



# BIHAR STATE POWER TRANSMISSION COMPANY LIMITED

## MANUFACTURING QUALITY PLAN -- PVC Signal / Instrumentation Cable

<b>MANUFACTURERS DETAILS</b>	<b>Customer</b>  BSPTCL	<b>Vendor's Code</b>	<b>Item:</b>  1.1 KV grade PVC Signal / Instrumentation Cable	MQP: 005  REV:00	Valid From: 15.01.2016  Valid Upto: Till revision  Page 1 of 8
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<p><b>Code 1</b> Indicates place <b>where testing is planned</b> to be performed i.e. Inspection Location</p> <p>A At Equipment Manufacturer's works</p> <p>B At Component Manufacturer's works</p> <p>C At Authorised Distributor's place</p> <p>D At Independent Lab</p> <p>E At Turn Key Contractor's location</p> <p>F Not specified</p>	<p><b>Code 2</b> Indicate <b>who has to perform the tests</b> i.e. Testing Agency</p> <p>The Equipment</p> <p>J Manufacturer</p> <p>The Component</p> <p>K Manufacturer</p> <p>L The Third Party</p> <p>M The Turnkey Contractor</p>
<p><b>Code 3</b> Indicates place <b>who shall witness</b> tests i.e. Witnessing Agency</p> <p>P Component Manufacturer itself</p> <p>Q Component Manufacturer and Equipment Manufacturer</p> <p>R Component Manufacturer, Equipment Manufacturer and Contractor</p> <p>S Equipment Manufacturer itself</p> <p>T Equipment Manufacturer and Contractor</p> <p>U Equipment Manufacturer, Contractor and BSPTCL</p> <p>V Third Party itself</p>	<p><b>Code 4</b> Review of Test Reports/Certificates</p> <p>W By Equipment manufacturer during raw material/bought out component inspection</p> <p>X By Contractor during product/process inspection</p> <p>Y BY BSPTCL during product/process inspection</p> <p>Z By Contractor and/or BSPTCL during product/process inspection.</p>
<p><b>Code 5</b> Whether specific approval of sub-vendor / Component make is envisaged?</p> <p>E Envisaged</p> <p>N Not Envisaged</p>	<p><b>Code 6</b> Whether test records required to be submitted after final inspection for issuance of Dispatch Instructions/Clearance of BSPTCL</p> <p>Y Yes</p> <p>N No</p>



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	<b>BSPTCL</b>		<b>1.1 KV grade PVC Signal / Instrumentation Cable</b>	<b>REV:00</b>	<b>Valid Upto:</b>	<b>Till revision</b>
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### NOTE:

- a. The MQP should be read in conjunction with BSPTCL specification and shall deem to include additional tests if any required as per the contract.
- b. BSPTCL specification shall include provisions of letter of Award, BSPTCL approved drawings /technical data sheet / BOM / test schedule / test procedure applicable to the specific contract.
- c. In case of any contradiction between EM plant standards, this MQP and BSPTCL specification following precedence shall be followed :-
  - i) BSPTCL specification
  - ii) This Manufacturing Quality plan.
  - iii) Manufacturer's plant standards
- d. 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.
- e. The manufacturer shall ensure that their as well as their sub vendors control, metering & testing instruments are duly callibrated and should have calibration certificates traceable to Indian/International standards. Caibration records should be available during inspection by BSPTCL. Key testing instruments will be calibrated only by NABL accredited laboratories or manufacturer laboratories.
- f. In case of any tests being carried out at third party lab, such lab / facility should be NABL accredited /accepted by BSPTCL
- g. The manufacturer shall maintain the proper co-relation of test certificates from raw material stage to finished product stage and the records should be available during inspection by BSPTCL.
- h. Manufacturer shall show the approval of BSPTCL engineering for all contract specific type tests, including specific type tests if any as per the BSPTCL specification at the time of final inspection.
- i. All packing cases should be marked with BSPTCL LOA details, name of project, item description and Dispatch Instructions/Clearance of BSPTCL number by which material has been cleared for dispatch.
- j. One copy of test report, Dispatch Instructions/Clearance of BSPTCL shall also be sent along with consignment.



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- k Inspection of spare items ordered by BSPTCL shall also be governed by the provisions of this MQP. Items if not governed under MQP shall be offered for inspection as per BSPTCL specification / Relevant-Indian / International Specification
  
- l The manufacturer shall align their quality system and that of their sub vendors to the requirements of latest ISO 9000 quality standards in a time bound Manner.
  
- m All raw materials where vendor approval is envisaged to be supplied from BSPTCL approved vendors.
  
- n BSPTCL may review the effective implementation of the processes during the product inspection / process inspection in case any violation in process or process parameters are observed, the reason along with corrective & preventive measures shall be conveyed to BSPTCL within 2 weeks.
  
- o The manufacturer shall adopt such a quality system/practice so as to ensure 100% conformity of all the input material as per technical specification/ standard requirements.

