



Figure 8 Aerial Cable

1. GENERAL

SCOPE

This Specification covers the design requirements and performance standard for the supply of optical fiber cable in the industry. Santander ensures a stable quality control system for our cable products through several programs including ISO9001, ISO 14001 and OHS.

1.1 Cable Description

Optical fibers are housed in loose tubes that are made of high-modulus plastic and filled with waterproof compounds.

Steel wire is applied as central strength member.

Loose tubes are SZ stranded around the central strength member.

Water blocking yarn and tape are used in and over the cable core to prevent it from water ingress.

Stranding wire is used as the messenger wire.

Polyethylene sheath is applied as outer sheath.

1.2 Reference

ITU-T G.652	Characteristics of a single-mode optical fiber
IEC 60794-1-1	Optical fiber cables-part 1-1: Generic specification- General
IEC 60794-1-2	Optical fiber cables-part 1-2: Generic specification- Basic optical cable test procedure
IEC 60794-3	Optical fiber cables-part 3: Sectional specification- Outdoor cables
IEC 60794-3-20	Optical fiber cables-part 3-20: Outdoor cables- Family specification for optical self-supporting aerial communication cables

2. OPTICAL FIBER

G. 652D Type

The optical fiber shall be made of high pure silica and germanium doped silica. UV curable acrylate material is applied over fiber cladding as optical fiber primary protective coating. The detail data of optical fiber performance are shown in the following table:

Category	Description	Specifications	
		Before Cabling	After Cabling
Optical Characteristics	Attenuation Coefficient: at 1310 nm Max : Average: at 1550 nm Max :	≤ 0.35 dB/km ≤ 0.35 dB/km ≤ 0.21 dB/km	≤ 0.36 dB/km ≤ 0.36 dB/km ≤ 0.22 dB/km
	Chromatic Dispersion: at 1310nm at 1550nm	≤ 3.5 ps/nm·km ≤ 18 ps/nm·km	
	Point Discontinuity: at 1310nm at 1550 nm	≤ 0.1 dB ≤ 0.1 dB	
	Polarization Mode Dispersion (PMD)	≤ 0.2 ps/ $\sqrt{\text{km}}$	
	Cable Cut off Wavelength (λ_{cc})	≤ 1260 nm	
	Mode Field Diameter: at 1310nm at 1550 nm	$9.2 \pm 0.4\mu\text{m}$ $10.4 \pm 0.5\mu\text{m}$	
Geometrical Characteristics	Cladding Diameter	$125 \pm 1.0\mu\text{m}$	
	Mode field (Core/clad) concentricity error	$\leq 0.5 \mu\text{m}$	
	Cladding Non-Circularity	$\leq 0.7\%$	
	Coating Diameter	$242 \pm 5\mu\text{m}$	
	Coating / Cladding Concentricity error	$\leq 0.6\mu\text{m}$	
	Coating-Cladding Concentricity	$\leq 12\mu\text{m}$	
	Effective Group Index of Refraction: at 1550 nm	1.4675	
Environmental Characteristics	Temperature Cycling Induced Attenuation: at 1550nm and 1625 nm (-60°C to +85°C)	0.05dB/km	
	Macro bending Loss: at 1550nm and 1625 nm (100 turns; Φ 60 mm)	≤ 0.1 dB	

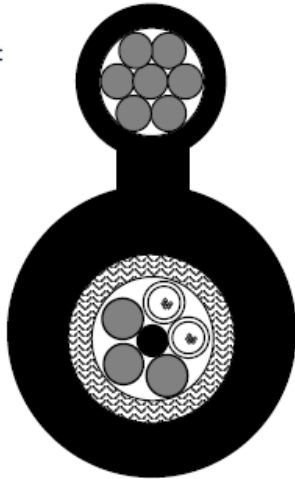
3. Drawing and Datasheet of GYTC8S

	FIGURE "8" OPTICAL CABLE SPECIFICATION	
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Cable type :

GYTC8S-12B1.3

Cable structure :



