Max. No of loose tube / filler No.	10/0
Fiber No. per tube	12
Loose tube diameter	1.8±0.2mm
Central strength member diameter (FRP)	2.1±0.2mm
Outer & inner sheath thickness	2.5mm & 1.5mm HDPE Black
Cable OD mm	17.2
Cable weight kg/km	252
Armored	Steel tape(1mm)
Operation temperature range	-40 °C to + 70 °C
Installation temperature range	-40 °C to + 70 °C
Transport and storage temperature range	-40 °C to + 70 °C
Allowable Tensile Load(N)	Short term:4000 Long term:3000
Crush resistance	Short term 3000 N/100mm Long term :1000N/100MM
Minimal installation bending radius	20 x OD
Minimal operation bending radius	10 x OD

The fibres shall be marked by a coloured coating with 12 different colours according to EIA/TIA 598:

1	2	3	4	5	6
7	8	9	10	11	12

TEST REQUIREMENTS

Approved by various professional optical and communication product institution. Suppliers should also conduct various in-house testing in its own Laboratory and Test Center.

The cable is in accordance with applicable standard of cable and requirement of customer.

The following test items are carried out according to corresponding reference.

Routine tests of optical fiber

<i>Mode field diameter</i>	<i>IEC 60793-1-45</i>
<i>Mode field Core/clad concentricity</i>	<i>IEC 60793-1-20</i>
<i>Cladding diameter</i>	<i>IEC 60793-1-20</i>
<i>Cladding non-circularity</i>	<i>IEC 60793-1-20</i>
<i>Attenuation coefficient</i>	<i>IEC 60793-1-40</i>
<i>Chromatic dispersion</i>	<i>IEC 60793-1-42</i>
<i>Cable cut-off wavelength</i>	<i>IEC 60793-1-44</i>

Test for outdoor cable

4.1 Tension Loading Test

Test Standard	IEC 60794-3-10
Sample length	No less than 50 meters
Load	Max. installation load
Duration time	1 hour
Test results	Additional attenuation:≤0.05dB No damage to outer jacket and inner elements

4.2 Crush/Compression Test

Test Standard	IEC 60794-3-10
Load	Crush load
Plate size	100mm length
Duration time	1 minute
Test number	1
Test results	Additional attenuation:≤0.05dB No damage to outer jacket and inner elements

4.3 Impact Resistance Test

Test Standard	IEC 60794-3-10
Impact energy	6.5J
Radius	12.5mm
Impact points	3
Impact number	2
Test result	Additional attenuation:≤0.05dB

4.4 Repeated Bending Test

Test Standard	IEC 60794-3-10
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Bending radius	20 X diameter of cable
Cycles	25 cycles
Test result	Additional attenuation: $\leq 0.05\text{dB}$ No damage to outer jacket and inner elements

4.5 Torsion/Twist Test

Test Standard	IEC 60794-3-10
Sample length	2m
Angles	± 180 degree
cycles	10
Test result	Additional attenuation: $\leq 0.05\text{dB}$ No damage to outer jacket and inner elements

4.6 Bend Test

Test Standard	IEC 60794-3-10
Mandrel diameter	20 X diameter of cable
Turn number	4
Number of cycles	3
Temperature	20°C
Test result	No damage to outer jacket and inner elements

4.7 Temperature cycling Test

Test Standard	IEC 60794-3-10
Temperature step	+20°C → -40°C → +85°C → +20°C
Time per each step	Transition from 0°C to -40°C:2hours; duration at -40°C:8 hours; Transition from -40°C to +85 °C:4hours; duration at +85°C:8 hours; Transition from +85°C to 0°C:2hours
Cycles	5
Test result	Attenuation variation for reference value (the attenuation to be measured before test at $+20 \pm 3^\circ\text{C}$) ≤ 0.05 dB/km

