

Technical Specification of Fibre
optical cable & Joint with 24 strands
for Line Differential Relay and
suitable PLB HDPE Pipe

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1.0. SCOPE

This specification covers manufacturing and supply of Fibre optical cable with 24 strands, its joint and suitable PLB HDPE Pipe.

2.0. SERVICE CONDITIONS

Optical Fiber cable to be supplied against this specification shall be suitable for satisfactory operation under the following conditions-

2.1	Average grade atmosphere	Heavily polluted, Dry
2.2	Maximum altitude above sea level	1000M
2.3	Relative Humidity	100%
2.4	Ambient air temperature	Highest 50 Deg C Average 40 Deg C Minimum 0 Deg C
2.5	Operating temperature	0 Deg C - 50 Deg C
2.6	Rainfall	750mm concentrated in four months

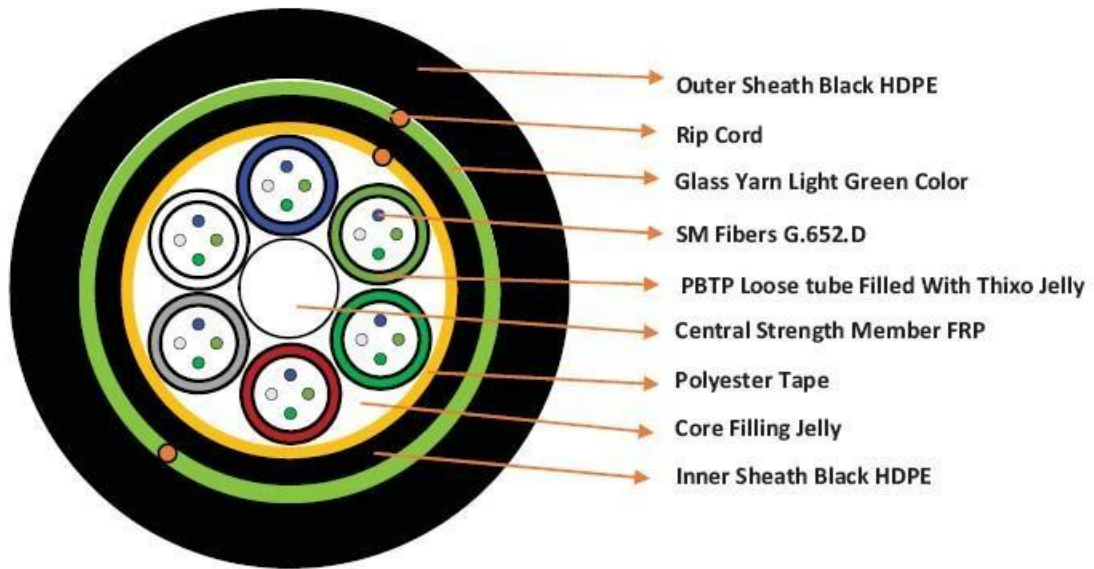
3.0. CONSTRUCTIONAL FEATURES OF OPTICAL FIBRE CABLE

S No	Parameter	Units	Guaranteed Value
3.1	No. of fibers in the cable		24
3.2	Type of fibers		Single mode,G652D
3.3	Cable diameter Nominal Tolerance	Mm Mm	10mm +-.3mm
3.4	Cable weight		
3.5	Max Tensile Strength	KN	3500
3.6	Max pulling tension - During installation - During Service	KN KN	6000 3500
3.7	Minimum bending radius - During installation - During service	Mm Mm	
3.8	Maximum continuous length	Km	2000+/-10%
3.9	Temperature range Operation Installation Shipping& Storage	°C	-20deg to +70deg
3.10	Crush strength	KN/M2	2000N/100X100mm
3.11	Impact resistance		25Nm
3.12	Torsion resistance Outer jacket		180deg

3.13	thickness - Nominal Tolerance	mm 1.6mm mm +/-0.2	
3.14	Outer jacket material		HDPE Black
3.15	Description of outer jacket coatings/ additives		Anti Termite & Anti Rodent
3.16	Inner jacket material		HDPE Black
3.17	Inner jacket thickness		1.2mm
3.18	Description of Inner jacket coatings/ additives Cable core binding arrangement		Anti Termite
3.19	Central strength members - Material - Diameter - Shape		2.0mm Round
3.20	Peripheral strength member		Glass Yarns
3.21	Central Fiber optic unit:		N
3.22	Loose tube dia & material		1.9mm +/- 0.1 with PBTP
3.25	No of fibers per tube		4
3.26	Total no. of tubes and number of empty tubes		6 no. Loose Tube, Dummy=Nil
3.27	Identification / numbering of individual tubes		Blue, Orange, Green, Brown, Slate, White
3.28	Filling compound within tube		Thixotropic Tube Filling Jelly
3.29	Filling compound in cable core interstices		Thixotropic Flooding Jelly
3.30	Rip cord (s) provided ?	Y/N	Y
3.31	Cable design life	Years	Min 25Years
3.32	Describe cable termite proofing Measures Describe cable anti-		Anti Termite additives Equally distributed Glass Yarns over
3.33	Rodent measures		Inner Sheath