Fiber: 12 x G.652D

				Structure Data		
				Name	Size	
CABLE	Phosphating steel wire	Dia.	1.4	mm		
	Loose tube	Dia.	1.6/1.0	mm		
	Fibers	No.s	12			
	Jelly					
	Thickness of Corrugated Steel Tape			0.25	mm	
	Thickness of MDPE Outer sheath			1.6	mm	
	Filling Compound					
	Filler			No.s	3	
Messenger	NECK		2.0x2.0 mm			
	Phosphating steel wire	7	1.0		mm	
	Thickness of MDPE sheath			1.0		mm

Tube/Fibers	2/6
Color of Optical fiber	blue/orange/green/brown/grey/white
Color of buffer tube	blue/orange

Diameter of Optical cable(D / L):	8.8±0.5/15.8±0.5	mm
Weight:	146	kg/km

Tech. Data :	Standard: According to IEC-60794		
	Features: Water blocking,Moisture proof,Tensile resistant, Crushing resistant		
	Allowable tension strength	short term	3000 N
	Voltage Resistance of Outer Sheath(measured after putting in water for 24 hours)		15KV DC/2min
	Water ingress resistance		1meter, 24hours, 3samples
	Minimun bending radius(Dynamic)		20 D
	Minimun bending radius(Static)		10 D
	Life span of Optical cable		≥30 years
TEMP.CAPABILITY	-40°C ~ +70°C	Δα≤0.05 dB/km	

Note : All dimetion and data are nominal value

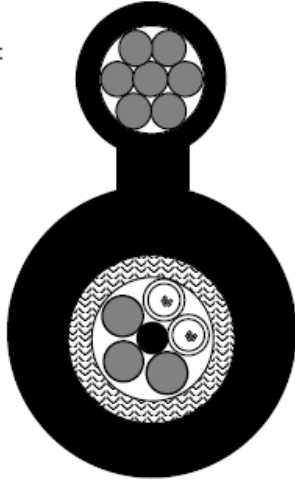
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FIGURE "8" OPTICAL CABLE SPECIFICATION

Cable type :

GYTC8A-12B1.3

Cable structure :



Fiber: 12 x G.652D

				Structure Data	
		Name	Size		
CABLE	Phosphating steel wire	Dia.	1.4 mm		
	Loose tube	Dia.	1.6/1.0 mm		
	Fibers	No.s	12		
	Jelly				
	Thickness of Aluminum Tape			0.25 mm	
	Thickness of MDPE Outer sheath			1.6 mm	
	Filling Compound				
	Filler			No.s	3
Messenger	NECK		2.0x2.0 mm		
	Phosphating steel wire	7	1.0 mm		
	Thickness of MDPE sheath		1.0 mm		

Tube/Fibers	2/6
Color of Optical fiber	blue/orange/green/brown/grey/white
Color of buffer tube	blue/orange

Diameter of Optical cable(D / L):	8.8±0.5/15.8±0.5	mm
Weight:	132.5	kg/km

Tech. Data :	Standard: According to IEC-60794		
	Features: Water blocking,Moisture proof,Tensile resistant, Crushing resistant		
	Allowable tension strength	short term	3000 N
	Voltage Resistance of Outer Sheath(measured after putting in water for 24 hours)		15KV DC/2min
	Water ingress resistance		1meter, 24hours, 3samples
	Minimun bending radius(Dynamic)		20 D
	Minimun bending radius(Static)		10 D
	Life span of Optical cable		≥30 years
TEMP.CAPABILITY	-40°C ~ +70°C	Δα≤0.05 dB/km	

Note : All dimetion and data are nominal value

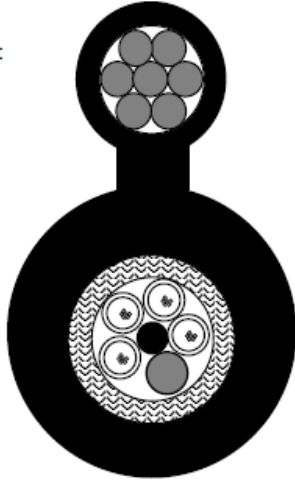
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FIGURE "8" OPTICAL CABLE SPECIFICATION