4.8 Water penetration Test

Test Standard	IEC 60794-3-10
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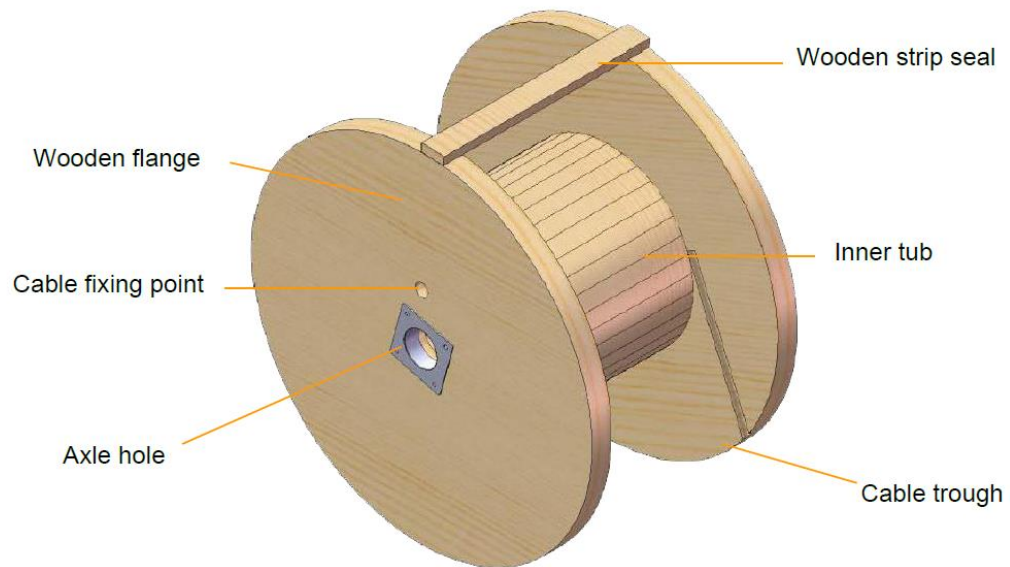
Height of water column	1m
Sample length	1m
Test time	1 hour
Test result	No water leakage from the opposite of the sample

4.9 Drip Test

Test Standard	IEC 60794-3-10
Sample length	0.3m
Temperature	70 °C
Duration	24 hrs
Test result	No filling compound shall drip from tubes

8.PACKING AND DRUM

T cables are packed in carton, coiled on Bakelite & wooden drum. During transportation, right tools should be used to avoid damaging the package and to handle with ease. Cables should be protected from moisture; kept away from high temperature and fire sparks; protected from over bending and crushing; protected from mechanical stress and damage.



GENERAL

1.1 SCOPE

This listed specification covers the design requirements and performance standard for the supply of optical fiber cable in the industry. It should also include premium designed cable with optical, mechanical and geometrical characteristics

Cable Type	Application
GYTA53	directly buried installation

1.2 Cable Description

Cable should be possessed high tensile strength and flexibility in compact cable sizes. At the same time, it provides excellent optical transmission and physical performance.

1.3 Quality

Suppliers should ensure a continuing level of quality in our cable products through several quality control programs including ISO 9001.

1.4 Reliability

Both initial and periodic qualification testing are performed to assure the cable's performance and durability in the field environments. .

