



# BIHAR STATE POWER TRANSMISSION COMPANY LIMITED

## MANUFACTURING QUALITY PLAN -- OPGW

Name of Manufacturer :	Customer : BSPTCL	Vendor's Code	ITEM :FO Approach Cable	M.Q.P No :38 Rev No: 00	Valid From : 15.01.2016 Valid Up to: Till Revision
Code 1 Indicates Place where testing is planned to be performed i.e. Inspection Location A At Equipment manufacturer's works B At component manufacturer's works C At authorized distributor's place D At independent Lab E At turnkey contractor's location F Not Specified			Code 2 Indicates who has to perform the tests i.e. Testing agency J The Equipment manufacturer K The Component manufacturer L The third party M Theturnkey contractor		
Code 3 Indicates who shall witness the tests i.e. Witnessing agency P Component Manufacturer itself Q Component Manufacturer and Equipment Manufacturer R Component Manufacturer, Equipment Manufacturer and Contractor S Equipment Manufacturer itself T Equipment Manufacturer and Contractor U Equipment Manufacturer, Contractor and BSPTCL V Third Party itself			Code 4 Review of Test Reports/ Certificates W By Equipment Manufacturer during raw material/bought out component inspection X By Contractor during Product/ Process Inspection Y By BSPTCL during Product/ Process Inspection Z By Contractor and/or BSPTCL during Product/Process Inspection		
Code 5 Whether specific approval of sub-vendor/ Component make is Envisaged? E Envisaged N Not Envisaged			Code 6 Whether test records required to be submitted after issuance of Dispatch Clearance / Instructions ? Y Yes N No		
PO : Purchase Order , DI : Dispatch Instruction .					
<p>Notes:</p> <ol style="list-style-type: none"><li>The MQP should be read in conjunction with BSPTCL specification and shall deem to include additional tests if any required as per the contract.</li><li>BSPTCL specification shall include provisions of purchase order, BSPTCL approved drawings/ technical data sheet/BOM/Test schedule/Test procedure applicable to the specific contract.</li><li>In case of any contradiction between the manufacturer's plant standards, this MQP and BSPTCL specification following precedence shall be followed.<ol style="list-style-type: none"><li>BSPTCL Specification.</li><li>This Manufacturing Quality Plan</li><li>Manufacturer's plant standards</li></ol></li><li>It is the responsibility of the manufacturer to ensure that this document is readily available at their works, as well as at the works of their sub vendors in order to avoid any delay at the time of inspection.</li><li>The manufacturer shall ensure that their sub vendors control, metering &amp; testing instruments are duly calibrated and should have calibration certificates traceable to Indian/ National standards. Calibration records should be available during inspection of BSPTCL. Calibration of Testing instrument should be carried out in a lab which is accredited by NABL or an agency having full membership &amp; MRA of ILAC/APLAC with upto date validity</li><li>In case of any tests being carried out at third party lab, such lab/ facility should be accredited/ accepted by BSPTCL</li><li>The manufacturer shall maintain the proper co-relation of test certificates from raw material stage to finished stage and the records should be available during BSPTCL inspection.</li></ol>					



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8. The; Manufacturer shall show the approval of BSPTCL engineering for all contracts specific type tests, including specific type tests if any as per the BSPTCL specification at the time of final inspection.
9. All packing cases should be marked with BSPTCL LOA details, name of project, item description and Dispatch Clearance / Instructions number( by which material has been cleared for dispatch.
10. One copy of test report, Dispatch Clearance / Instructions shall also be sent along with the consignment.
11. Inspection of spares ordered by BSPTCL shall also be governed by provisions of this MQP. Items if not governed under MQP shall be offered for inspection as per the BSPTCL specifications/ Relevant Indian/ International specifications.
12. The manufacturer shall align their Quality System and that of their Sub vendors of latest ISO 9000 Quality standards.
13. In case of Change of name of sub vendor the manufacturer shall submit request to update the same along with supporting documents.
14. Whenever Indian / International standard are referred their last amendment shall be included.
15. Raw material / bought out items (envisaged) shall be procured from Approved source only.
16. All Out sourced services shall be from approved source only.
17. Surveillance checks shall be carried out by BSPTCL sources as and when deemed necessary no inspection call to be given for surveillance check.
18. BSPTCL may review the effective implementation of the processes during the product - inspection / process inspection. In case any violations in process or process parameters are observed, the reason along with corrective & preventive, measure shall be conveyed to BSPTCL within 2 weeks.