Cable type :

GYTC8S-24B1.3

Cable structure :



Fiber: 24 x G.652D

				Structure Data	
		Name	Size		
CABLE	Phosphating steel wire	Dia.	1.4 mm		
	Loose tube	Dia.	1.6/1.0 mm		
	Fibers	No.s	24		
	Jelly				
	Thickness of Corrugated Steel Tape			0.25 mm	
	Thickness of MDPE Outer sheath			1.6 mm	
	Filling Compound				
	Filler			No.s	1
Messenger	NECK		2.0x2.0 mm		
	Phosphating steel wire	7	1.0 mm		
	Thickness of MDPE sheath			1.0 mm	

Tube/Fibers	4/6
Color of Optical fiber	blue/orange/green/brown/grey/white
Color of buffer tube	blue/orange/green/brown

Diameter of Optical cable(D / L):	8.8±0.5/15.8±0.5	mm
Weight:	147.5	kg/km

Tech. Data :	Standard: According to IEC-60794		
	Features: Water blocking,Moisture proof,Tensile resistant, Crushing resistant		
	Allowable tension strength	short term	3000 N
	Voltage Resistance of Outer Sheath(measured after putting in water for 24 hours)		15KV DC/2min
	Water ingress resistance		1meter, 24hours, 3samples
	Minimum bending radius(Dynamic)		20 D
	Minimum bending radius(Static)		10 D
	Life span of Optical cable		≥30 years
TEMP.CAPABILITY	-40°C ~ +70°C	Δα≤0.05 dB/km	

Note : All dimention and data are nominal value

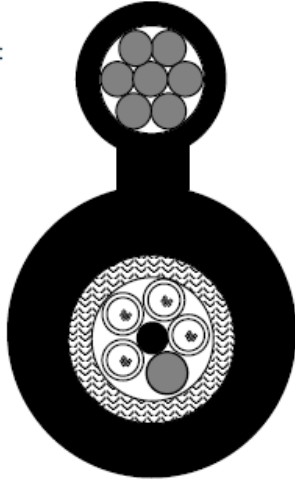
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FIGURE "8" OPTICAL CABLE SPECIFICATION

Cable type :

GYTC8A-24B1.3

Cable structure :



Fiber: 24 x G.652D

				Structure Data			
				Name		Size	
CABLE	Phosphating steel wire	Dia.	1.4			mm	
	Loose tube	Dia.	1.6/1.0		mm		
	Fibers	No.s	24				
	Jelly						
	Thickness of Aluminum Tape						0.25 mm
	Thickness of MDPE Outer sheath						1.6 mm
	Filling Compound						
	Filler						No.s 1
Messenger	NECK				2.0x2.0 mm		
	Phosphating steel wire	7			1.0 mm		
	Thickness of MDPE sheath						1.0 mm

Tube/Fibers	4/6
Color of Optical fiber	blue/orange/green/brown/grey/white
Color of buffer tube	blue/orange/green/brown

Diameter of Optical cable(D / L):	8.8±0.5/15.8±0.5	mm
Weight:	133.5	kg/km

Tech. Data :	Standard: According to IEC-60794		
	Features: Water blocking,Moisture proof,Tensile resistant, Crushing resistant		
	Allowable tension strength	short term	3000 N
	Voltage Resistance of Outer Sheath(measured after putting in water for 24 hours)		15KV DC/2min
	Water ingress resistance 1meter, 24hours, 3samples		
	Minimun bending radius(Dynamic)		20 D
	Minimun bending radius(Static)		10 D
	Life span of Optical cable		≥30 years
TEMP.CAPABILITY	-40℃ ~ +70℃	$\Delta\alpha \leq 0.05$ dB/km	

Note : All dimetion and data are nominal value

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4. COLOR IDENTIFICATION OF FIBER IN GYTC8S

4.1 Fiber color code

Each fiber will be identifiable throughout the length of the cable in accordance with the following color sequence. Fiber color in each tube starts from No. 1 Blue.

