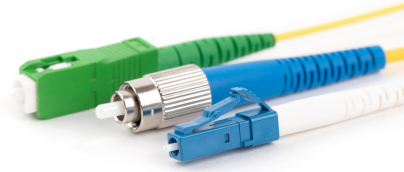
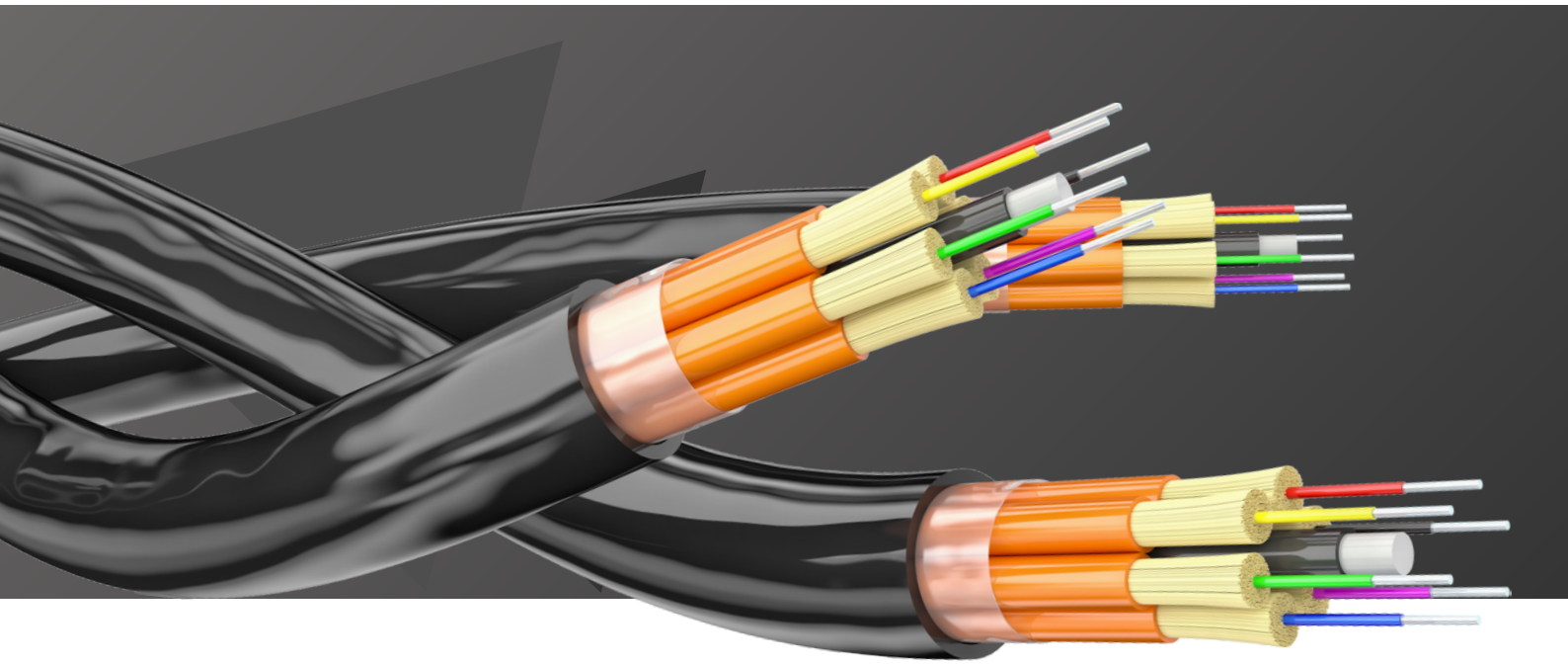


PRODUCT FIBER OPTIC



สายใยแก้วนำแสง สำหรับโครงการจัดซื้อภาครัฐ



Fiber Optic

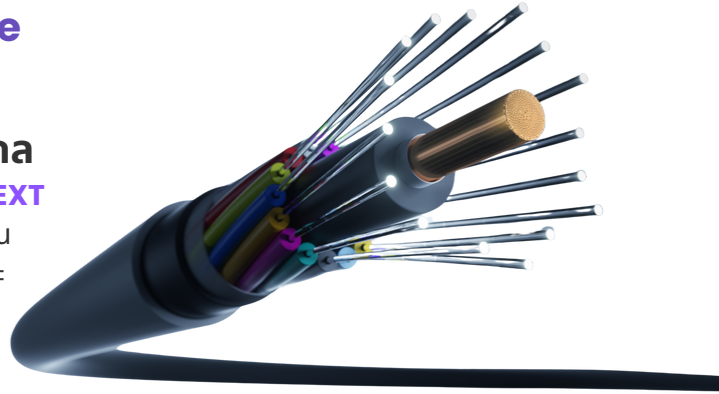
Connecting the Future with Reliable Network Infrastructure

มาตรฐานการออกแบบและคุณภาพระดับสากล

สายใยแก้วนำแสง (Fiber Optic Cable) แบบ **TSP NEXT** ผลิตขึ้นตามข้อกำหนดด้านการออกแบบและมาตรฐานการปฏิบัติในอุตสาหกรรมไฟเบอร์อปติก โดยมุ่งเน้นทั้งคุณภาพการใช้งานและความทนทาน เพื่อให้ตอบโจทย์ทุกโครงการด้านโครงข่ายสื่อสาร

คุณภาพที่มั่นใจได้จากโรงงานผู้ผลิต

TSP NEXT รับประกันคุณภาพและความเสถียร ด้วยระบบการควบคุมคุณภาพที่เข้มงวดตั้งแต่ขั้นตอนการผลิตในโรงงาน จึงมั่นใจได้ว่าสินค้าทุกเส้นผ่านมาตรฐานเดียวกัน



มอก. 2166-2548

มาตรฐานรับรองระดับโลก

ผลิตภัณฑ์สายไฟเบอร์อปติก TSP ผ่านการรับรองมาตรฐานสากลหลายรายการ อาทิ

- ISO 9001 : ระบบบริหารคุณภาพ
- ISO 14001 : ระบบการจัดการสิ่งแวดล้อม
- มอก. 2166-2548

ด้วยมาตรฐานเหล่านี้ ทำให้สายใยแก้วนำแสง **TSP NEXT** เป็นตัวเลือกที่มั่นใจได้ สำหรับทุกโครงการที่ต้องการความน่าเชื่อถือและคุณภาพสูงสุด

เหมาะสำหรับโครงการภาครัฐและงานจัดซื้อจัดจ้าง

สายใยแก้วนำแสง **TSP NEXT** ได้รับการออกแบบและผลิตขึ้นเพื่อตอบโจทย์ความต้องการของโครงการภาครัฐโดยเฉพาะ ทั้งในด้านมาตรฐานคุณภาพ ความน่าเชื่อถือ และการรองรับข้อกำหนดทางเทคนิคที่ใช้ในกระบวนการจัดซื้อจัดจ้างภาครัฐ (e-Bidding) สินค้าทุกชิ้นผ่านการรับรองตามมาตรฐานสากล พร้อมเอกสารรับรองครบถ้วน ทำให้สามารถนำไปใช้ยื่นประกวดราคาและติดตั้งในโครงการภาครัฐได้อย่างมั่นใจ

ด้วยคุณสมบัติที่โดดเด่นด้านความเสถียร ความทนทาน และการรับรองที่ถูกต้องตามข้อกำหนด สายไฟเบอร์อปติก **TSP NEXT** จึงเป็นตัวเลือกที่ตอบโจทย์หน่วยงานราชการ องค์กรภาครัฐ และโครงการโครงข่ายสื่อสารระดับประเทศได้อย่างสมบูรณ์แบบ

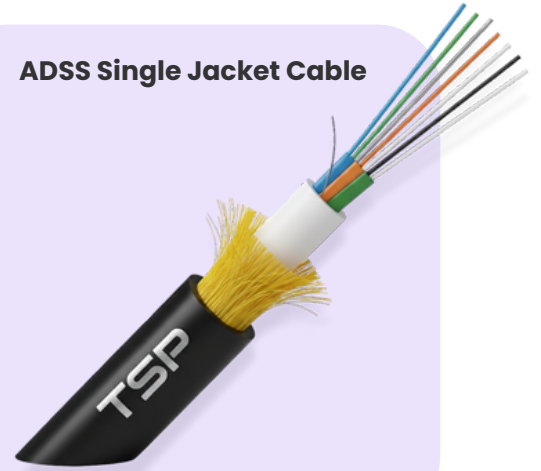
- โครงการระบบกล้องโทรทัศน์วงจรปิด (CCTV System)
- โครงการ Smart City / Smart Pole / Smart Infrastructure
- โครงการระบบเครือข่ายอินเทอร์เน็ตและระบบ Network
- โครงการระบบโทรมาตร / ระบบ SCADA / ระบบควบคุมอัตโนมัติ
- โครงการเชื่อมโยงสถานศึกษา / หน่วยงานท้องถิ่น / โครงข่าย G-Cloud

Fiber Optic

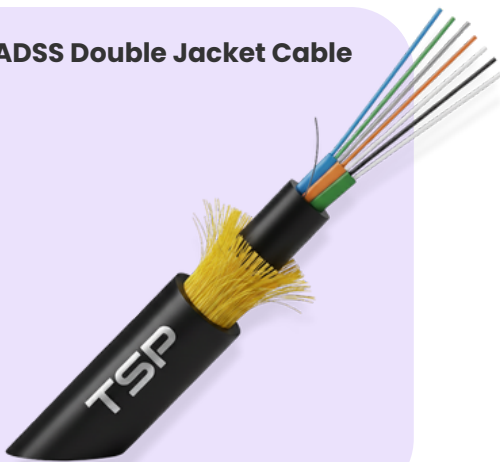
ADSS Single Jacket Cable

สายใยแก้วนำแสงแบบแขวนอากาศที่ออกแบบมาเพื่อการติดตั้งบนเสาไฟฟ้าหรือเสาโครงข่ายโดยไม่ต้องใช้ลวดสลิงเสริม เหมาะสำหรับงานวางระบบภายนอกอาคาร (**Outdoor**) ด้วยโครงสร้างเปลือกหุ้มชั้นเดียวที่แข็งแรง ทนต่อรังสี UV แสง ดึงลม และสภาพอากาศได้เป็นอย่างดี พร้อมปกป้องแกนไฟเบอร์ให้ส่งสัญญาณได้อย่างมีประสิทธิภาพสูงสุดในระยะไกล

ADSS Single Jacket Cable



ADSS Double Jacket Cable



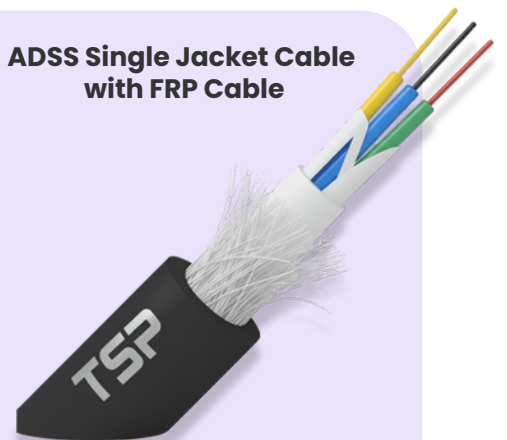
ADSS FIBER OPTIC DOUBLE JACKET

สายใยแก้วนำแสงแบบแขวนอากาศที่ออกแบบมาเพื่อรองรับการติดตั้งในสภาพแวดล้อมที่โหดร้ายและมีความเสี่ยงสูง เช่น พื้นที่ที่มีแรงลมสูง ฝนตกชุก หรือสภาพอากาศรุนแรง โครงสร้างแบบ **Double Jacket (เปลือกหุ้มสองชั้น)** ช่วยเพิ่มความทนทานต่อแรงกระแทก การเสียดสี และแสง UV ได้ดียิ่งขึ้น อีกทั้งยังช่วยยืดอายุการใช้งานของสายได้ยาวนานขึ้น

ADSS Single Jacket Cable with FRP Cable

สายใยแก้วนำแสงที่ออกแบบมาเพื่อติดตั้งกลางอากาศโดยไม่ต้องใช้ลวดสลิงเสริมแรง เหมาะสำหรับใช้งานในโครงข่ายสื่อสารที่ต้องการความเสถียร ปลอดภัย และติดตั้งได้รวดเร็ว สายชนิดนี้มี **โครงสร้าง FRP (Fiber Reinforced Plastic)** เป็นแกนเสริมแรงภายใน ช่วยเพิ่มความแข็งแรง ทนแรงดึง และทนต่อสภาพอากาศได้อย่างยอดเยี่ยม