**Section A Raw Materials**

Sl.No.	Components / Operations & Description of Test	Type of Check	Quantum of Check / Sampling with basis	Reference document for Testing	Acceptance Norms	Format of Record	Applicable Codes						Remarks
							1	2	3	4	5	6	
<b>1.1 Optical Fibre</b>													<b>E</b>
1.1.1	Attenuation Coefficient	Measurement	100% of fibers	IEC 60793-1-40	BSPTCL Approved Drawing and Specifications	Supplier Test Certificate	B	K	P	W		N	
1.1.2	Point Discontinuity of Attenuation	Measurement	100% of fibers	IEC 60793-1-40	BSPTCL Approved Drawing and Specifications	Supplier Test Certificate	B	K	P	W		N	



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1.1.3	Chromatic Dispersion	Measurement	100% of fibers	IEC 60793-1-42	BSPTCL Approved Drawing and Specifications	Supplier Test Certificate	B	K	P	W		N	
1.1.4	Mode Field Diameter	Measurement	100% of fibers	IEC 60793-1-45	BSPTCL Approved Drawing and Specifications	Supplier Test Certificate	B	K		W		N	
1.1.5	Fiber Cutoff Wavelength	Measurement	100% of fibers	IEC 60793-1-44	BSPTCL Approved Drawing and Specifications	Supplier Test Certificate)	B	K	P	W		N	
1.1.6	Fiber Geometry (core-clad concentricity error and Cladding diameter)	Measurement	100% of fibers	IEC 60793-1-20	BSPTCL Approved Drawing and Specifications	Supplier Test Certificate)	B	K	P	W		N	
1.1.7	Fiber Tensile proof test	Measurement	100% of fibers	BSPTCL technical specification	BSPTCL Approved Drawing and Specifications	Supplier Test Certificate)	B	K	P	W		N	
<b>Section A Raw Materials</b>													
1.2 Ink <span style="float:right">E</span>													
1.2.1	Color	Measurement	EM Specs.	Test certificate from supplier	BSPTCL Approved Drawing and Specifications	Supplier TC	B	K	P	W		N	
1.2.2	Viscosity	Measurement	EM Specs.	Test certificate from supplier	BSPTCL Approved Drawing and Specifications	Supplier TC	B	K	P	W		N	





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1.4.7	Heat stress,Hydrogen generation	Measurement	EM Specs.	Test certificate from supplier	BSPTCL Approved Drawing and Specifications	Supplier TC	B	K	P	W		N			
1.4.8	Coefficient of Thermal expansion	Measurement	EM Specs.	Test certificate from supplier	BSPTCL Approved Drawing and Specifications	Supplier TC	B	K	P	W		N			
Section A Raw Materials															
1.5 ECCS Tape															
							E								
1.5.1	Thickness	Measurement	EM Specs.	Test certificate from supplier	BSPTCL Approved Drawing and Specifications	Supplier TC	B	K	P	W		N			
1.5.2	Tensile Strength	Measurement	EM Specs.	Test certificate from supplier	BSPTCL Approved Drawing and Specifications	Supplier TC	B	K	P	W		N			
1.5.3	Coating to steel Adhesion sterngh	measurement	EM Specs.	Test certificate from supplier	BSPTCL Approved Drawing and Specifications	Supplier TC	B	K	P	W		N			
1.5.4	Elongattion at break	measurement	EM Specs.	Test certificate from supplier	BSPTCL Approved Drawing and Specifications	Supplier TC	B	K	P	W		N			