Fiber	1	2	3	4	5	6
Color	Blue	White	Yellow	Green	Grey	Red
Code	7	8	9	10	11	12
	Orange	Black	Pink	Violet	Brown	Aqua

4.2 Color Codes for Loose Tube

The loose tubes will be identifiable in accordance with the following color sequence. If there are fillers, the color is Black.

Tube	1	2	3	4	5	6
Color	Blue	White	Yellow	Green	Grey	Red
Code	7	8	9	10	11	12
	Orange	Black	Pink	Violet	Brown	Aqua

5. TEST REQUIREMENTS FOR GYTC8S

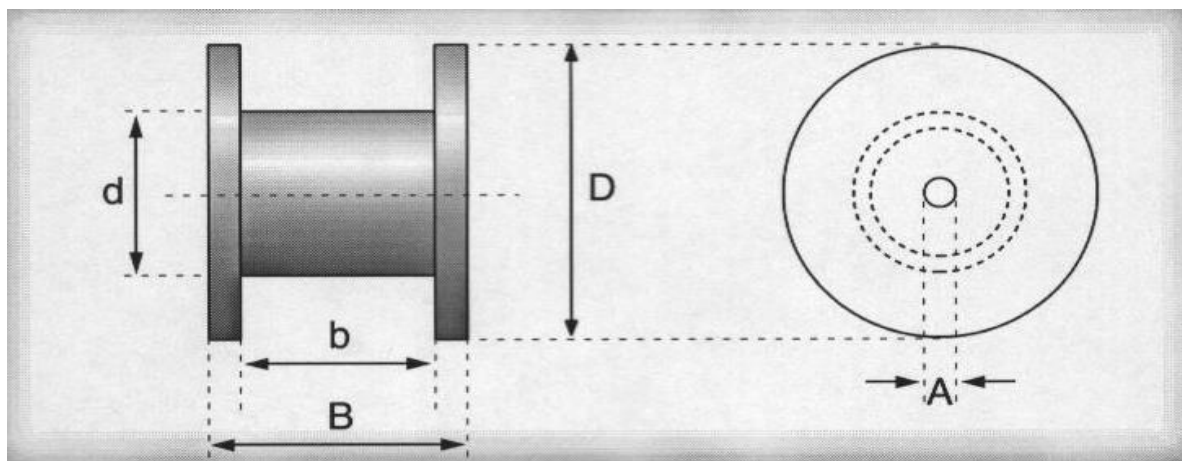
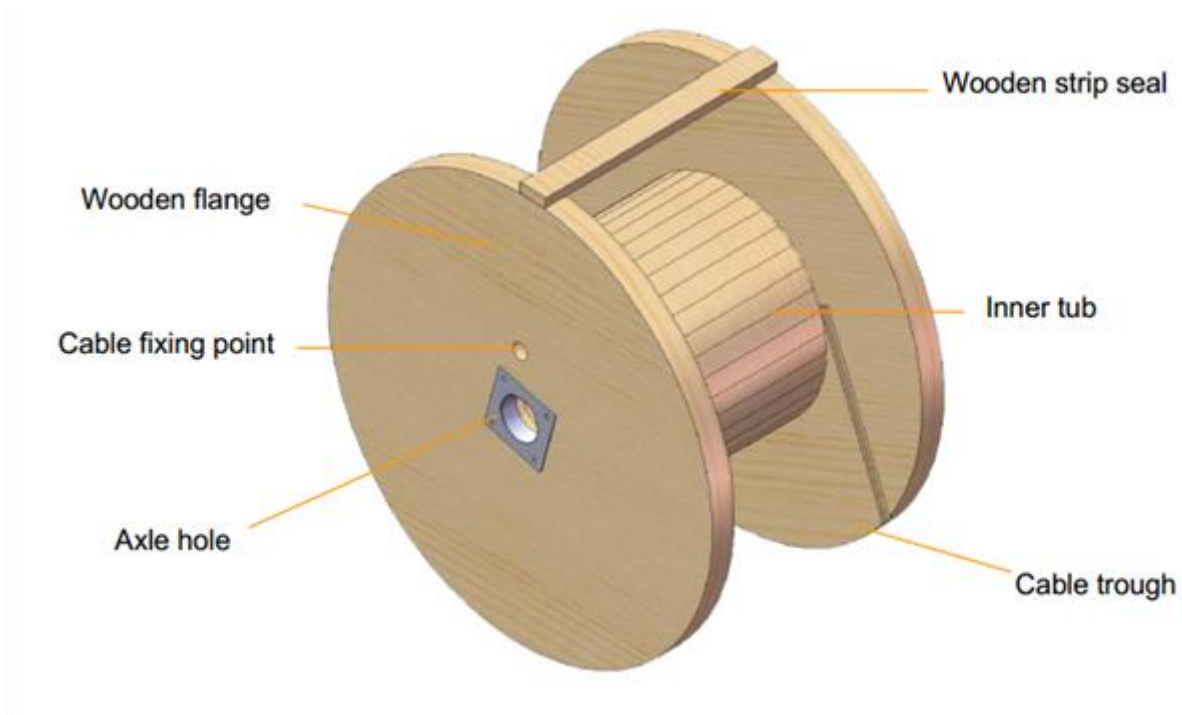
GYTC8S shall be accordance with applicable standard of **GYTC8S** and requirement of customer. The following test items shall be carried out according to corresponding reference.