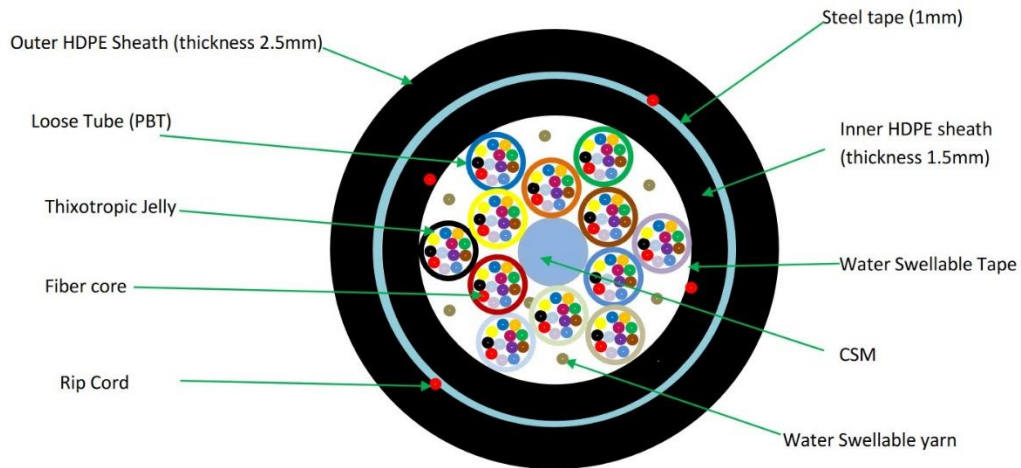
1.5 The cable are designed, manufactured and tested according to international standards as follow

B1.3(G652D) single mode fiber

Optics Specifications		
Attenuation(dB/km)	@1310nm	≤0.35db/km
	@1383nm (after hydrogen aging)	≤0.32db/km
	@1550nm	≤0.21db/km
	@1625nm	≤0.24db/km
Dispersion	@1285nm~1340nm	-3.0~3.0ps/(nm*km)
	@1550nm	≤18ps/(nm*km)
	@1625nm	≤22ps/(nm*km)
Zero-Dispersion wavelength		1300~1324nm
Zero-Dispersion slope		≤0.092ps/(nm ² *km)
Mode field diameter @ 1310nm		9.2 ± 0.4μm
Mode field diameter @ 1550nm		10.4 ± 0.8μm
PMD	Max. value for fiber on the reel	0.2ps/km 1/2
	Max. Designed value for link	0.08ps/km 1/2
Cable cutoff wavelength,λ cc		≤1260nm
Effective group index(Neff)@1310nm		1.4675
Effective group index(Neff)@1550nm		1.4680
Macro-bend loss(Φ 60mm,100 turns)@1550nm		≤0.05db
Back scatter characteristic(@1310nm&1550nm)		
Point discontinuity		≤0.05db
Attenuation uniformity		≤0.05db/km
Attenuation coefficient difference for bi-directional measurement		≤0.05db/km
Geometrical characteristics		
Cladding diameter		125±1μm
Cladding non-circularity		≤1%
Core/cladding concentricity error		≤0.4μm
Fiber diameter with coating(uncolored)		245±5μm
Cladding/coating concentricity error		≤12.0μm
Curl		≥4m
Mechanical characteristic		
Proof test		0.69GPa
Coating strip force(typical value)		1.4N
Dynamic stress corrosion susceptibility parameter(typical value)		≥20
Environmental characteristics(@1310nm&1550nm)		
Temperature induced attenuation(-60~+85°C)		≤0.5dB/km
Dry heat induced attenuation(85 ± 2°C,30days)		≤0.5dB/km
Water immersion induced attenuation(23 ± 2°C,30days)		≤0.5dB/km
Damp heat induced attenuation(85 ± 2°C,RH85%,30days)		≤0.5dB/km

6.Cable structure

144c Underground Fiber cable, Cross sectional view



Technical Characteristics

Characteristics

- Excellent mechanical and temperature performance guaranteed by the accurate excess fiber length
- Critical protection to fibers,
- Excellent crush resistance and flexibility
- The following measures are taken to ensure the water blocking performance of the cable:

- Single steel wire used as the central strength member
- Special water-blocking filling compound in the loose tube.