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**Section A Raw Materials**

1.6 HDPE (High Density Poly Ethylene)						E							
			EM Specs.	Test certificate from supplier	BSPTCL Approved Drawing and Specifications	Supplier TC	B	K	P	W		N	
1.6.1	Density	Measurement											
1.6.2	Melt flow index	Measurement											
1.6.3	Carbon black content	Measurement											
1.6.4	Tensile strength	Measurement											
1.6.5	Elongation at break	Measurement											
1.6.6	Oxidation Induction time	Measurement											

**Section B Inprocess**

**2.1 Coloring Process (Coloring Stage)**

			100% of fibers	Test certificate from supplier	Smooth	In process Test Report	A	J	S	W		N	
2.1.1	Appearance	Naked eye											
2.1.2	Attenuation coefficient	Measurement	100% of fibers	IEC 60793-1 -40	≤0.35 dB/km @ 1310nm ≤0.21dB/km @1550nm								

**Section B Inprocess**



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<b>2.2 Loose Tube Buffer (Buffering Stage)</b>													
2.2.1	Appearance	Naked eye	10% sample per lot	Test certificate from supplier	Smooth	In process Test Report	A	J	S	W		N	
2.2.2	Diameters	Measurement	10% sample per lot	Test certificate from supplier	2.0 mm nominal	In process Test Report	A	J	S	W		N	
2.2.3	Colour scheme of Loose tubs & optical fibers	Naked eye	10% sample per lot	Test certificate from supplier	BSPTCL Approved Drawing and Specifications	In process Test Report	A	J	S	W		N	
2.2.4	Attenuation coefficient	Measurement	100% of fibers	IEC 60793-1 -40	$\leq 0.35$ dB/km @ 1310nm $\leq 0.21$ dB/km @1550nm	In process Test Report	A	J	S	W		N	



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Section B Inprocess											
2.3 Stranding Core (Loose tube buffer stranding stage)											
2.3.1	Attenuation Co-efficient.	Measurement	100% of fibers	IEC 60793-1-40	≤0.35 dB/km @ 1310nm ≤0.21dB/km @1550nm	In process Test Report	A	J	S	W	N
2.3.2	Colour scheme of Loose tubs & optical fibers	Naked eye	10% sample per lot	BSPTCL technical specification	BSPTCL Approved Drawing and Specifications	In process Test Report	A	J	S	W	N
Section C Final Inspection (Factory Acceptance Test)											
3.1 Routine tests on Final FG Fiber Optic Approach cable											
3.1.1	Attenuation Coefficient	Measurement	100 % of drums	IEC60793-1-40	≤0.35 dB/km @ 1310nm ≤0.21dB/km @1550nm	Inprocess test Report	A	J	S	W	Y
3.1.2	Attenuation At water peak	Measurement	100% of drums	BSPTCL technical specification	Less than Attenuation @ 1310nm	FAT Report	A	J	S	W	Y
3.1.3	Point Discontinuity	Measurement	100% of drums	IEC60793-1-40	≤0.1 dB	FAT Report	A	J	S	W	Y
3.1.4	Overall Diameter	Measurement	100 % of drums	BSPTCL Approved Drawing and Specifications	10.5 ± 5% mm	FAT Report	A	J	S	W	Y
3.1.5	Sheath Thickness	Measurement	100 % of drums	BSPTCL Approved Drawing and Specifications	1.6 mm Nominal	FAT Report	A	J	S	W	Y