Items	Test Method	Requirements
Tension	IEC 60794-1-2-E1 Load: According to 3.5 Sample length: Not less than 50m. Duration time: 1min.	Additional attenuation: ≤ 0.1 dB after test No damage to outer jacket and inner elements
Crush	IEC 60794-1-2-E3 Load: According to 3.5 Duration of load: 1min	Additional attenuation: ≤ 0.1 dB after test No damage to outer jacket and inner elements
Impact	IEC 60794-1-2-E4 Radius: 300 mm Impact energy: 10 J Impact number: 1 Impact points: 3	Additional attenuation: ≤ 0.1 dB No damage to outer jacket and inner elements
Bend	IEC 60794-1-2-E11A Mandrel radius: $10 \cdot D$ Turns:4	Additional attenuation: ≤ 0.1 dB No damage to outer jacket and inner elements
Repeated bending	IEC 60794-1-2-E6 Bending radius: $20 \cdot D$ Cycles: 25 Load: 150N	Additional attenuation: ≤ 0.1 dB No damage to outer jacket and inner elements
Torsion	IEC 60794-1-2-E7 Cycles:10 Length under test: 1m Turns: $\pm 180^\circ$	Additional attenuation: ≤ 0.1 dB No damage to outer jacket and inner elements
Water Penetration	IEC 60794-1-2-F5B Time: 24 hours Sample length: 3m	No water leakage , except the part of stranded wire
Temperature cycling	IEC 60794-1-2-F1 Sample length: at least 1000m Temperature range: $-40^\circ\text{C} \sim +70^\circ\text{C}$ Cycles: 2 Temperature cycling test dwell	The change in attenuation coefficient shall be less than 0.1dB/km.
Other parameters	According to IEC 60794-1	

6. PACKING AND DRUM FOR GYTC8S

GYTC8S shall be wound on a non-returnable wooden drum or metal drum. Both ends of GYTC8S shall be securely fastened to drum and sealed with a shrinkable cap. The required marking shall be printed with a weather-proof material on the outsides of drum according to customer's requirement.

EXAMPLE:



Cable Diameter (mm)	Drum Length (m)	Drum Dimensions & Weights					
		D	b	B	d	A	weight
		cm	cm	cm	cm	cm	kg
8.8-15.8	4000	115	62	103	55	10	189
	4000	115	62	103	55	10	189
	4000	115	62	103	55	10	189
	4000	115	62	103	55	10	189

The actual reel dimension is according to the actual provision.