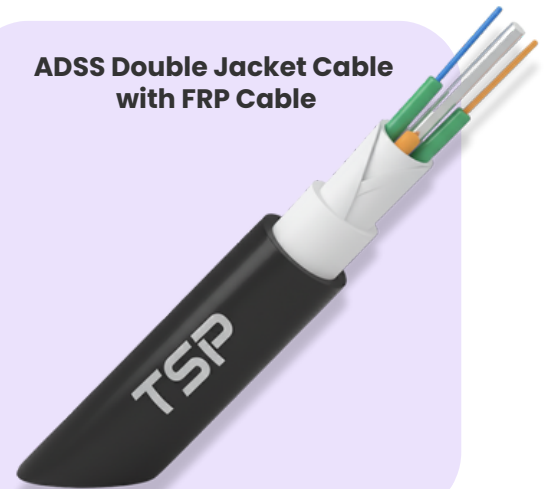
ADSS Single Jacket Cable with FRP Cable



ADSS Double Jacket Cable with FRP Cable

สายไฟเบอร์ออฟติกคุณภาพสูงที่ออกแบบมาเพื่อการติดตั้งกลางอากาศโดยไม่ต้องใช้ลวดสลิงเสริมแรง โครงสร้างภายในใช้ **FRP (Fiber Reinforced Plastic)** เป็นแกนรับแรง ช่วยเพิ่มความแข็งแรง ทนต่อแรงดึงสูง และลดการยืดตัวของสายแม้ในระยะทางไกลหรือพื้นที่ที่มีแรงลมสูง สายรุ่น **Double Jacket** มีฉนวนหุ้มสองชั้น ช่วยเพิ่มความทนทานต่อรังสี UV ความชื้น การกัดกร่อน และแรงกระแทก

ADSS Double Jacket Cable with FRP Cable



ARSS Single Jacket Cable



ARSS Single Jacket Cable

สายใยแก้วนำแสงชนิดกลมที่ออกแบบมาให้สามารถติดตั้งกลางอากาศได้โดยตรง โดยไม่ต้องมีโครงสร้างโลหะหรือสายสลิงในตัว โครงสร้างแบบ Self-Supporting หมายถึงสายสามารถพยุ่งตัวเองได้เมื่อติดตั้งบนเสาไฟฟ้าหรือโครงสร้างรองรับ จึงเหมาะสมอย่างยิ่งกับการใช้งานในระบบโครงข่ายสื่อสารที่ต้องการความเร็ว คล่องตัว และไม่ซับซ้อน รุ่น Single Jacket มาพร้อมกับฉนวนหุ้มชั้นเดียวที่มีความทนทานสูง และยืดหยุ่น เหมาะสำหรับเดินสายในเขตชุมชน

ARSS Double Jacket Cable

สายใยแก้วนำแสงชนิดกลมที่ออกแบบมาให้สามารถติดตั้งกลางอากาศได้โดยตรง โดยไม่ต้องใช้ลวดสลิงในตัว โครงสร้างแบบ Self-Supporting หมายถึงสายสามารถรับน้ำหนักตัวเองได้เมื่อเดินสายบนเสาไฟฟ้าหรือโครงสร้างรองรับ เหมาะอย่างยิ่งกับระบบโครงข่ายไฟเบอร์ที่ต้องการความแข็งแรง เสถียร และทนทานต่อสภาพอากาศภายนอก รุ่น Double Jacket มาพร้อมฉนวนป้องกัน 2 ชั้น ที่เพิ่มระดับความทนทานและอายุการใช้งานให้ยาวนานยิ่งขึ้น

ARSS Double Jacket Cable



Hot Stamp Printing

เพิ่มความเป็นเอกลักษณ์ให้สายไฟเบอร์ของคุณ

เพื่อรองรับความต้องการที่หลากหลายของโครงการระดับมืออาชีพ เราพร้อมให้บริการ **“Hot Stamp Printing”** หรือการ สกรีนข้อความลงบนสายไฟเบอร์ออฟติกโดยตรงจากโรงงาน ซึ่งเป็นกระบวนการพิมพ์ถาวรที่คมชัด ไม่ลอกง่าย และทนต่อทุกสภาพแวดล้อม การสกรีนด้วยระบบ **Hot Stamp** ช่วยให้คุณสามารถ เพิ่มข้อมูลเฉพาะตัวของโครงการหรือหน่วยงาน ลงบนตัวสาย เช่น



- **ชื่อหน่วยงาน** – สำหรับโครงการภาครัฐ หน่วยงานราชการ หรือองค์กร
- **ชื่อโครงการ / สัญญา** – เพื่อความชัดเจนในการระบุจุดติดตั้งและความเป็นเจ้าของ
- **ข้อความเฉพาะ / Serial Number / Lot Number** – เพิ่มมาตรการด้านความปลอดภัยและการติดตาม.

ข้อความที่สกรีนจะมีลักษณะ ถาวร ชัดเจน ทนต่อแสงแดด ความร้อน และสภาพอากาศ เหมาะอย่างยิ่งสำหรับงานติดตั้งภายนอกที่ต้องการอายุการใช้งานยาวนานและสามารถตรวจสอบย้อนกลับได้ตลอดอายุการใช้งานของสาย

ประโยชน์ของ Hot Stamp Printing

-  **เพิ่มความเป็นเอกลักษณ์** – ระบุข้อมูลเฉพาะของหน่วยงานหรือโครงการบนสายโดยตรง
-  **ช่วยระบุแหล่งใช้งานได้ง่าย** – เหมาะกับงานภาครัฐหรือระบบโครงข่ายขนาดใหญ่
-  **เพิ่มความเป็นมืออาชีพ** – เสริมภาพลักษณ์และมาตรฐานของโครงการ
-  **รองรับการจัดการและตรวจสอบ** – ใช้ในการติดตามสายแต่ละล๊อตหรือ Serial ได้อย่างมีระบบ

Hot Stamp Printing คืออีกหนึ่งบริการที่ช่วยยกระดับมาตรฐานการติดตั้งสายไฟเบอร์ออฟติกให้ครบวงจร ตั้งแต่โครงสร้างภายในจนถึงรายละเอียดภายนอก ตอบโจทย์ทั้งงานภาครัฐและเอกชนที่ต้องการความแตกต่างและความเป็นมืออาชีพในทุกขั้นตอน

FIBER OPTIC CABLE

ADSS FIBER OPTIC SINGLE JACKET

This specification covers design requirements and performance standards for procurement of fiber optic cables in the fiber industry. TSP brand guarantees a stable quality control system for us from the factory. Cable products pass several programs including ISO 9001, ISO 14001 and ROHS.

// PRODUCT DESCRIPTION

- Single Mode (9/125 μm)
- The cable shall be used for aerial or duct installed.
- Provide additional mechanical protection.
- low friction installation.
- Excellent protection from environmental hazards.
- Color code fiber and Loose tube in standard.

// APPLICATION

- Ethernet LAN Network, CCTV Camera , ETC
- Optical fibre cables supplied in compliance with this specifications is capable to withstand the typical service condition for a period of 30 years without detriment to the operation characteristics of the cable.
- Outdoor environment with high electric field strength in the Power communication system and the area where frequent thunder happens suitable for both aerial or duct installation.

// STANDARD

- ATM, FDDI, FTTX, Fiber Channel, CATV, Communication
- ISO/IEC 11801:2007, ISO/IEC 11801:2011 (Ed.2.2)
- ANSI/TIA/EIA-568-B.3, ANSI/TIA-568-C.3, ANSI/TIA-568.3-D, ANSI/ICEA 640
- Telcordia (Bellcore) GR-20 CORE, GR-409-CORE
- ANSI/ICEA 596, ICEA 696, IEC 61034-2, IEC 60754-2, IEC 60793, IEC 60794-1-2
- ITU-T G.652D, ITU-T G.657A2
- TIA/EIA-598-C (Rev. TIA/EIA-598-A), EIA-359-A.
- IEEE 802.3z, IEEE 802.3ae, IEEE 802.3 (LAN, Ethernet Fast Ethernet, Gigabit Ethernet and 10 Gigabit Ethernet 40-100 Gbps)
- RoHS Compliant
- TIS 2166-2548
- GB/T 12706-2008 Standard



// CONSTRUCTION CABLE

Cable type		ADSS
Element	-	5
Central strength member	Material	FRP 1.5mm
Loose tube	Material	PBT
	Diameter	2.0 ± 0.2 mm
	-	6 fiber per tube, Thixotropic Jelly compound.
water blocking element	Material	Water -blocking tape and Water Swallable yarn
Strength member	Material	Aramid yarns
	Thickness	0.5 mm
Outer Sheath	Material	UV-Proof Black HDPE (non Rodent Repellent / Rodent Repellent)
	Thickness	1.8±0.2mm
Tensile Load	Short term	4000N
	Long term	1800N
	Pressure	2200N/10CM
Overall diameter	Diameter	9.5 mm
Weight	-	Approx. 43±10 kg/km
Span Length		40-80m
Temperature Range	Operation	-40 + 70°C
	Storage	-40 + 75°C
	Installing	-40 + 70°C
Relative humidity		Up to 90%, no frost
Pole mount	-	80 m and wind force 128 Km/hr
Bending	Installing	20
	Using	10
Rip Cord	Material	Polyester cords or Aramid yarn
	Number	One

// BUFFER TUBE STRANDING

Fiber count	Fiber number per tube	Number of tube / filler	Nom. Diameter(mm)	Nom. Weight(kg/km)
12	6	2/3	11.4 - 12	100
24	6	4/1	11.4 - 12	100
48	12	4/1	11.8 - 12.5	105
60	12	5/0	11.8 - 12.5	105

// OPTICAL FIBER CHARACTERISTICS

CATEGORY	DESCRIPTION	SPECIFICATIONS
Optical Specifications		ITU-T G.652D(Singlemode OS2) 9/125 μm (OS2) ITU-T G651(Multimode) 62.5/125 μm , 50/125 μm
Attenuation	@1310nm	$\leq 0.35/\leq 0.33\text{dB/km}$
	@1383nm	$\leq 0.35/\leq 0.31\text{dB/km}$
	@1490nm	$\leq 0.24\text{db/km}$
	@1550nm	$\leq 0.21/\leq 0.19\text{dB/km}$
	@1625nm	$\leq 0.23/\leq 0.20\text{dB/km}$
Attenuation discontinuity		$\leq 0.05\text{ dB}$
Attenuation vs. Wavelength	1285 -1330 @1310nm	$\leq 0.05\text{ dB/km}$
	1525 -1575@1550nm	$\leq 0.05\text{ dB/km}$
Zero dispersion wavelength		1300 -1324 nm
Zero dispersion slope		$\leq 0.092\text{ ps}/(\text{nm}^2.\text{km})$
Dispersion	@1310nm	$\leq 3.5\text{ ps}/\text{nm.km}$
	@1550nm	$\leq 18\text{ ps}/\text{nm.km}$
Polarization mode dispersion(PMD)		$\leq 0.1\text{ ps}/\text{km}^{1/2}$
Cable cutoff wavelength (λ_{cc})		$\leq 1260\text{ nm}$
Effective group index of reaction	@1310nm	1.4675
	@1550nm	1.4681
Geometric Specifications		
Mode field diameter	@1310nm	$9.2 \pm 0.6\text{ }\mu\text{m}$
	@1550nm	$10.4 \pm 0.8\text{ }\mu\text{m}$
Cladding diameter		$125 \pm 1\text{ }\mu\text{m}$
Cladding non -circularity		$\leq 1.0\%$
Coating Material	Material	UV curable acrylate
	Diameter	$250 \pm 5\text{ }\mu\text{m}$
Coating/Cladding concentricity error		$\leq 12\text{ }\mu\text{m}$
Core/Cladding concentricity error		$\leq 0.5\text{ }\mu\text{m}$
Color Fiber Diameter		$250\text{ }\mu\text{m} \pm 15\text{ }\mu\text{m}$ (Colored)
Fiber proof-tested		0.69 GPa (1.0%, 100kpsi) in accordance with the optical fiber proof test by IEC 60793-1-30