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Section C Final Inspection (Factory Acceptance Test)												
3.2 Completed FO Cable												
3.2.1	Attenuation Coefficient	Measurement	10% of lot	IEC60793-1-40	≤0.35 dB/km @ 1310nm ≤0.21dB/km @1550nm	FAT Report	A	J	U	Z	N	Y
3.2.2	Attenuation At water peak	Measurement	10% of lot	BSPTCL technical specification	Less than Attenuation @ 1310nm	FAT Report	A	J	U	Z	N	Y
3.2.3	Point Discontinuity	Measurement	10% of lot	IEC60793-1-40	≤0.1 dB	FAT Report	A	J	U	Z	N	Y
3.2.4	Overall Diameter	Measurement	10% of lot	BSPTCL Approved Drawing and Specifications	10.5 ± 5% mm	FAT Report	A	J	U	Z	N	Y
3.2.5	Sheath Thickness	Measurement	10% of lot	BSPTCL Approved Drawing and Specifications	1.6 mm Nominal	FAT Report	A	J	U	Z	N	Y



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Section D Final Inspection (Factory Acceptance Test)												
4.1 Cable Drum												
4.1.1	Appearance of OFAC Cable	Naked Eye	10%of lot	BSPTCL Approved Drawing and Specifications	Smooth	FAT Report	A	J	U	Z	N	Y
4.1.2	Dimensions	Measurement	10%of lot	BSPTCL Approved Drawing and Specifications	1200 mmx600 mmx800 mm or equivalent	FAT Report	A	J	U	Z	N	Y
4.1.3	Material of Drum	Measurement	10%of lot	BSPTCL Approved Drawing and Specifications	Wooden Drum	FAT Report	A	J	U	Z	N	Y
4.1.4	Sealing cable ends with ends caps.	Naked Eye	100%of lot	BSPTCL Approved Drawing and Specifications	Proper sealing at the cable ends	FAT Report	A	J	U	Z	N	Y
4.1.5	Signing by the inspection official on the drum details printed on paper.	Naked Eye	100%of lot	BSPTCL Approved Drawing and Specifications	---	FAT Report	A	J	U	Z	N	Y
			100%of	BSPTCL Approved Drawing and		FAT Report						



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4.1.6	Sealing/pasting the drum details over the ends cap with transparent tape.	Naked Eye	lot	Drawing and Specifications	-----	A J U Z N Y



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Section E						
5.1 Packing & Dispatch .						
5.1.1	Total Drums	Naked Eye	100% of reals/shipment	BSPTCL Approved Drawing and Specifications	As per Approved BOQ	A J S W N N
5.1.2	Shipping Mark	Naked Eye	100% of reals/shipment	BSPTCL Approved Drawing and Specifications	Stenciling on drums	A J S W N N
5.1.3	Weather proof covering	Naked Eye	100% of reals/shipment	BSPTCL Approved Drawing and Specifications	Polythene sheet covered to OF cable	A J S W N N
5.1.4	Drum number	Naked Eye	100% of reals/shipment	BSPTCL Approved Drawing and Specifications		A J S W N N
5.1.5	Consignee's name & address	Naked Eye	100% of reals/shipment	As per Dispatch Clearance / Instructions	Stenciling on drums	A J S W N N
5.1.6	Contractor's name & address	Naked Eye	100% of reals/shipment	As per Dispatch Clearance / Instructions	Stenciling on drums	A J S W N N
5.1.7	Type of Cable	Naked Eye	100% of reals/shipment	As per Dispatch Clearance / Instructions	24 F Approach cable	A J S W N N
5.1.8	No. of fibers	Naked Eye	100% of reals/shipment	As per Dispatch Clearance / Instructions	24	A J S W N N
5.1.9	Year of manufacturing, month & batch no.	Naked Eye	100% of reals/shipment	BSPTCL Approved Drawing and Specifications	Stenciling on drums	A J S W N N
5.1.10	Name of the manufacturer	Naked Eye	100% of reals/shipment		EM name	A J S W N N
5.1.11	Total Cable Length	Naked Eye	100% of reals/shipment	As per Approved BOQ	As peer approved BOQ	A J S W N N