PSP moisture barrier

- 100% cable core filling and water-blocking material

Fiber count	144
Max. No of loose tube / filler No.	12/0
Fiber No. per tube	12
Loose tube diameter	1.9±0.2mm
Central strength member diameter (Steel)	2.1±0.2mm
Outer & inner sheath thickness	2.5mm & 1.5mm HDPE Black
Cable OD mm	18.2
Cable weight kg/km	283
Armored	Steel tape (1 mm)
Operation temperature range	-40 °C to + 70 °C
Installation temperature range	-40 °C to + 70 °C
Transport and storage temperature range	-40 °C to + 70 °C
Allowable Tensile Load(N)	Short term:4000 Long term:3000
Crush resistance	Short term 3000 N/100mm Long term :1000N/100MM
Minimal installation bending radius	20 x OD
Minimal operation bending radius	10 x OD

The fibres shall be marked by a coloured coating with 12 different colours according to EIA/TIA 598:

1	2	3	4	5	6
7	8	9	10	11	12

TEST REQUIREMENTS

Approved by various professional optical and communication product institution. Suppliers should also conduct various in-house testing in its own Laboratory and Test Center.

The cable is in accordance with applicable standard of cable and requirement of customer.

The following test items are carried out according to corresponding reference.

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<i>Cladding diameter</i>	<i>IEC 60793-1-20</i>
<i>Cladding non-circularity</i>	<i>IEC 60793-1-20</i>
<i>Attenuation coefficient</i>	<i>IEC 60793-1-40</i>
<i>Chromatic dispersion</i>	<i>IEC 60793-1-42</i>
<i>Cable cut-off wavelength</i>	<i>IEC 60793-1-44</i>

Test for outdoor cable

4.1 Tension Loading Test

Test Standard	IEC 60794-3-10
Sample length	No less than 50 meters
Load	Max. installation load
Duration time	1 hour
Test results	Additional attenuation:≤0.05dB No damage to outer jacket and inner elements

4.2 Crush/Compression Test

Test Standard	IEC 60794-3-10
Load	Crush load
Plate size	100mm length
Duration time	1 minute
Test number	1
Test results	Additional attenuation:≤0.05dB No damage to outer jacket and inner elements

4.3 Impact Resistance Test

Test Standard	IEC 60794-3-10
Impact energy	6.5J
Radius	12.5mm
Impact points	3
Impact number	2
Test result	Additional attenuation:≤0.05dB

4.4 Repeated Bending Test

Test Standard	IEC 60794-3-10
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Bending radius	20 X diameter of cable
Cycles	25 cycles
Test result	Additional attenuation: $\leq 0.05\text{dB}$ No damage to outer jacket and inner elements

4.5 Torsion/Twist Test

Test Standard	IEC 60794-3-10
Sample length	2m
Angles	± 180 degree
cycles	10
Test result	Additional attenuation: $\leq 0.05\text{dB}$ No damage to outer jacket and inner elements

4.6 Bend Test

Test Standard	IEC 60794-3-10
Mandrel diameter	20 X diameter of cable
Turn number	4
Number of cycles	3
Temperature	20°C
Test result	No damage to outer jacket and inner elements

4.7 Temperature cycling Test

Test Standard	IEC 60794-3-10
Temperature step	+20°C → -40°C → +85°C → +20°C
Time per each step	Transition from 0°C to -40°C:2hours; duration at -40°C:8 hours; Transition from -40°C to +85 °C:4hours; duration at +85°C:8 hours; Transition from +85°C to 0°C:2hours
Cycles	5
Test result	Attenuation variation for reference value (the attenuation to be measured before test at $+20 \pm 3^\circ\text{C}$) ≤ 0.05 dB/km

4.8 Water penetration Test

Test Standard	IEC 60794-3-10
---------------	----------------

Height of water column	1m
Sample length	1m
Test time	1 hour
Test result	No water leakage from the opposite of the sample

4.9 Drip Test

Test Standard	IEC 60794-3-10
Sample length	0.3m
Temperature	70 °C
Duration	24 hrs
Test result	No filling compound shall drip from tubes

9.PACKING AND DRUM

T cables are packed in carton, coiled on Bakelite & wooden drum. During transportation, right tools should be used to avoid damaging the package and to handle with ease. Cables should be protected from moisture; kept away from high temperature and fire sparks; protected from over bending and crushing; protected from mechanical stress and damage.