// OPTICAL FIBER CHARACTERISTICS

CATEGORY	DESCRIPTION	SPECIFICATIONS
Optical Specifications		ITU-T G.652D(Singlemode OS2) 9/125 μm (OS2) ITU-T G651(Multimode) 62.5/125 μm , 50/125 μm
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	@1490nm	$\leq 0.24\text{db/km}$
	@1550nm	$\leq 0.21/\leq 0.19\text{dB/km}$
	@1625nm	$\leq 0.23/\leq 0.20\text{dB/km}$
Attenuation discontinuity		$\leq 0.05\text{ dB}$
Attenuation vs. Wavelength	1285 -1330 @1310nm	$\leq 0.05\text{ dB/km}$
	1525 -1575@1550nm	$\leq 0.05\text{ dB/km}$
Zero dispersion wavelength		1300 -1324 nm
Zero dispersion slope		$\leq 0.092\text{ ps}/(\text{nm}^2.\text{km})$
Dispersion	@1310nm	$\leq 3.5\text{ ps}/\text{nm.km}$
	@1550nm	$\leq 18\text{ ps}/\text{nm.km}$
Polarization mode dispersion(PMD)		$\leq 0.1\text{ ps}/\text{km}^{1/2}$
Cable cutoff wavelength (λ_{cc})		$\leq 1260\text{ nm}$
Effective group index of reaction	@1310nm	1.4675
	@1550nm	1.4681
Geometric Specifications		
Mode field diameter	@1310nm	$9.2 \pm 0.6\text{ }\mu\text{m}$
	@1550nm	$10.4 \pm 0.8\text{ }\mu\text{m}$
Cladding diameter		$125 \pm 1\text{ }\mu\text{m}$
Cladding non -circularity		$\leq 1.0\%$
Coating Material	Material	UV curable acrylate
	Diameter	$250 \pm 5\text{ }\mu\text{m}$
Coating/Cladding concentricity error		$\leq 12\text{ }\mu\text{m}$
Core/Cladding concentricity error		$\leq 0.5\text{ }\mu\text{m}$
Color Fiber Diameter		$250\text{ }\mu\text{m} \pm 15\text{ }\mu\text{m}$ (Colored)
Fiber proof-tested		0.69 GPa (1.0%, 100kpsi) in accordance with the optical fiber proof test by IEC 60793-1-30

// OPTICAL FIBER CHARACTERISTICS

CATEGORY	DESCRIPTION	SPECIFICATIONS
Mechanical Specifications		
Proof test level		$\geq 1.0\%$
Fiber curl radius		≥ 4.0 m
Peak coating strip force		1.3 - 8.9N
Relative humidity		Up to 90%, no frost
Maximum Span Length	Sag 0.5%	40 m.
	Sag 1.0%	80 m.
Maximum Wind Velocity		80 m and wind force 126 Km/hr
Max. Tensile load	Installation	4000 N. for 6-120 Cores
	Operation	1800 N. for 6-120 Cores
Maximum Crush resistance		2200 N./10 cm.
Minimum bending Radius	Installation	20 x Diameter of Cable
	Operation	10 x Diameter of Cable

// IDENTIFICATION COLOR CODE OF FIBER AND LOOSE TUBE

The color code of the loose tubes and the individual fibers within each loose tube shall be in accordance TIA/EIA-598-C (Rev.TIA/EIA-598-A) and EIA-359-A

NO.	FIBER COLOR	LOOSE TUBE COLOR
1	Blue	Blue
2	Orange	Orange
3	Green	Green
4	Brown	Brown
5	Slate	Slate
6	White	White
7	Red	Red
8	Black	Black
9	Yellow	Yellow
10	Violet	Violet
11	Rose	Rose
12	Aqua	Aqua

// PACKING AND DRUM

Standard reel length: 4 km/reel, other length is also available. The cables are packed in fumigated wooden drums.

Unless otherwise specified, the cable sheath marking shall be as follows:

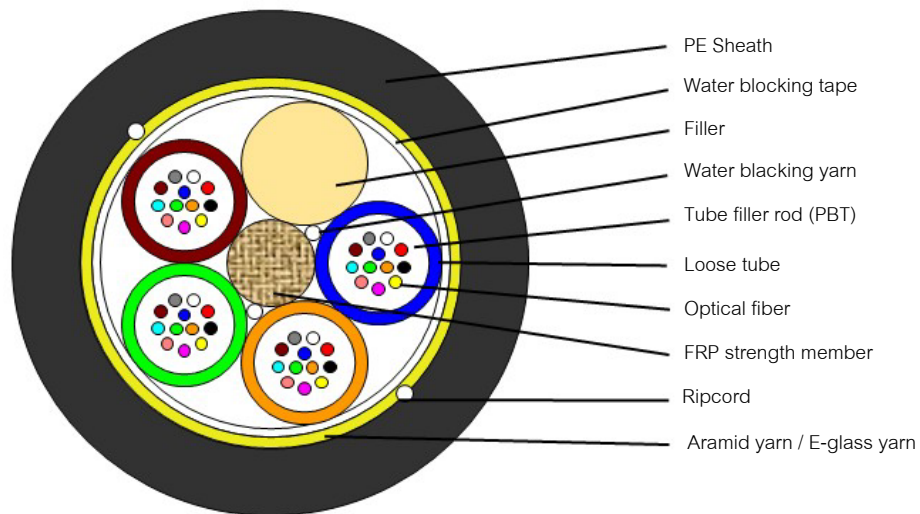
- Color: white.
- Contents: TSP, the year of manufacture, the type of cable, cable number, length marking , Name of organization in English, Thai, Chinese, etc.
- Format to choose from: screen, hot stamp, laser.
- Interval: 1 m.

(Outer sheath marking legend can be changed according to user's requests.)

// TEST REQUIREMENTS

Item	Method	Acceptance criteria
Tensile test	- Max. tensile strength: 3000 N	-Fiber strain at maximum
IEC 60794-1-2-E1A	- Sample length: 100 meter	-Load max. 0.33 %
TIA/EIA-455-33A	- Times: 1 hour	-Attenuation increase ≤ 0.1 dB
Crush or Compression test	- Load: 2200 N	-No splits or cracks in the outer jacket
IEC 60794-1-2-E3	- Time: 10 minute	-Attenuation increase ≤ 0.10 dB
TIA/EIA-455-41A	- Length: 100 m	
Impact test	- Impact energy: 450	- No splits or cracks in the outer jacket
IEC 60794-1-2-E4	- Height: 1 meter	-Attenuation increase ≤ 0.10 dB (after the test)
TIA/EIA-455-25C	- Impact points: min. - Number of impacts:	
Torsion or Twist test	- 1 m cable length with 150 N weight	- No splits or cracks in the outer jacket
IEC 60794-1-2-E7	- $\pm 180^\circ$, 10 cycle	-Attenuation increase ≤ 0.10 dB (after the test)
TIA/EIA-455-85A		
Repeated bending Cable bending Test	- Radius = $20 \times$ cable outer diameter - 1m cable length with 150 N weight, 30 cycle	- No splits or cracks in the outer jacket -Attenuation increase ≤ 0.10 dB (after the test)
IEC 60794-1-2-E6, TIA/EIA-455-104A IEC 60794-1-2-E11B		
Temperature cycling test	- Temperature step: $+20^\circ\text{C} -40^\circ\text{C} +70^\circ\text{C} -40^\circ\text{C}$ $+70^\circ\text{C} +20^\circ\text{C}$	-Attenuation variation for reference value(the attenuation to be measured before test at $+20 \pm 3$) ≤ 0.10 dB/km
IEC 60794-1-2-F1		
TIA/EIA-455-3A	- Time per each step: 16 hrs. - Number of cycles: 2 cycles	
Water penetration test	- Water height: 1	-No water leakage at the end of the sample
IEC 60794-1-2-F5	- Sample length: 3	
TIA/EIA-455-82B	- Duration of test: 24hr	
Drip test	- Five 0.3m samples suspended vertically in a climate chamber, raised temperature to $+70^\circ\text{C}$	-No filling compound shall drip from tubes after 24 hrs.
IEC 60794-1-2-E14		

STRUCTURE DESIGN



ORDER INFORMATION

NO. OF CORE	DESCRIPTION
6	Indoor/Outdoor, 6C ADSS, Single Jacket, Single Mode 9/125 μm
12	Indoor/Outdoor, 12C ADSS, Single Jacket, Single Mode 9/125 μm
24	Indoor/Outdoor, 24C ADSS, Single Jacket, Single Mode 9/125 μm
48	Indoor/Outdoor, 48C ADSS, Single Jacket, Single Mode 9/125 μm
60	Indoor/Outdoor, 60C ADSS, Single Jacket, Single Mode 9/125 μm
96	Indoor/Outdoor, 96C ADSS, Single Jacket, Single Mode 9/125 μm
120	Indoor/Outdoor, 120C ADSS, Single Jacket, Single Mode 9/125 μm



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FIBER OPTIC CABLE

ADSS FIBER OPTIC DOUBLE JACKET

This specification covers design requirements and performance standards for procurement of fiber optic cables in the fiber industry. TSP brand guarantees a stable quality control system for us from the factory. Cable products pass several programs including ISO 9001, ISO 14001 and ROHS.

// PRODUCT DESCRIPTION

- Single Mode (9/125 μm)
- The cable shall be used for aerial or duct installed.
- Provide additional mechanical protection.
- low friction installation.
- Excellent protection from environmental hazards.
- Color code fiber and Loose tube in standard.

// APPLICATION

- Ethernet LAN Network, CCTV Camera , ETC
- Optical fibre cables supplied in compliance with this specifications is capable to withstand the typical service condition for a period of 30 years without detriment to the operation characteristics of the cable.
- Outdoor environment with high electric field strength in the Power communication system and the area where frequent thunder happens suitable for both aerial or duct installation.

// STANDARD

- ATM, FDDI, FTTX, Fiber Channel, CATV, Communication
- ISO/IEC 11801:2007, ISO/IEC 11801:2011 (Ed.2.2)
- ANSI/TIA/EIA-568-B.3, ANSI/TIA-568-C.3, ANSI/TIA-568.3-D, ANSI/ICEA 640
- Telcordia (Bellcore) GR-20 CORE, GR-409-CORE
- ANSI/ICEA 596, ICEA 696, IEC 61034-2, IEC 60754-2, IEC 60793, IEC 60794-1-2
- ITU-T G.652D, ITU-T G.657A2
- TIA/EIA-598-C (Rev. TIA/EIA-598-A), EIA-359-A.
- IEEE 802.3z, IEEE 802.3ae, IEEE 802.3 (LAN, Ethernet Fast Ethernet, Gigabit Ethernet and 10 Gigabit Ethernet 40-100 Gbps)
- RoHS Compliant
- TIS 2166-2548
- GB/T 12706-2008 Standard



// CONSTRUCTION CABLE

Cable type		ADSS
Element	-	6
Central strength member	Material	FRP (1.8mm)
Loose tube	Material	PBT
	Diameter	2.0mm
	-	6 fiber per tube, Thixotropic Jelly compound.
Protective tape	Material	Water-blocking tape and Water Swallable yarn
Strength member	Material	Aramid yarns/E-glass yarn
Outer Sheath	Material	UV-Proof Black HDPE (non Rodent Repellent / Rodent Repellent(LS2))
	Thickness	1.8 ± 0.2 mm
Inner Sheath	Material	Black PE
	Material	Water blocking tape
Overall diameter	Diameter	13.4mm-16.4mm
Weight	-	Approx. 180kg/km
Tensile Load	Short term	5000N
	Long term	4000N
Bending radius	Short term	20H
	Long term	10H
Span		40-80m
Temperature Range	Operation	-40+70 °C
	Installation	-40+70 °C
	Storage	-40+75 °C
Pole mount		80 m and wind force 126 Km/hr
Rip Cord	Material	Polyester cords or Aramid yarn
	Number	2

// OPTICAL FIBER CHARACTERISTICS

CATEGORY	DESCRIPTION	SPECIFICATIONS
Mechanical Specifications		
Proof test level		≥1.0 %
Fiber curl radius		≥4.0 m
Peak coating strip force		1.3 - 8.9N
Relative humidity		Up to 90%, no frost
Maximum Span Length	Sag 0.5%	40 m.
	Sag 1.0%	80 m.
Maximum Wind Velocity		80 m and wind force 126 Km/hr
Max. Tensile load	Installation	5000 N.
	Operation	4000 N.
Maximum Crush resistance		3,400 N./10 cm.
Minimum bending Radius	Installation	20 x Diameter of Cable
	Operation	10 x Diameter of Cable