Cable Cross Section Drawing of 24F SM Multitube Double Sheath Direct Buried Cable

DO NOT SCALE



4.0. CONSTRUCTIONAL FEATURES OF JOINT FOR OPTICAL FIBER CABLE

Construction of the optical fiber cable joint Box shall be as following:

4.1 Main Box:

The main box shall be sturdy & durable having a base and dome shaped body. The domed shaped body shall cover the entire junction while the base shall enable the entries of the optical fiber cable. The base and dome shall be made of Thermoplastic /High density polypropylene material. The Joint Box should be suitable for opening and reentry frequently without impairing its properties. The body may have ribs as strength member if required.

4.2 Cable organizer (Strength member and cable termination)

Cable organizer shall be suitable to secure extra length of fiber tubes with safe bending radius. It should not cause any strain or tension on the fiber. It shall be possible to fix the strength member(s) and the optical fiber cable firmly so that the cable arrangement will not shift or move laterally inside the Joint box. The Internal structure shall be metallic (made of stainless steel) to support and hold the cables and strength members etc. The metallic parts for making connections shall be made of Brass or Nickle Chromium plated steel and the total assembly shall be corrosion proof.

4.3 Fiber organizer/ Fiber Splice trays

Fiber organizer shall be non-metallic made of ABS material having following-

Specific Gravity	1.01-1.21 gm/cc	ASTM-D-792
Tensile Strength	0.002 kg/sqmm –0.005 kg/sqmm	ASTM-D-638
Elongation	<50%	ASTM-D-638
Water absorption	0.3-0.4	ASTM-D-57-59
Rock well hardness	R81-R111	ASTM- D785A

Test certificates in conformity to the above parameters of the ABS Material shall be furnished. Fiber organizer cassettes shall be provided on which the fibre splice and service loops of fibres may be placed by making fibre coils. Slots on the splice tray for fixing splice protection sleeve shall be in such a way that they will not cause any stress or strain on sleeve or fibre and shall not shift, loose or move inside the tray or come into conflict with the fibre coils once

No PVC or any other type of adhesive tape is permitted to hold fibers and loose tube inside the tray. All fibers of a tube shall be spliced in a single tray for better tube identity and fiber looping. The fiber organizer shall be fixed inside the Joint box in such a way that this shall not loosen once fixed or to shift or move in any way.

4.4 Holding Arrangements

The box shall provide the following:

- i. Holding arrangement and framework for properly securing cable organizers with splice trays.
- ii. Securing arrangement for holding fibers.
- iii. Holding device to hold strength member of fiber optic cable securely.
- iv. Any other extra component required for providing strength and reliability to the Joint Box.

4.4 Compatibility

All the components and parts used shall be compatible with the optical fiber cable, fiber splices and cable components. Their use for long should not result in an increase in transmission loss or deterioration in other properties.

4.5 Marking on body of the Joint box

Following information by marking indelibly on Joint box shall be provided:

- i. Manufacturer's name & date
- ii. Type of Joint box
- iii. Number of Splice organizer cassettes
- iv. Number of splices per cassette
- v. Batch number and serial number.
- vi. Name of Purchaser i.e. BSES Yamuna Power Ltd
- vii. Purchase order number & Date

5.0. CONSTRUCTIONAL FEATURES OF HDPE PIPE FOR OPTICAL FIBRE CABLE

S No	Parameter	Units	Guaranteed Value
PLB HDPE Pipe Parameters			
	Manufacturer's Name		
5.1	Pipe diameter Nominal	mm	40
5.2	Tolerance Wall Thickness	% mm	+1% & -0% 3.5
5.3	Nominal Tolerance	% mm	+1% & -0% 500
5.4	Standard Length Nominal Tolerance		+/- 5%
5.6	Pipe construction type		Two concentric layers
5.7	Thickness of permanent	mm	3.85 mm
5.8	Lubricant Construction material of outer layer		HDPE
5.9	Construction material of inner layer		HDPE with silicon
5.10	Base HDPE Resin - Density at 27 deg C	Kg/m3	940 to 958
5.11	Melt flow rate at 190 deg C & 5 kg load	g/10 minutes	0.2 to 1.1
5.12	Service life span Maximum outside diameter of fiber optic cable that can be installed by blowing technique	years	>25 16mm
5.13	Tensile Strength	N/mm2	Min. 20
5.14	Elongation at break	%	Min 350
5.15	Internal coefficient of friction		>0.06
5.16	Description of coatings/ additive	s	Anti Termite & Anti Rodent
PLB HDPE Pipe Accessories			
5.17	Coupler Type		Push Fit
2.18	Coupler Material		PP
5.19	Coupler strength		15 Kgf/cm ²
5.20	End cap material		PP

