

ANNEXURE – B (PQR)

- Vendor (OEM) must have supplied at least 200km of Fibre optic cable to any contractor / agency.
- Vendor (OEM) must be ISO certified.

Document Required:

1. PO / Invoice for supply of at 200kns of Fibre optic cable.
2. ISO certificate

311970/2024/HEP-SWE40906

ANNEXURE-A TO PURCHASE INDENT :		REV.NO.- 01
BHEL Bhopal SWE	Technical Specification of: Fibre Optic cable	Page 1 of 1
PI No.:	Enq. No.:	PO No.:
W.O. Nos. : For Rate Contract		

FIBRE OPTIC CABLE

1.0 APPLICATION: Suitable for Indoor/Outdoor Local Area Network System.

2.0 TECHNICAL DETAILS:

Item: 001 : 6Core Single Mode Unitube Armoured O.F Cable

Sr.No	Detail	Requierment	Confirmation
1	Cable Type	Single Mode Unitube Armoured O.F Cable	
2	Armoured / Unarmoured	Armouring with ECCS tape	
3	No. of fiber per tube	6	
4	No. of loose tubes	1	
5	Fibre Typr	G.652D	
6	Max Attenuation	< 0.38 dB/km at 1310 nm < 0.25 dB/km at 1550 nm	
7	Group Index of Refraction	1.466 /1.467 at 1310 nm/1550 nm	
8	Jacket material	LSZH	
9	Tensile Strength	2000N	
10	Standards	ISO 11801, IEC 60793-1/60794-1-2	

3.0 MQP:

Vendor to submit MQP for customer approval in line with standard MQP attached within 15 days of receipt of firm PO in case desired in PO. Manufacturing clearance shall be given by BHEL after approval of document.

Vendor to give inspection call 15 days in advance.

4.0 ACCEPTANCE CRITERIA:

i)	Visual checks for cracks and surface finish.
ii)	Availability of routine test certificates

Prepared by : Rahul Rajput
Date : 17.05.2024

Approved by : Murtaza Hussain
Date : 17.05.2024

ITEM : FIBER OPTIC CABLES. (SINGLE MODE)		STANDARD QUALITY PLAN					To be filled by NTPC		Reviewed By: Approved By		Remarks			
		CONFIRMING TO CODE : IEC 60794-1					QP No.: 0000-999-QOI-S-036 Revision:00 Date:02/01/2013 Page:1 OF 3		Archana Naitik S.Samanta B.D.Prasad		Approved I.Gowrishankar			
							Valid up to : 01/01/2016							
Sl No	Component & Operations	Characteristics	Class	Type of check	Quantum of check	Reference	Acceptance	Format of record	Agency			Remarks		
1	2	3	4	5	6	7	8	9	D*	10	11			
A RAW MATERIAL														
	FO Cable-Fiber	1.Fiber Geometry a) Core diameter b) Cladding diameter c) Coated Fiber diameter d) Core-clad concentricity error e) Cladding non-circularity f) Colour coding	Maj.	Measu.	100%	1 sample/each drum	Approved data sheet/ Manufacturer's standard	Approved data sheet/TR	IMR/ TC		P	V	V	Fiber Supplier Test report to be reviewed in case of Bought-Out-Item.
		2.Attenuation @ 1310 nm @ 1550 nm b) Cut-off wave length on 2 meter sample of Fiber(In cable)	Maj.	Measu.	100%	1 sample/each drum	Approved data sheet/ Manufacturer's standard	Approved data sheet/TR	IMR/ TC		P	V	V	
		3. Chromatic dispersion @ 1310 nm @ 1550 nm b) Zero dispersion slope c) Zero dispersion wave length	Maj.	Measu.	100%	1 Sample / each drum	Approved data sheet/ Manufacturer's standard	Approved data sheet/TR	IMR/ TC		P	V	V	
B IN PROCESS INSPECTION														
	Fiber	a) Length,loss & continuity b) winding c)Colourness d) Fiber diameter e)Rub test	Maj.	Visual/ Measu.	Mfr's standard	Sample	Approved data sheet/ Manufacturer's standard	Approved data sheet/TR			P	V		
C FINAL INSPECTION														
	Finished Fiber optic cable-	1.VISUAL a) Cable surface finish b) winding c) Ends availability d) Printing/Marking e) length checking f) Colour of Outer sheath	Maj.	Visual	100%	100%	Approved data sheet/ Manufacturer's standard	Approved data sheet/TR	IMR/ TC	V		P	W	W

LEGEND : * RECORDS, IDENTIFIED WITH " TICK" SHALL BE ESSENTIALLY INCLUDED BY SUPPLIER IN QA DOCUMENTATION .M:MANUFACTURER/ SUB SUPPLIER C:MAIN SUPPLIER,N:NTPC, P:PERFORM ,W: WITNESS and V: VERIFICATION AS APPROPRIATE, "CHP" NTPC SHALL INDICATED IN COLOUM "N" AS "W"