// OPTICAL FIBER CHARACTERISTICS

CATEGORY	DESCRIPTION	SPECIFICATIONS
Optical Specifications		ITU-T G.652D(Singlemode OS2) 9/125 μm (OS2) ITU-T G651(Multimode) 62.5/125 μm , 50/125 μm
Attenuation	@1310nm	$\leq 0.35/\leq 0.33\text{dB/km}$
	@1383nm	$\leq 0.35/\leq 0.31\text{dB/km}$
	@1490nm	$\leq 0.24\text{db/km}$
	@1550nm	$\leq 0.21/\leq 0.19\text{dB/km}$
	@1625nm	$\leq 0.23/\leq 0.20\text{dB/km}$
Attenuation discontinuity		$\leq 0.05\text{ dB}$
Attenuation vs. Wavelength	1285 -1330 @1310nm	$\leq 0.05\text{ dB/km}$
	1525 -1575@1550nm	$\leq 0.05\text{ dB/km}$
Zero dispersion wavelength		1300 -1324 nm
Zero dispersion slope		$\leq 0.092\text{ ps}/(\text{nm}^2.\text{km})$
Dispersion	@1310nm	$\leq 3.5\text{ ps}/\text{nm.km}$
	@1550nm	$\leq 18\text{ ps}/\text{nm.km}$
Polarization mode dispersion(PMD)		$\leq 0.1\text{ ps}/\text{km}^{1/2}$
Cable cutoff wavelength (λ_{cc})		$\leq 1260\text{ nm}$
Effective group index of reaction	@1310nm	1.4675
	@1550nm	1.4681
Geometric Specifications		
Mode field diameter	@1310nm	$9.2 \pm 0.6\text{ }\mu\text{m}$
	@1550nm	$10.4 \pm 0.8\text{ }\mu\text{m}$
Cladding diameter		$125 \pm 1\text{ }\mu\text{m}$
Cladding non -circularity		$\leq 1.0\%$
Coating Material	Material	UV curable acrylate
	Diameter	$250 \pm 5\text{ }\mu\text{m}$
Coating/Cladding concentricity error		$\leq 12\text{ }\mu\text{m}$
Core/Cladding concentricity error		$\leq 0.5\text{ }\mu\text{m}$
Color Fiber Diameter		$250\text{ }\mu\text{m} \pm 15\text{ }\mu\text{m}$ (Colored)
Fiber proof-tested		0.69 GPa (1.0%, 100kpsi) in accordance with the optical fiber proof test by IEC 60793-1-30

// IDENTIFICATION COLOR CODE OF FIBER AND LOOSE TUBE

The color code of the loose tubes and the individual fibers within each loose tube shall be in accordance TIA/EIA-598-C (Rev.TIA/EIA-598-A) and EIA-359-A

NO.	FIBER COLOR	LOOSE TUBE COLOR
1	Blue	Blue
2	Orange	Orange
3	Green	Green
4	Brown	Brown
5	Slate	Slate
6	White	White
7	Red	Red
8	Black	Black
9	Yellow	Yellow
10	Violet	Violet
11	Rose	Rose
12	Aqua	Aqua

// PACKING AND DRUM

Standard reel length: 4 km/reel, other length is also available. The cables are packed in fumigated wooden drums.

Unless otherwise specified, the cable sheath marking shall be as follows:

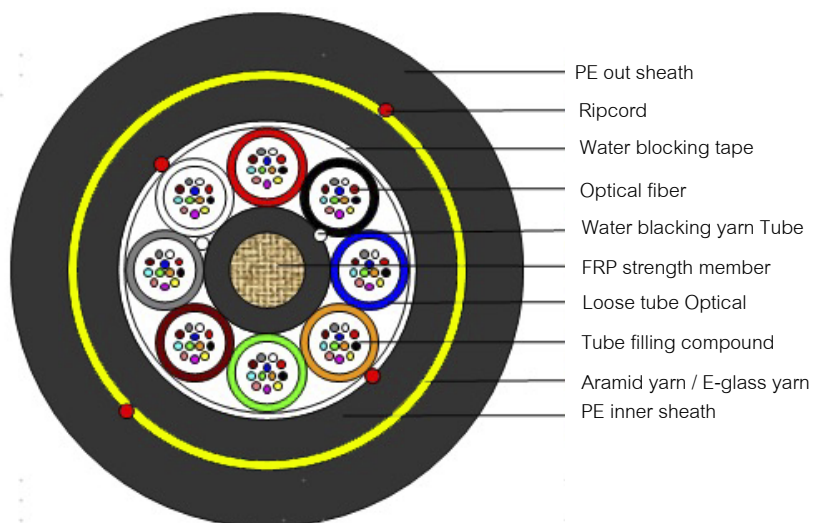
- Color: white.
- Contents: TSP, the year of manufacture, the type of cable, cable number, length marking , Name of organization in English, Thai, Chinese, etc.
- Format to choose from: screen, hot stamp, laser.
- Interval: 1 m.

(Outer sheath marking legend can be changed according to user's requests.)

// TEST REQUIREMENTS

Item	Method	Acceptance criteria
Tensile test	- Max. tensile strength: 3000 N	-Fiber strain at maximum
IEC 60794-1-2-E1A	- Sample length: 100 meter	-Load max. 0.33 %
TIA/EIA-455-33A	- Times: 1 hour	-Attenuation increase ≤ 0.1 dB
Crush or Compression test	- Load: 2200 N	-No splits or cracks in the outer jacket
IEC 60794-1-2-E3	- Time: 10 minute	-Attenuation increase ≤ 0.10 dB
TIA/EIA-455-41A	- Length: 100 m	
Impact test	- Impact energy: 450	- No splits or cracks in the outer jacket
IEC 60794-1-2-E4	- Height: 1 meter	-Attenuation increase ≤ 0.10 dB (after the test)
TIA/EIA-455-25C	- Impact points: min. - Number of impacts:	
Torsion or Twist test	- 1 m cable length with 150 N weight	- No splits or cracks in the outer jacket
IEC 60794-1-2-E7	- $\pm 180^\circ$, 10 cycle	-Attenuation increase ≤ 0.10 dB (after the test)
TIA/EIA-455-85A		
Repeated bending Cable bending Test	- Radius = $20 \times$ cable outer diameter - 1m cable length with 150 N weight, 30 cycle	- No splits or cracks in the outer jacket -Attenuation increase ≤ 0.10 dB (after the test)
IEC 60794-1-2-E6, TIA/EIA-455-104A IEC 60794-1-2-E11B		
Temperature cycling test	- Temperature step: $+20^\circ\text{C} -40^\circ\text{C} +70^\circ\text{C} -40^\circ\text{C}$ $+70^\circ\text{C} +20^\circ\text{C}$	-Attenuation variation for reference value(the attenuation to be measured before test at $+20 \pm 3$) ≤ 0.10 dB/km
IEC 60794-1-2-F1		
TIA/EIA-455-3A	- Time per each step: 16 hrs. - Number of cycles: 2 cycles	
Water penetration test	- Water height: 1	-No water leakage at the end of the sample
IEC 60794-1-2-F5	- Sample length: 3	
TIA/EIA-455-82B	- Duration of test: 24hr	
Drip test	- Five 0.3m samples suspended vertically in a climate chamber, raised temperature to $+70^\circ\text{C}$	-No filling compound shall drip from tubes after 24 hrs.
IEC 60794-1-2-E14		

STRUCTURE DESIGN



ORDER INFORMATION

NO. OF CORE	DESCRIPTION
6	Indoor/Outdoor, 6C ADSS, Double Jacket, Single Mode 9/125 μm
12	Indoor/Outdoor, 12C ADSS, Double Jacket, Single Mode 9/125 μm
24	Indoor/Outdoor, 24C ADSS, Double Jacket, Single Mode 9/125 μm
48	Indoor/Outdoor, 48C ADSS, Double Jacket, Single Mode 9/125 μm
60	Indoor/Outdoor, 60C ADSS, Double Jacket, Single Mode 9/125 μm
96	Indoor/Outdoor, 96C ADSS, Double Jacket, Single Mode 9/125 μm
120	Indoor/Outdoor, 120C ADSS, Double Jacket, Single Mode 9/125 μm



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FIBER OPTIC CABLE

ADSS FIBER OPTIC SINGLE JACKET FRP

This specification covers design requirements and performance standards for procurement of fiber optic cables in the fiber industry. TSP brand guarantees a stable quality control system for us from the factory. Cable products pass several programs including ISO 9001, ISO 14001 and ROHS.

// PRODUCT DESCRIPTION

- Single Mode (9/125 μm)
- The cable shall be used for aerial or duct installed.
- Provide additional mechanical protection.
- low friction installation.
- Excellent protection from environmental hazards.
- Color code fiber and Loose tube in standard.

// APPLICATION

- Ethernet LAN Network, CCTV Camera , ETC
- Optical fibre cables supplied in compliance with this specifications is capable to withstand the typical service condition for a period of 30 years without detriment to the operation characteristics of the cable.
- Outdoor environment with high electric field strength in the Power communication system and the area where frequent thunder happens suitable for both aerial or duct installation.

// STANDARD

- ATM, FDDI, FTTX, Fiber Channel, CATV, Communication
- ISO/IEC 11801:2007, ISO/IEC 11801:2011 (Ed.2.2)
- ANSI/TIA/EIA-568-B.3, ANSI/TIA-568-C.3, ANSI/TIA-568.3-D, ANSI/ICEA 640
- Telcordia (Bellcore) GR-20-CORE, GR-409-CORE
- ANSI/ICEA 596, ICEA 696, IEC 61034-2, IEC 60754-2, IEC 60793, IEC 60794-1-2, EN 50173
- ITU-T G.652D, ITU-T G.657A2
- TIA/EIA-598-C (Rev. TIA/EIA-598-A), EIA-359-A.
- IEEE 802.3z, IEEE 802.3ae, IEEE 802.3 (LAN, Ethernet Fast Ethernet, Gigabit Ethernet and 10 Gigabit Ethernet 40-100 Gbps)
- RoHS Compliant
- TIS 2166-2548
- GB/T 12706-2008 Standard



// CONSTRUCTION CABLE

Cable type		ADSS
Element	-	5
Fiber Optic	Material	Silica High Grade / Compound Glass
Central strength member	Material	FRP 1.8 ± 0.2 mm
Loose tube	Material	PBT
	Outer Diameter	2.0 ± 0.2 mm
	Inner Diameter	1.5 ± 0.2 mm
	-	6 fiber per tube, Thixotropic Jelly Compound
Protective tape	Material	Water -blocking tape : 0.3mm, Water blocking yarn : 0.3mm
Strength member	Material	Aramid yarns
Rodent Protection Armor	Material	Flat FRP Non-Metallic type (FRP: Fiber Reinforced Plastics)
		Nominal thickness 1.0 ± 0.2 mm
Outer Sheath	Material	Black HDPE (non Rodent Repellent/Rodent Repellent)
	Thickness	1.8 ± 0.2 mm
Rip Cord	Material	Polyester
	No.	2
Filler Rod	Material	Polyethylene, natural Color
	Diameter	2.2 mm ± 0.2 mm
Stranding method	-	Reverse oscillating lay (ROL) technique (SZ Direction)
	-	Lay - length 75 mm ± 5 mm
Tensile Load	Short term	4000 N
	Long term	2500 N
	Pressure	≥ 3400 N / 10 cm
Overall diameter	Diameter	9.5 - 12 mm
Cable diameter	Diameter (24/48 core)	10.5 ± 1mm / 11.5 ± 1mm.
Weight	(24/48 core)	Approx. 85 / 100±10 kg/km
Span Length		40-100m
Water Blocking Element		Dry-core technology
Width		≥ 126 km/hr
Temperature Range	Operation Temperature	-40°C to +70 °C
	Installation Temperature	-40°C to +70 °C
	Storage/Shipping Temperature	-40°C to +75°C
Color Stripe		3 mm ± 0.5mm

// BUFFER TUBE STRANDING

Fiber count	Fiber number per tube	Number of tube / filler	Nom. Diameter(mm)	Nom. Weight(kg/km)
12	6	2/3	11.4 - 12	100
24	6	4/1	11.4 - 12	100
48	12	4/1	11.8 - 12.5	105
60	12	5/0	11.8 - 12.5	105

// OPTICAL FIBER CHARACTERISTICS

CATEGORY	DESCRIPTION	SPECIFICATIONS
Optical Specifications		ITU-T G.652D(Singlemode OS2) 9/125 μm (OS2) ITU-T G651(Multimode) 62.5/125 μm , 50/125 μm
Attenuation	@1310nm	$\leq 0.35/\leq 0.33\text{dB/km}$
	@1383nm	$\leq 0.35/\leq 0.31\text{dB/km}$
	@1490nm	$\leq 0.24\text{dB/km}$
	@1550nm	$\leq 0.21/\leq 0.19\text{dB/km}$
	@1625nm	$\leq 0.23/\leq 0.20\text{dB/km}$
Attenuation discontinuity		$\leq 0.05\text{ dB}$
Attenuation vs. Wavelength	1285 -1330 @1310nm	$\leq 0.05\text{ dB/km}$
	1525 -1575@1550nm	$\leq 0.05\text{ dB/km}$
Zero dispersion wavelength		1300 -1324 nm
Zero dispersion slope		$\leq 0.092\text{ ps}/(\text{nm}^2.\text{km})$
Dispersion	@1310nm	$\leq 3.5\text{ ps}/\text{nm.km}$
	@1550nm	$\leq 18\text{ ps}/\text{nm.km}$
Polarization mode dispersion(PMD)		$\leq 0.1\text{ ps}/\text{km}^{1/2}$
Cable cutoff wavelength (λ_{cc})		$\leq 1260\text{ nm}$
Effective group index of reaction	@1310nm	1.4675
	@1550nm	1.4681
Geometric Specifications		
Mode field diameter	@1310nm	$9.2 \pm 0.6\text{ }\mu\text{m}$
	@1550nm	$10.4 \pm 0.8\text{ }\mu\text{m}$
Cladding diameter		$125 \pm 1\text{ }\mu\text{m}$
Cladding non-circularity		$\leq 1.0\%$
Coating Material	Material	UV curable acrylate
	Diameter	$250 \pm 5\text{ }\mu\text{m}$
Coating/Cladding concentricity error		$\leq 12\text{ }\mu\text{m}$
Core/Cladding concentricity error		$\leq 0.5\text{ }\mu\text{m}$
Color Fiber Diameter		$250\text{ }\mu\text{m} \pm 15\text{ }\mu\text{m}$ (Colored)
Fiber proof-tested		0.69 GPa (1.0%, 100kpsi) in accordance with the optical fiber proof test by IEC 60793-1-30

// OPTICAL FIBER CHARACTERISTICS

CATEGORY	DESCRIPTION	SPECIFICATIONS
Optical Specifications		ITU-T G.652D(Singlemode OS2) 9/125 μm (OS2) ITU-T G651(Multimode) 62.5/125 μm , 50/125 μm
Attenuation	@1310nm	$\leq 0.35/\leq 0.33\text{dB/km}$
	@1383nm	$\leq 0.35/\leq 0.31\text{dB/km}$
	@1490nm	$\leq 0.24\text{dB/km}$
	@1550nm	$\leq 0.21/\leq 0.19\text{dB/km}$
	@1625nm	$\leq 0.23/\leq 0.20\text{dB/km}$
Attenuation discontinuity		$\leq 0.05\text{ dB}$
Attenuation vs. Wavelength	1285 -1330 @1310nm	$\leq 0.05\text{ dB/km}$
	1525 -1575@1550nm	$\leq 0.05\text{ dB/km}$
Zero dispersion wavelength		1300 -1324 nm
Zero dispersion slope		$\leq 0.092\text{ ps}/(\text{nm}^2.\text{km})$
Dispersion	@1310nm	$\leq 3.5\text{ ps}/\text{nm.km}$
	@1550nm	$\leq 18\text{ ps}/\text{nm.km}$
Polarization mode dispersion(PMD)		$\leq 0.1\text{ ps}/\text{km}^{1/2}$
Cable cutoff wavelength (λ_{cc})		$\leq 1260\text{ nm}$
Effective group index of reaction	@1310nm	1.4675
	@1550nm	1.4681
Geometric Specifications		
Mode field diameter	@1310nm	$9.2 \pm 0.6\text{ }\mu\text{m}$
	@1550nm	$10.4 \pm 0.8\text{ }\mu\text{m}$
Cladding diameter		$125 \pm 1\text{ }\mu\text{m}$
Cladding non-circularity		$\leq 1.0\%$
Coating Material	Material	UV curable acrylate
	Diameter	$250 \pm 5\text{ }\mu\text{m}$
Coating/Cladding concentricity error		$\leq 12\text{ }\mu\text{m}$
Core/Cladding concentricity error		$\leq 0.5\text{ }\mu\text{m}$
Color Fiber Diameter		$250\text{ }\mu\text{m} \pm 15\text{ }\mu\text{m}$ (Colored)
Fiber proof-tested		0.69 GPa (1.0%, 100kpsi) in accordance with the optical fiber proof test by IEC 60793-1-30

// OPTICAL FIBER CHARACTERISTICS

CATEGORY	DESCRIPTION	SPECIFICATIONS
Mechanical Specifications		
Proof test level		$\geq 1.0\%$
Fiber curl radius		≥ 4.0 m
Peak coating strip force		1.3 - 8.9N
Relative humidity		Up to 90%, no frost
Maximum Span Length	Sag 0.5%	40 m.
	Sag 1.0%	80 m.
Maximum Wind Velocity		80 m and wind force 126 Km/hr
Max. Tensile load	Installation	4000 N. for 6-120 Cores
	Operation	1800 N. for 6-120 Cores
Maximum Crush resistance		2200 N./10 cm.
Minimum bending Radius	Installation	20 x Diameter of Cable
	Operation	10 x Diameter of Cable

// IDENTIFICATION COLOR CODE OF FIBER AND LOOSE TUBE

The color code of the loose tubes and the individual fibers within each loose tube shall be in accordance TIA/EIA-598-C (Rev.TIA/EIA-598-A) and EIA-359-A

NO.	FIBER COLOR	LOOSE TUBE COLOR
1	Blue	Blue
2	Orange	Orange
3	Green	Green
4	Brown	Brown
5	Slate	Slate
6	White	White
7	Red	Red
8	Black	Black
9	Yellow	Yellow
10	Violet	Violet
11	Rose	Rose
12	Aqua	Aqua

// PACKING AND DRUM

Standard reel length: 4 km/reel, other length is also available. The cables are packed in fumigated wooden drums.

Unless otherwise specified, the cable sheath marking shall be as follows:

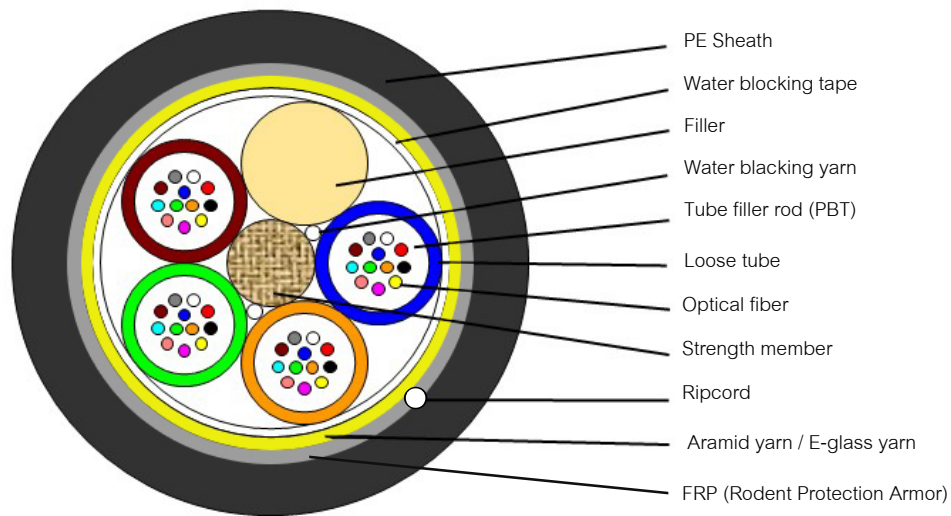
- Color: white.
- Contents: TSP, the year of manufacture, the type of cable, cable number, length marking , Name of organization in English, Thai, Chinese, etc.
- Format to choose from: screen, hot stamp, laser.
- Interval: 1 m.

(Outer sheath marking legend can be changed according to user's requests.)

// TEST REQUIREMENTS

Item	Method	Acceptance criteria
Tensile test	- Max. strength: 4000 N	-Fiber strain at maximum
IEC 60794-1-2	- Sample length: 100 meter	-Load max. 0.33 %
TIA/EIA-455-33A	- Times: 1 hour	-Attenuation increase ≤ 0.1 dB
Crush or Compression test	- load: 2200 N	-No splits or cracks in the outer jacket
IEC 60794-1-2	- Time: 10 minute	-Attenuation increase ≤ 0.10 dB
TIA/EIA-455-41A	- Length: 100 m	
Impact test	- Impact energy: 450	- No splits or cracks in the outer jacke
IEC 60794-1-2	- Height: 1 mete	-Attenuation increase ≤ 0.10 dB (after the test)
TIA/EIA-455-25C	- Impact points: min. - Number of impacts:	
Torsion or Twist test	- 1 m cable length with 150 N weigh	- No splits or cracks in the outer jacke
IEC 60794-1-2-E7	- $\pm 180^\circ$,10 cycle	-Attenuation increase ≤ 0.10 dB (after the test)
TIA/EIA-455-85A		
Repeated bending Cable bending Test	- Radius = $20 \times$ cable outer diamete - 1m cable length with 150 N weight, 30 cycle	- No splits or cracks in the outer jacke -Attenuation increase ≤ 0.10 dB (after the test)
IEC 60794-1-2-E6, TIA/EIA-455-104A IEC 60794-1-2-E11B		
Temperature cycling test	- emperature step: $+20^\circ\text{C}$ - 40°C + 70°C - 40°C + 70°C + 20°C	-Attenuation variation for reference value(the attenuation to be measured before test at $+20\pm 3$) ≤ 0.10 dB/km
IEC 60794-1-2-F1 TIA/EIA-455-3A	- ime per each step: 16 hrs. - N mber of cycles: 2 cycles	
Water penetration test	- Water height: 1	-No water leakage at the end of the sample
IEC 60794-1-2-F5	- Sample length:3	
TIA/EIA-455-82B	- Duration of test: 24hr	
Drip test	- Five 0.3m samples suspended vertically in a climat chamber, raised temperature to $+70^\circ\text{C}$	-No filling compound shall drip from tubes after 24 hrs.
IEC 60794-1-2-E14		

STRUCTURE DESIGN



ORDER INFORMATION

NO. OF CORE	DESCRIPTION
6	Indoor/Outdoor, 6C ADSS, Single Jacket FRP, Single Mode 9/125 μm
12	Indoor/Outdoor, 12C ADSS, Single Jacket FRP, Single Mode 9/125 μm
24	Indoor/Outdoor, 24C ADSS, Single Jacket FRP, Single Mode 9/125 μm
48	Indoor/Outdoor, 48C ADSS, Single Jacket FRP, Single Mode 9/125 μm
60	Indoor/Outdoor, 60C ADSS, Single Jacket FRP, Single Mode 9/125 μm
96	Indoor/Outdoor, 96C ADSS, Single Jacket FRP, Single Mode 9/125 μm
120	Indoor/Outdoor, 120C ADSS, Single Jacket FRP, Single Mode 9/125 μm



*Product pictures and technical data in this datasheet are only for reference. Updates are subject to change without prior notice. The final interpretation right is reserved by Rabbit Innovation.,ltd

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FIBER OPTIC CABLE

ADSS FIBER OPTIC DOUBLE JACKET FRP

This specification covers design requirements and performance standards for procurement of fiber optic cables in the fiber industry. TSP brand guarantees a stable quality control system for us from the factory. Cable products pass several programs including ISO 9001, ISO 14001 and ROHS.

// PRODUCT DESCRIPTION

- Single Mode (9/125 μm)
- The cable shall be used for aerial or duct installed.
- Provide additional mechanical protection.
- low friction installation.
- Excellent protection from environmental hazards.
- Color code fiber and Loose tube in standard.

// APPLICATION

- Ethernet LAN Network, CCTV Camera , ETC
- Optical fibre cables supplied in compliance with this specifications is capable to withstand the typical service condition for a period of 30 years without detriment to the operation characteristics of the cable.
- Outdoor environment with high electric field strength in the Power communication system and the area where frequent thunder happens suitable for both aerial or duct installation.