Format No. :QS-01-QAI-P-09/F1-R1

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1	2	3	4	5	M	C,N	Document	Norms	9	D*	10	11	
2.ELECTRICAL													
	a) Loss & Continuity		Cri.	Measu	100%	1 Sample / each drum	Approved data sheet/Manufacturer's catalogue	Approved data sheet/Manufacturer's catalogue	IMR/ TC	√	P	W	W
	b).Attenuation,Band width, Chromatic dispersion @ 1310 nm @ 1550 nm		Maj.	Measu	100%	1 Sample / each drum	Approved data sheet/Manufacturer's catalogue	Approved data sheet/Manufacturer's catalogue	IMR/ TC	√	P	W	W
	c)Outer sheath-Flame retardant & UV resistance performance test		Maj.	Measu	100%	1 Sample / lot	Approved data sheet/Manufacturer's catalogue	Approved data sheet/Manufacturer's catalogue	IMR/ TC	√	P	W	W
3.DIMENSIONAL													
	a) Cable Constructional checks and dimensions b)Outer sheath thickness c) Overall diameter of cable		Maj.	Measu	100%	1 Sample / each drum	Approved data sheet/Manufacturer's catalogue	Approved data sheet/Manufacturer's catalogue	IMR/ TC	√	P	W	W
4.MECHANICAL TESTING													
	a) Tensile Test		Maj.	Mech	1 Sample / lot	1 Sample / lot	Approved data sheet/Manufacturer's catalogue/IEC 60794-1-2-E1	ADS/2000 N with fiber strain of 0.25% maximum.Change in attenuation after test<=0.15dB/KM	IMR/ TC	√	P	W	W
	b) Crush Test		Maj.	Mech	1 Sample / lot	1 Sample / lot	Approved data sheet/Manufacturer's catalogue/IEC 60794-1-2-E3	ADS/4000 N between 100 x 100 mm plate for 10 minutes.Change in attenuation after test<=0.15dB/KM	IMR/ TC	√	P	W	W
	c) Impact Test		Maj.	Mech	1 Sample / lot	1 Sample / lot	Approved data sheet/Manufacturer's catalogue/IEC 60794-1-2-E4	ADS/3 nos, 5 kg from the height of 0.5 m .Change in attenuation after test<=0.15dB/KM	IMR/ TC	√	P	W	W
	d) Kink Test		Maj.	Mech	1 Sample / lot	1 Sample / lot	Approved data sheet/Manufacturer's catalogue/IEC 60794-1-2-E10	ADS/Loop of 20D should be made .Change in attenuation after test<=0.15dB/KM	IMR/ TC	√	P	W	W
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					M	C,N	Document	Norms	9	D*	10
1	2	3	4	5	6	7	8	9	10	11	
		e) Bend Test	Maj.	Mech	1 Sample / lot	1 Sample / lot	Approved data sheet/Manufacturer's catalogue/IEC 60794-1-2-E11	ADS/Diameter of mandral=250mm,4 turns 10 times wrapped & unwrapped.Change in attenuation after test<=0.15dB/KM	IMR/ TC	√	P W W
		f) Repeated Bend Test	Maj.	Mech	1 Sample / lot	1 Sample / lot	Approved data sheet/Manufacturer's catalogue/IEC 60794-1-2-E6	ADS/30 times with weight of 5 kg .Change in attenuation after test<=0.15dB/KM	IMR/ TC	√	P W W
		g) Torsion Test	Maj.	Mech	1 Sample / lot	1 Sample / lot	Approved data sheet/Manufacturer's catalogue/IEC 60794-1-2-E7	ADS/10 times with weight of 10 kg for 180 degree.Change in attenuation after test<=0.15dB/KM	IMR/ TC	√	P W W
		h) Water penetration Test	Cri.	Mech	1 Sample / lot	1 Sample / lot	Approved data sheet/Manufacturer's catalogue/IEC 60794-1-2-F5	ADS/ 3 MTR Cable sample with 1 mtr water head for 24 hrs.No water should be observed on other end of cable	IMR/ TC	√	P W W
5.ENVIRONMENTAL											
		Drip test(Loss/Change due to Temperature cycling)	Cri.	Measu	1 Sample / lot	1 Sample / lot	Approved data sheet/Manufacturer's catalogue/IEC 60794-1-2-F1	ADS/ 30 cm Cable sample will be placed in a chamber for 24 hrs at 70 deg C.No jelly should be observed	IMR/ TC	√	P W W
D	Packaging and dispatch	Stenciling, completeness & Verification with packing list on drums	Maj.	Visual	100%	-	Mfg. Practice	Mfg. Practice			P V -

NOTE 1 : Where witnessing and verification of records is done only by main contractor (Coloum "C"), NTPC inspection Engineer may do a surveillance Verification/ Witnessing as per his discretion.

NOTE 2 : IMR : Inword Material Register, TC : Test Certificates, Mfg. : Manufacturer, FIR : Final Inspection Report.,TR-Manufacturer Test Report,ADS-Approved Data Sheet

NOTE 3 : NTPC Inspection Enginner to check,approval date,revision no of reference documents at the time of Inspection.

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