// STANDARD

- ATM, FDDI, FTTX, Fiber Channel, CATV, Communication
- ISO/IEC 11801:2007, ISO/IEC 11801:2011 (Ed.2.2)
- ANSI/TIA/EIA-568-B.3, ANSI/TIA-568-C.3, ANSI/TIA-568.3-D, ANSI/ICEA 640
- Telcordia (Bellcore) GR-20 CORE, GR-409-CORE
- ANSI/ICEA 596, ICEA 696, IEC 61034-2, IEC 60754-2, IEC 60793, IEC 60794-1-2, EN 50173
- ITU-T G.652D, ITU-T G.657A2
- TIA/EIA-598-C (Rev. TIA/EIA-598-A), EIA-359-A.
- IEEE 802.3z, IEEE 802.3ae, IEEE 802.3 (LAN, Ethernet Fast Ethernet, Gigabit Ethernet and 10 Gigabit Ethernet 40-100 Gbps)
- RoHS Compliant
- TIS 2166-2548
- GB/T 12706-2008 Standard



// CONSTRUCTION CABLE

Cable type		ADSS
Element	-	5
Fiber Optic	Material	Silica High Grade / Compound Glass
Central strength member	Material	FRP 1.8 ± 0.2 mm
Loose tube	Material	PBT
	Outer Diameter	2.0 ± 0.2 mm
	Inner Diameter	1.5 ± 0.2 mm
	-	6 fiber per tube, Thixotropic Jelly Compound
Protective tape	Material	Water -blocking tape : 0.3mm, Water blocking yarn : 0.3mm
Strength member	Material	Aramid yarns
Rodent Protection Armor	Material	Flat FRP Non-Metallic type (FRP: Fiber Reinforced Plastics) Nominal thickness 1.0 ± 0.2 mm
Outer Sheath	Material	Black HDPE (non Rodent Repellent/Rodent Repellent)
	Thickness	1.8 ± 0.2 mm
Rip Cord	Material	Polyester
	No.	2
Filler Rod	Material	Polyethylene, natural Color
	Diameter	2.2 mm ± 0.2 mm
Stranding method	-	Reverse oscillating lay (ROL) technique (SZ Direction)
	-	Lay - length 75 mm ± 5 mm
Tensile Load	Short term	4000 N
	Long term	2500 N
	Pressure	≥ 3400 N / 10 cm
Overall diameter	Diameter	9.5 - 12 mm
Cable diameter	Diameter (24/48 core)	10.5 ± 1mm / 11.5 ± 1mm.
Weight	(24/48 core)	Approx. 85 / 100±10 kg/km
Span Length		40-100m
Water Blocking Element		Dry-core technology
Width		≥ 126 km/hr
Temperature Range	Operation Temperature	-40°C to +70 °C
	Installation Temperature	-40°C to +70 °C
	Storage/Shipping Temperature	-40°C to +75°C
Color Stripe		3 mm ± 0.5mm

// BUFFER TUBE STRANDING

Fiber count	Fiber number per tube	Number of tube / filler	Nom. Diameter(mm)	Nom. Weight(kg/km)
12	6	2/3	11.4 - 12	100
24	6	4/1	11.4 - 12	100
48	12	4/1	11.8 - 12.5	105
60	12	5/0	11.8 - 12.5	105

// OPTICAL FIBER CHARACTERISTICS

CATEGORY	DESCRIPTION	SPECIFICATIONS
Optical Specifications		ITU-T G.652D(Singlemode OS2) 9/125 μm (OS2) ITU-T G651(Multimode) 62.5/125 μm , 50/125 μm
Attenuation	@1310nm	$\leq 0.35/\leq 0.33\text{dB/km}$
	@1383nm	$\leq 0.35/\leq 0.31\text{dB/km}$
	@1490nm	$\leq 0.24\text{dB/km}$
	@1550nm	$\leq 0.21/\leq 0.19\text{dB/km}$
	@1625nm	$\leq 0.23/\leq 0.20\text{dB/km}$
Attenuation discontinuity		$\leq 0.05\text{ dB}$
Attenuation vs. Wavelength	1285 -1330 @1310nm	$\leq 0.05\text{ dB/km}$
	1525 -1575@1550nm	$\leq 0.05\text{ dB/km}$
Zero dispersion wavelength		1300 -1324 nm
Zero dispersion slope		$\leq 0.092\text{ ps}/(\text{nm}^2.\text{km})$
Dispersion	@1310nm	$\leq 3.5\text{ ps/nm.km}$
	@1550nm	$\leq 18\text{ ps/nm.km}$
Polarization mode dispersion(PMD)		$\leq 0.1\text{ ps/km}^{1/2}$
Cable cutoff wavelength (λ_{cc})		$\leq 1260\text{ nm}$
Effective group index of reaction	@1310nm	1.4675
	@1550nm	1.4681
Geometric Specifications		
Mode field diameter	@1310nm	$9.2 \pm 0.6\text{ }\mu\text{m}$
	@1550nm	$10.4 \pm 0.8\text{ }\mu\text{m}$
Cladding diameter		$125 \pm 1\text{ }\mu\text{m}$
Cladding non-circularity		$\leq 1.0\%$
Coating Material	Material	UV curable acrylate
	Diameter	$250 \pm 5\text{ }\mu\text{m}$
Coating/Cladding concentricity error		$\leq 12\text{ }\mu\text{m}$
Core/Cladding concentricity error		$\leq 0.5\text{ }\mu\text{m}$
Color Fiber Diameter		$250\text{ }\mu\text{m} \pm 15\text{ }\mu\text{m}$ (Colored)
Fiber proof-tested		0.69 GPa (1.0%, 100kpsi) in accordance with the optical fiber proof test by IEC 60793-1-30

// OPTICAL FIBER CHARACTERISTICS

CATEGORY	DESCRIPTION	SPECIFICATIONS
Optical Specifications		ITU-T G.652D(Singlemode OS2) 9/125 μm (OS2) ITU-T G651(Multimode) 62.5/125 μm , 50/125 μm
Attenuation	@1310nm	$\leq 0.35/\leq 0.33\text{dB/km}$
	@1383nm	$\leq 0.35/\leq 0.31\text{dB/km}$
	@1490nm	$\leq 0.24\text{db/km}$
	@1550nm	$\leq 0.21/\leq 0.19\text{dB/km}$
	@1625nm	$\leq 0.23/\leq 0.20\text{dB/km}$
Attenuation discontinuity		$\leq 0.05\text{ dB}$
Attenuation vs. Wavelength	1285 -1330 @1310nm	$\leq 0.05\text{ dB/km}$
	1525 -1575@1550nm	$\leq 0.05\text{ dB/km}$
Zero dispersion wavelength		1300 -1324 nm
Zero dispersion slope		$\leq 0.092\text{ ps}/(\text{nm}^2.\text{km})$
Dispersion	@1310nm	$\leq 3.5\text{ ps}/\text{nm.km}$
	@1550nm	$\leq 18\text{ ps}/\text{nm.km}$
Polarization mode dispersion(PMD)		$\leq 0.1\text{ ps}/\text{km}^{1/2}$
Cable cutoff wavelength (λ_{cc})		$\leq 1260\text{ nm}$
Effective group index of reaction	@1310nm	1.4675
	@1550nm	1.4681
Geometric Specifications		
Mode field diameter	@1310nm	$9.2 \pm 0.6\text{ }\mu\text{m}$
	@1550nm	$10.4 \pm 0.8\text{ }\mu\text{m}$
Cladding diameter		$125 \pm 1\text{ }\mu\text{m}$
Cladding non -circularity		$\leq 1.0\%$
Coating Material	Material	UV curable acrylate
	Diameter	$250 \pm 5\text{ }\mu\text{m}$
Coating/Cladding concentricity error		$\leq 12\text{ }\mu\text{m}$
Core/Cladding concentricity error		$\leq 0.5\text{ }\mu\text{m}$
Color Fiber Diameter		$250\text{ }\mu\text{m} \pm 15\text{ }\mu\text{m}$ (Colored)
Fiber proof-tested		0.69 GPa (1.0%, 100kpsi) in accordance with the optical fiber proof test by IEC 60793-1-30

// OPTICAL FIBER CHARACTERISTICS

CATEGORY	DESCRIPTION	SPECIFICATIONS
Mechanical Specifications		
Proof test level		$\geq 1.0\%$
Fiber curl radius		≥ 4.0 m
Peak coating strip force		1.3 - 8.9N
Relative humidity		Up to 90%, no frost
Maximum Span Length	Sag 0.5%	40 m.
	Sag 1.0%	80 m.
Maximum Wind Velocity		80 m and wind force 126 Km/hr
Max. Tensile load	Installation	4000 N. for 6-120 Cores
	Operation	1800 N. for 6-120 Cores
Maximum Crush resistance		2200 N./10 cm.
Minimum bending Radius	Installation	20 x Diameter of Cable
	Operation	10 x Diameter of Cable

// IDENTIFICATION COLOR CODE OF FIBER AND LOOSE TUBE

The color code of the loose tubes and the individual fibers within each loose tube shall be in accordance TIA/EIA-598-C (Rev.TIA/EIA-598-A) and EIA-359-A

NO.	FIBER COLOR	LOOSE TUBE COLOR
1	Blue	Blue
2	Orange	Orange
3	Green	Green
4	Brown	Brown
5	Slate	Slate
6	White	White
7	Red	Red
8	Black	Black
9	Yellow	Yellow
10	Violet	Violet
11	Rose	Rose
12	Aqua	Aqua

// PACKING AND DRUM

Standard reel length: 4 km/reel, other length is also available. The cables are packed in fumigated wooden drums.

Unless otherwise specified, the cable sheath marking shall be as follows:

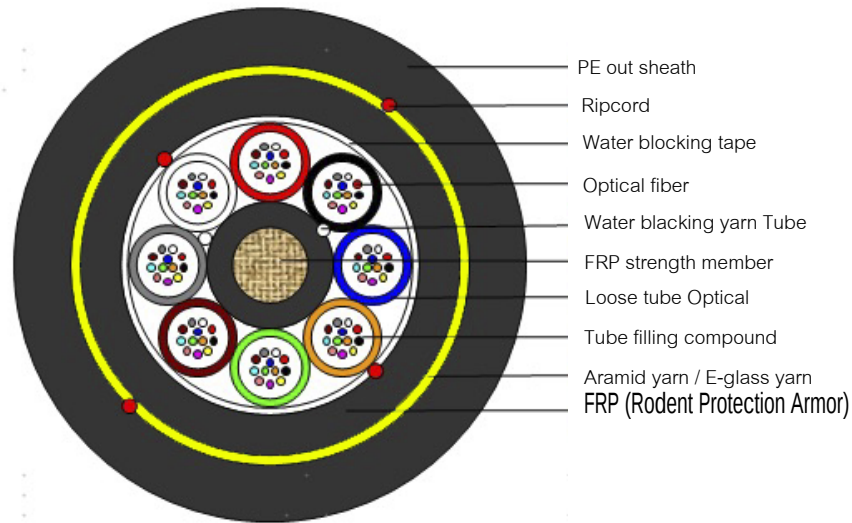
- Color: white.
- Contents: TSP, the year of manufacture, the type of cable, cable number, length marking , Name of organization in English, Thai, Chinese, etc.
- Format to choose from: screen, hot stamp, laser.
- Interval: 1 m.

(Outer sheath marking legend can be changed according to user's requests.)

// TEST REQUIREMENTS

Item	Method	Acceptance criteria
Tensile test	- Max. strength: 4000 N	-Fiber strain at maximum
IEC 60794-1-2	- Sample length: 100 meter	-Load max. 0.33 %
TIA/EIA-455-33A	- Times: 1 hour	-Attenuation increase ≤ 0.1 dB
Crush or Compression test	- load: 2200 N	-No splits or cracks in the outer jacket
IEC 60794-1-2	- Time: 10 minute	-Attenuation increase ≤ 0.10 dB
TIA/EIA-455-41A	- Length: 100 m	
Impact test	- Impact energy: 450	- No splits or cracks in the outer jacke
IEC 60794-1-2	- Height: 1 mete	-Attenuation increase ≤ 0.10 dB (after the test)
TIA/EIA-455-25C	- Impact points: min. - Number of impacts:	
Torsion or Twist test	- 1 m cable length with 150 N weigh	- No splits or cracks in the outer jacke
IEC 60794-1-2-E7	- $\pm 180^\circ$,10 cycle	-Attenuation increase ≤ 0.10 dB (after the test)
TIA/EIA-455-85A		
Repeated bending Cable bending Test	- Radius = $20 \times$ cable outer diamete - 1m cable length with 150 N weight, 30 cycle	- No splits or cracks in the outer jacke -Attenuation increase ≤ 0.10 dB (after the test)
IEC 60794-1-2-E6, TIA/EIA-455-104A IEC 60794-1-2-E11B		
Temperature cycling test	- emperature step: $+20^\circ\text{C}$ - 40°C + 70°C - 40°C + 70°C + 20°C	-Attenuation variation for reference value(the attenuation to be measured before test at $+20\pm 3$) ≤ 0.10 dB/km
IEC 60794-1-2-F1		
TIA/EIA-455-3A	- ime per each step: 16 hrs. - N mber of cycles: 2 cycles	
Water penetration test	- Water height: 1	-No water leakage at the end of the sample
IEC 60794-1-2-F5	- Sample length:3	
TIA/EIA-455-82B	- Duration of test: 24hr	
Drip test	- Five 0.3m samples suspended vertically in a climat	-No filling compound shall drip from tubes after 24 hrs.
IEC 60794-1-2-E14	chamber, raised temperature to $+70^\circ\text{C}$	

STRUCTURE DESIGN



ORDER INFORMATION

NO. OF CORE	DESCRIPTION
6	Indoor/Outdoor, 6C ADSS, Single Jacket FRP, Single Mode 9/125 μm
12	Indoor/Outdoor, 12C ADSS, Single Jacket FRP, Single Mode 9/125 μm
24	Indoor/Outdoor, 24C ADSS, Single Jacket FRP, Single Mode 9/125 μm
48	Indoor/Outdoor, 48C ADSS, Single Jacket FRP, Single Mode 9/125 μm
60	Indoor/Outdoor, 60C ADSS, Single Jacket FRP, Single Mode 9/125 μm
96	Indoor/Outdoor, 96C ADSS, Single Jacket FRP, Single Mode 9/125 μm
120	Indoor/Outdoor, 120C ADSS, Single Jacket FRP, Single Mode 9/125 μm



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FIBER OPTIC CABLE

ARSS FIBER OPTIC SINGLE JACKET

This specification covers design requirements and performance standards for procurement of fiber optic cables in the fiber industry. TSP brand guarantees a stable quality control system for us from the factory. Cable products pass several programs including ISO 9001, ISO 14001 and ROHS.

// PRODUCT DESCRIPTION

- Single Mode (9/125 μm)
- The cable shall be used for aerial or duct installed.
- Provide additional mechanical protection.
- low friction installation.
- Excellent protection from environmental hazards.
- Color code fiber and Loose tube in standard.

// APPLICATION

- Ethernet LAN Network, CCTV Camera , ETC
- Optical fibre cables supplied in compliance with this specifications is capable to withstand the typical service condition for a period of 30 years without detriment to the operation characteristics of the cable.
- Outdoor environment with high electric field strength in the Power communication system and the area where frequent thunder happens suitable for both aerial or duct installation.

// STANDARD

- IEEE802.3 (LAN, Ethernet Fast Ethernet, Gigabit Ethernet and 10 Gigabit Ethernet) ,10 G Ethernet, ATM, FDDI, FTTX,Fiber Channel,CATV, Communication
- TIA/EIA-598-A ,TIA/EIA-598-C, ANSI/TIA/EIA-568-B.3, ANSI/ TIA-568-C.3,ANSI/TIA/EIA-568-D.3, ANSI/ICEA640, EN 50173-1
- ISO/IEC 11801:2017, ISO/IEC 11801:2011(Ed.2.2)
- ASTM D1603 , ASTM D638 , ASTM D1693
- Telcordia (Bellcore) GR-20CORE
- IEC 60793-2B1.3, IEC 60794-1-2, ICEA696, IEC61034-2, IEC60754-2, IEC 60793, IEC 596
- ITU-T G.652D, ITU-TG 657A2
- RoHS Compliant
- TIS 2166-2548
- GB/T 12706-2008 Standard



// CONSTRUCTION CABLE

Number of fibers		6-24	36-60	72	96
Loose Tube	Multi-Twisted Tube				
	Material	PBT (Polybutylene Terephthalate) with color coding			
	Filling Compound	Thixotropic Jelly Compound			
	Fiber per Tube	6	12	12	12
	Number	1-4	3-5	6	8
Filler Rod	Material	Plastic rod, natural color			
	Number	4-1	2-0	0	0
	Diameter	2.2 ± 0.1 mm.			
Stranding	Method	Reverse oscillating lay (ROL) technique (SZ Direction)			
Central Strength Member	Material	FRP (Fiberglass Reinforce with Plastic)			
	Color	Natural			
Water Blocking Yarn	Material	Suitable Water Swellable Materials (Dry-Core Technology)			
Binder & Wrapping	Material	Polyester yarns			
Water Blocking Tape	Thickness	0.3 ± 0.05 mm.			
Ripcord	Material	Polyester			
	Number	2			
Additional Strength Member	Material	Water blocking E-glass yarn (aramid yarn is available on request)			
Armored	Material	Corrugated chrome steel tape coated with polymer to prevent rodents (AR)			
	Thickness	Steel & Polymer coating : 0.25 mm.			
Outer Sheath	Material	UV-Proof, Black HDPE (non Rodent Repellent/Rodent Repellent(LS2))			
	Thickness(Approx.)	1.6 ± 0.2 mm.			
Cable Diameter (Approx.)		10.3 ± 1 mm.	10.7 ± 1 mm.	11.2 ± 1 mm.	12.4 ± 1 mm.
Cable Weight (Approx.)		90 ± 10kg./km.	100 ± 10kg./km.	110 ± 10kg./km.	135 ± 10kg./km.
Temperature Range	Operation Temperature	-40°C to +70°C			
	Installation Temperature	-40°C to +70°C			
	Storage/Shipping Temperature	-40°C to +75°C			
Numerical Aperture		0.130 ± 0.010			

// OPTICAL FIBER CHARACTERISTICS

CATEGORY	DESCRIPTION	SPECIFICATIONS
Optical Specifications		ITU-T G.652D(SinglemodeOS2) 9/125 μm (OS2) ITU-T G651(Multimode) 62.5/125 μm , 50/125 μm
Attenuation	@1310nm	$\leq 0.35/\leq 0.33\text{dB/km}$
	@1383nm	$\leq 0.35/\leq 0.31\text{dB/km}$
	@1490nm	$\leq 0.24\text{db/km}$
	@1550nm	$\leq 0.21/\leq 0.19\text{dB/km}$
	@1625nm	$\leq 0.23/\leq 0.20\text{dB/km}$
Attenuation discontinuity		$\leq 0.05\text{ dB}$
Attenuation vs. Wavelength	1285 -1330 @1310nm	$\leq 0.05\text{ dB/km}$
	1525 -1575@1550nm	$\leq 0.05\text{ dB/km}$
Zero dispersion wavelength		1300 -1324 nm
Zero dispersion slope		$\leq 0.092\text{ ps}/(\text{nm}^2.\text{km})$
Dispersion	@1310nm	$\leq 3.5\text{ ps/nm.km}$
	@1550nm	$\leq 18\text{ ps/nm.km}$
Polarization mode dispersion(PMD)		$\leq 0.2\text{ ps/km } \frac{1}{2}$
Cable cutoff wavelength (λ_{cc})		$\leq 1260\text{ nm}$
Effective group index of reaction	@1310nm	1.4676
	@1550nm	1.4682
Geometric Specifications		
Mode field diameter	@1310nm	$9.2 \pm 0.6\text{ }\mu\text{m}$
	@1550nm	$10.4 \pm 0.8\text{ }\mu\text{m}$
Cladding diameter		$125 \pm 1\text{ }\mu\text{m}$
Coating Diameter, Primary		$242 \pm 5\text{ }\mu\text{m}$
Coating Diameter, Secondary		$250 \pm 5\text{ }\mu\text{m}$
Cladding non -circularity		$\leq 1.0\%$
Coating Material	Material	UV curable acrylate
	Diameter	$250 \pm 5\mu\text{m}$
Coating/Cladding concentricity error		$\leq 12\text{ }\mu\text{m}$
Core/Cladding concentricity error		$\leq 0.5\mu\text{m}$
Color Fiber Diameter		$250\text{ }\mu\text{m} \pm 15\text{ }\mu\text{m}$ (Colored)
Fiber proof-tested		0.69 GPa (1.0%, 100kpsi) in accordance with the optical fiber proof test by IEC 60793-1-30

// OPTICAL FIBER CHARACTERISTICS

CATEGORY	DESCRIPTION	SPECIFICATIONS
Mechanical Specifications		
Proof test level		$\geq 1.0\%$
Fiber curl radius		≥ 4.0 m
Peak coating strip force		1.3 - 8.9N
Relative humidity		Up to 90%, no frost
Maximum Span Length	Sag 0.5%	40 m.
	Sag 1.0%	80 m.
Maximum Wind Velocity		126 km./hr.
Max. Tensile load	Installation	3,600 N. for 6-96 Cores
	Operation	2,500 N. for 6-96 Cores
Maximum Crush resistance		3,400 N./10 cm.
Minimum bending Radius	Installation	20 x Diameter of Cable
	Operation	10 x Diameter of Cable
Thermal oxidative stability (OIT-Test)		OIT at 200 °C > 40 min (IEC 60811-410)

// IDENTIFICATION COLOR CODE OF FIBER AND LOOSE TUBE

The color code of the loose tubes and the individual fibers within each loose tube shall be in accordance TIA/EIA-598-C (Rev.TIA/EIA-598-A) and EIA-359-A

NO.	FIBER COLOR	LOOSE TUBE COLOR
1	Blue	Blue
2	Orange	Orange
3	Green	Green
4	Brown	Brown
5	Slate	Slate
6	White	White
7	Red	Red
8	Black	Black
9	Yellow	Yellow
10	Violet	Violet
11	Rose	Rose
12	Aqua	Aqua

// PACKING AND DRUM

Standard reel length: 4 km/reel, other length is also available. The cables are packed in fumigated wooden drums.

Unless otherwise specified, the cable sheath marking shall be as follows:

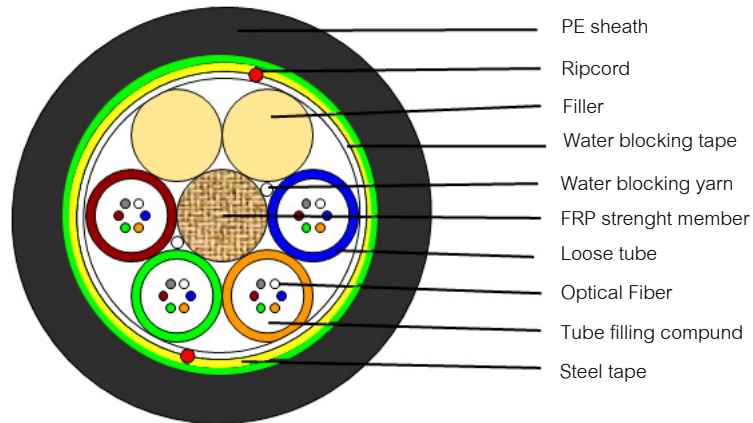
- Color: white.
- Contents: TSP, the year of manufacture, the type of cable, cable number, length marking , Name of organization in English, Thai, Chinese, etc.
- Format to choose from: screen, hot stamp, laser.
- Interval: 1 m.

(Outer sheath marking legend can be changed according to user's requests.)

// TEST REQUIREMENTS

Item	Method	Acceptance criteria
Tensile test	- Max. tensile strength: 3000 N	-Fiber strain at maximum
IEC 60794-1-2-E1A	- Sample length: 100 meter	-Load max. 0.33 %
TIA/EIA-455-33A	- Times: 1 hour	-Attenuation increase $\leq$ 0.1dB
Crush or Compression test	- Load: 2200 N	-No splits or cracks in the outer jacket
IEC 60794-1-2-E3	- Time: 10 minute	-Attenuation increase $\leq$ 0.10 dB
TIA/EIA-455-41A	- Length: 100 m	
Impact test	- Impact energy: 450	- No splits or cracks in the outer jacket
IEC 60794-1-2-E4	- Height: 1 meter	-Attenuation increase $\leq$ 0.10 dB (after the test)
TIA/EIA-455-25C	- Impact points: min. - Number of impacts:	
Torsion or Twist test	- 1 m cable length with 150 N weight	- No splits or cracks in the outer jacket
IEC 60794-1-2-E7	- $\pm 180^\circ$,10 cycle	-Attenuation increase $\leq$ 0.10 dB (after the test)
TIA/EIA-455-85A		
Repeated bending Cable bending Test	- Radius = 20 $\times$ cable outer diameter - 1m cable length with 150 N weight, 30 cycle	- No splits or cracks in the outer jacket -Attenuation increase $\leq$ 0.10 dB (after the test)
IEC 60794-1-2-E6, TIA/EIA-455-104A IEC 60794-1-2-E11B		
Temperature cycling test	- Temperature step: +20 $^\circ$ C -40 $^\circ$ C+70 $^\circ$ C-40 $^\circ$ C +70 $^\circ$ C+20 $^\circ$ C	-Attenuation variation for reference value(the attenuation to be measured before test at +20 $\pm$ 3) $\leq$ 0.10dB/km
IEC 60794-1-2-F1 TIA/EIA-455-3A	- Time per each step: 16 hrs. - Number of cycles: 2 cycles	
Water penetration test	- Water height: 1	-No water leakage at the end of the sample
IEC 60794-1-2-F5	- Sample length:3	
TIA/EIA-455-82B	- Duration of test: 24hr	
Drip test	- Five 0.3m samples suspended vertically in a climatic chamber, raised temperature to +70 $^\circ$ C	-No filling compound shall drip from tubes after 24 hrs.
IEC 60794-1-2-E14		

STRUCTURE DESIGN



ORDER INFORMATION

NO. OF CORE	DESCRIPTION
6	Indoor/Outdoor, 6C ARSS, Single Jacket, Single Mode 9/125 μm
12	Indoor/Outdoor, 12C ARSS, Single Jacket, Single Mode 9/125 μm
24	Indoor/Outdoor, 24C ARSS, Single Jacket, Single Mode 9/125 μm
48	Indoor/Outdoor, 48C ARSS, Single Jacket, Single Mode 9/125 μm
60	Indoor/Outdoor, 60C ARSS, Single Jacket, Single Mode 9/125 μm
96	Indoor/Outdoor, 96C ARSS, Single Jacket, Single Mode 9/125 μm
120	Indoor/Outdoor, 120C ARSS, Single Jacket, Single Mode 9/125 μm



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FIBER OPTIC CABLE

ARSS FIBER OPTIC DOUBLE JACKET

This specification covers design requirements and performance standards for procurement of fiber optic cables in the fiber industry. TSP brand guarantees a stable quality control system for us from the factory. Cable products pass several programs including ISO 9001, ISO 14001 and ROHS.

// PRODUCT DESCRIPTION

- Single Mode (9/125 μm)
- The cable shall be used for aerial or duct installed.
- Provide additional mechanical protection.
- low friction installation.
- Excellent protection from environmental hazards.
- Color code fiber and Loose tube in standard.

// APPLICATION

- Ethernet LAN Network, CCTV Camera , ETC
- Optical fibre cables supplied in compliance with this specifications is capable to withstand the typical service condition for a period of 30 years without detriment to the operation characteristics of the cable.
- Outdoor environment with high electric field strength in the Power communication system and the area where frequent thunder happens suitable for both aerial or duct installation.

// STANDARD

- IEEE802.3 (LAN, Ethernet Fast Ethernet, Gigabit Ethernet and 10 Gigabit Ethernet) ,10 G Ethernet, ATM, FDDI, FTTX,Fiber Channel,CATV, Communication
- TIA/EIA-598-A ,TIA/EIA-598-C, ANSI/TIA/EIA-568-B.3, ANSI/ TIA-568-C.3,ANSI/TIA/EIA-568-D.3, ANSI/ICEA640, EN 50173-1
- ISO/IEC 11801:2017, ISO/IEC 11801:2011(Ed.2.2)
- ASTM D1603 , ASTM D638 , ASTM D1693
- Telcordia (Bellcore) GR-20CORE
- IEC 60793-2B1.3, IEC 60794-1-2, ICEA696, IEC61034-2, IEC60754-2, IEC 60793, IEC 596
- ITU-T G.652D, ITU-TG 657A2
- RoHS Compliant
- TIS 2166-2548
- GB/T 12706-2008 Standard



// CONSTRUCTION CABLE

Number of fibers		6-24	36-60	72	96
Loose Tube	Multi-Twisted Tube				
	Material	PBT (Polybutylene Terephthalate) with color coding			
	Filling Compound	Thixotropic Jelly Compound			
	Fiber per Tube	6	12	12	12
	Number	1-4	3-5	6	8
Filler Rod	Material	Plastic rod, natural color			
	Number	4-1	2-0	0	0
	Diameter	2.2 ± 0.1 mm.			
Stranding	Method	Reverse oscillating lay (ROL) technique (SZ Direction)			
Central Strength Member	Material	FRP (Fiberglass Reinforce with Plastic)			
	Color	Natural			
Water Blocking Yarn	Material	Suitable Water Swellable Materials (Dry-Core Technology)			
Binder & Wrapping	Material	Polyester yarns			
Water Blocking Tape	Thickness	0.3 ± 0.05 mm.			
Ripcord	Material	Polyester			
	Number	2			
Additional Strength Member	Material	Water blocking E-glass yarn (aramid yarn is available on request)			
Armored	Material	Corrugated chrome steel tape coated with polymer to prevent rodents (AR)			
	Thickness	Steel & Polymer coating : 0.25 mm.			
Outer Sheath	Material	UV-Proof, Black HDPE (non Rodent Repellent/Rodent Repellent(LS2))			
	Thickness(Approx.)	1.6 ± 0.2 mm.			
Cable Diameter (Approx.)		10.3 ± 1 mm.	10.7 ± 1 mm.	11.2 ± 1 mm.	12.4 ± 1 mm.
Cable Weight (Approx.)		90 ± 10kg./km.	100 ± 10kg./km.	110 ± 10kg./km.	135 ± 10kg./km.
Temperature Range	Operation Temperature	-40°C to +70°C			
	Installation Temperature	-40°C to +70°C			
	Storage/Shipping Temperature	-40°C to +75°C			
Numerical Aperture		0.130 ± 0.010			

// OPTICAL FIBER CHARACTERISTICS

CATEGORY	DESCRIPTION	SPECIFICATIONS
Optical Specifications		ITU-T G.652D(SinglemodeOS2) 9/125 μm (OS2) ITU-T G651(Multimode) 62.5/125 μm , 50/125 μm
Attenuation	@1310nm	$\leq 0.35/\leq 0.33\text{dB/km}$
	@1383nm	$\leq 0.35/\leq 0.31\text{dB/km}$
	@1490nm	$\leq 0.24\text{db/km}$
	@1550nm	$\leq 0.21/\leq 0.19\text{dB/km}$
	@1625nm	$\leq 0.23/\leq 0.20\text{dB/km}$
Attenuation discontinuity		$\leq 0.05\text{ dB}$
Attenuation vs. Wavelength	1285 -1330 @1310nm	$\leq 0.05\text{ dB/km}$
	1525 -1575@1550nm	$\leq 0.05\text{ dB/km}$
Zero dispersion wavelength		1300 -1324 nm
Zero dispersion slope		$\leq 0.092\text{ ps}/(\text{nm}^2.\text{km})$
Dispersion	@1310nm	$\leq 3.5\text{ ps/nm.km}$
	@1550nm	$\leq 18\text{ ps/nm.km}$
Polarization mode dispersion(PMD)		$\leq 0.2\text{ ps/km } \frac{1}{2}$
Cable cutoff wavelength (λ_{cc})		$\leq 1260\text{ nm}$
Effective group index of reaction	@1310nm	1.4676
	@1550nm	1.4682
Geometric Specifications		
Mode field diameter	@1310nm	$9.2 \pm 0.6\text{ }\mu\text{m}$
	@1550nm	$10.4 \pm 0.8\text{ }\mu\text{m}$
Cladding diameter		$125 \pm 1\text{ }\mu\text{m}$
Coating Diameter, Primary		$242 \pm 5\text{ }\mu\text{m}$
Coating Diameter, Secondary		$250 \pm 5\text{ }\mu\text{m}$
Cladding non -circularity		$\leq 1.0\%$
Coating Material	Material	UV curable acrylate
	Diameter	$250 \pm 5\mu\text{m}$
Coating/Cladding concentricity error		$\leq 12\text{ }\mu\text{m}$
Core/Cladding concentricity error		$\leq 0.5\mu\text{m}$
Color Fiber Diameter		$250\text{ }\mu\text{m} \pm 15\text{ }\mu\text{m}$ (Colored)
Fiber proof-tested		0.69 GPa (1.0%, 100kpsi) in accordance with the optical fiber proof test by IEC 60793-1-30

// OPTICAL FIBER CHARACTERISTICS

CATEGORY	DESCRIPTION	SPECIFICATIONS
Mechanical Specifications		
Proof test level		$\geq 1.0 \%$
Fiber curl radius		$\geq 4.0 \text{ m}$
Peak coating strip force		1.3 - 8.9N
Relative humidity		Up to 90%, no frost
Maximum Span Length	Sag 0.5%	40 m.
	Sag 1.0%	80 m.
Maximum Wind Velocity		126 km./hr.
Max. Tensile load	Installation	3,600 N. for 6-96 Cores
	Operation	2,500 N. for 6-96 Cores
Maximum Crush resistance		3,400 N./10 cm.
Minimum bending Radius	Installation	20 x Diameter of Cable
	Operation	10 x Diameter of Cable
Thermal oxidative stability (OIT-Test)		OIT at 200 °C > 40 min (IEC 60811-410)

// IDENTIFICATION COLOR CODE OF FIBER AND LOOSE TUBE

The color code of the loose tubes and the individual fibers within each loose tube shall be in accordance TIA/EIA-598-C (Rev.TIA/EIA-598-A) and EIA-359-A

NO.	FIBER COLOR	LOOSE TUBE COLOR
1	Blue	Blue
2	Orange	Orange
3	Green	Green
4	Brown	Brown
5	Slate	Slate
6	White	White
7	Red	Red
8	Black	Black
9	Yellow	Yellow
10	Violet	Violet
11	Rose	Rose
12	Aqua	Aqua

// PACKING AND DRUM

Standard reel length: 4 km/reel, other length is also available. The cables are packed in fumigated wooden drums.

Unless otherwise specified, the cable sheath marking shall be as follows:

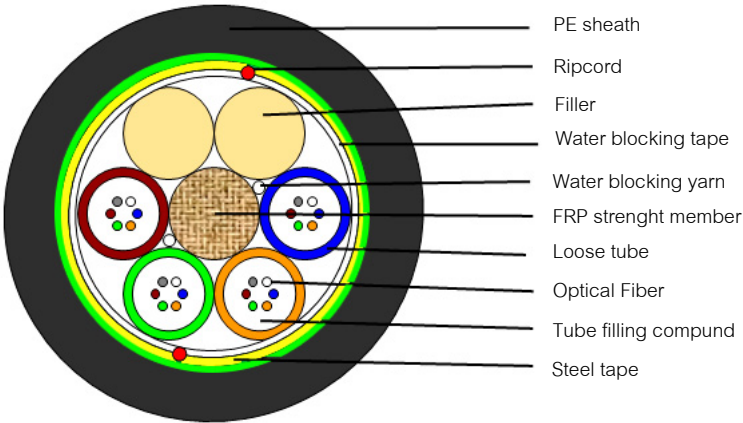
- Color: white.
- Contents: TSP, the year of manufacture, the type of cable, cable number, length marking , Name of organization in English, Thai, Chinese, etc.
- Format to choose from: screen, hot stamp, laser.
- Interval: 1 m.

(Outer sheath marking legend can be changed according to user's requests.)

// TEST REQUIREMENTS

Item	Method	Acceptance criteria
Tensile test	- Max. tensile strength: 3000 N	-Fiber strain at maximum
IEC 60794-1-2-E1A	- Sample length: 100 meter	-Load max. 0.33 %
TIA/EIA-455-33A	- Times: 1 hour	-Attenuation increase ≤ 0.1 dB
Crush or Compression test	- Load: 2200 N	-No splits or cracks in the outer jacket
IEC 60794-1-2-E3	- Time: 10 minute	-Attenuation increase ≤ 0.10 dB
TIA/EIA-455-41A	- Length: 100 m	
Impact test	- Impact energy: 450	- No splits or cracks in the outer jacket
IEC 60794-1-2-E4	- Height: 1 meter	-Attenuation increase ≤ 0.10 dB (after the test)
TIA/EIA-455-25C	- Impact points: min. - Number of impacts:	
Torsion or Twist test	- 1 m cable length with 150 N weight	- No splits or cracks in the outer jacket
IEC 60794-1-2-E7	- $\pm 180^\circ$,10 cycle	-Attenuation increase ≤ 0.10 dB (after the test)
TIA/EIA-455-85A		
Repeated bending Cable bending Test	- Radius = 20 $\times$ cable outer diameter - 1m cable length with 150 N weight, 30 cycle	- No splits or cracks in the outer jacket -Attenuation increase ≤ 0.10 dB (after the test)
IEC 60794-1-2-E6, TIA/EIA-455-104A IEC 60794-1-2-E11B		
Temperature cycling test	- Temperature step: +20 $^\circ$ C -40 $^\circ$ C+70 $^\circ$ C-40 $^\circ$ C +70 $^\circ$ C+20 $^\circ$ C	-Attenuation variation for reference value(the attenuation to be measured before test at +20 $\pm$ 3) ≤ 0.10 dB/km
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