EM : Equipment Manufacturer

CM: Component Manufacturer



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Sr. No.	Components / Operations & Description of Test	Class	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>A</b>	<b>RAW MATERIAL</b>														
<b>1.0</b>	<b>COPPER ROD for Conductor/ Drain</b>												E		
1.1	a) Dimension	Maj.	Measu.	1 Sample/batch	IS: 613/IS: 12444	IS: 613/IS: 12444	Manuf. T.C	A	J	S	W			N	Review of Supplier TC
1.2	b) Conductivity/ Resistivity	Cri	Elec.	1 Sample/batch	IS: 613/IS: 12444	IS: 613/IS: 12444	-do-	A	J	S	W			N	-do-
<b>2.0</b>	<b>PVC Compound for Insulation (Type-A)</b>												E		
2.1	a) Type/ Grade	MA	Verify	100%	IS: 5831/ADS	IS: 5831/ADS	Plant Std	A	J	S	W			N	-do-
2.2	b) Thermal Stability ( for Insulation)	Maj.	Therm.	1 Sample/batch	IS: 5831/ADS	IS: 5831/ADS	-do-	A	J	S	W			N	-do-
2.3	c)TS & % elongation Before and After ageing	Maj.	Mech.	-do-	-do-	-do-	-do-	A	J	S	W			N	-do-
2.4	d)Loss of Mass	Maj.	Therm.	-do-	-do-	-do-	-do-	A	J	S	W			N	-do-
<b>3.0</b>	<b>PVC Compound for Sheath (Type "ST-1")</b>												E		
3.1	a) Type/ Grade/ visual Check for PVC Granuels	MA	Visual	100%	IS: 5831/ADS	IS: 5831/ADS	Plant Std.	A	J	S	W			N	-do-
3.2	b)Thermal stability ( for Outersheath)	Maj	Therm.	1 Sample/batch	IS: 5831/ADS	IS: 5831/ADS	-do-	A	J	S	W			N	-do-
3.3	c) TS & % Elongation Before and After Ageing	Maj	Mech.	-do-	-do-	-do-	-do-	A	J	S	W			N	-do-
3.4	d) Loss of mass	Maj	Therm.	-do-	-do-	-do-	-do-	A	J	S	W			N	-do-
3.5	e)Oxygen Index test on Outersheath	Cri.	Therm.	1 Sample/batch	29% ( min.) ASTMD2863	29% ( min.) ASTMD2863	Manuf. T.C	A	J	S	W			N	-do-
3.6	f)Temperature Index test on Outersheath	Cri.	Therm.	-do-	250 ( min.)ASTMD 2863	250 ( min.)ASTMD 2863	-do-	A	J	S	W			N	-do-
<b>4.0</b>	<b>Taps/Binders( Aluminium Mylar, Melinex &amp; Binders)</b>												N		
4.1	a) Thickness	Maj.	Measu.	1 Sample/batch	Mfg. Plant Std./ADS	Mfg. Plant Std./ADS	TC/ Register	A	J	S	W			N	---
4.2	b) Size	Maj.	Measu.	1 Sample/batch	-do-	-do-	-do-	A	J	S	W			N	---
<b>5.0</b>	<b>Test on Armour ( if Applicable)</b>												E		
5.1	a) Dimension	Maj.	Measu.	1 Sample/batch	IS: 3975/ADS	IS: 3975/ADS	-do-	A	J	S	W			N	Review of Supplier TC
5.2	b) TS & %Elongation	Maj.	Mech.	-do-	-do-	-do-	-do-	A	J	S	W			N	-do-
5.3	c)Zinc coating Test ( Thickness and Mass)	Maj.	Chem.	-do-	-do-	-do-	-do-	A	J	S	W			N	-do-
5.4	d)Torsion	Maj.	Elec.	-do-	-do-	-do-	-do-	A	J	S	W			N	-do-
5.5	e)Winding/ Adhesion	Maj.	Mech.	-do-	-do-	-do-	-do-	A	J	S	W			N	-do-
5.6	f) Resistivity	Maj.	Elec.	-do-	-do-	-do-	-do-	A	J	S	W			N	-do-






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	<b>BSPTCL</b>		<b>1.1 KV grade PVC Signal / Instrumentation Cable</b>	<b>REV:00</b>	<b>Valid Upto:</b>	<b>Till revision</b>
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Sr. No.	Components / Operations & Description of Test	Class	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>11.0</b>	<b>Twisting</b>													
11.1	a) Lay Length and Direction	Maj.	Measu.& Visual	Mfg. Std.	Spec. /ADS	Spec. /ADS	-do-	A	J	S	W		N	----
11.2	b) size/ Dimension	Maj.	Measu.	Mfg. Std.	Spec. /ADS	Spec. /ADS	-do-	A	J	S	W		N	----
11.3	c) Pair colour	Maj.	Visu.	Mfg. Std.	Spec. /ADS	Spec. /ADS	-do-	A	J	S	W		N	----
<b>12.0</b>	<b>Laying of Pairs/ Taping/ Shielding (Wherever Applicable)</b>													
12.1	a) Construction	Maj.	Visu.	Mfg. Std.	Spec. /ADS/Mfg. Std.	Spec. /ADS/Mfg. Std.	-do-	A	J	S	W		N	----
12.2	b) Dimension	Maj.	Measu.	Mfg. Std.	Spec. /ADS/Mfg. Std.	Spec. /ADS/Mfg. Std.	-do-	A	J	S	W		N	----
12.3	c) Coverage/ Overlap	Maj.	Measu.	Mfg. Std.	Spec. /ADS	Spec. /ADS	-do-	A	J	S	W		N	----
12.4	d) Continuity	Maj.	Dimn.	Mfg. Std.	Spec. /ADS/Mfg. Std.	Spec. /ADS/Mfg. Std.	-do-	A	J	S	W		N	----
<b>13.0</b>	<b>Inner Sheathing (If Applicable)</b>													
13.1	a) Surface Finish	Maj.	Visu.	Mfg. Std.	Smooth Free from visual defects	Smooth Free from visual defects	In process Log Sheet	A	J	S	W		N	----
13.2	b) Colour	Maj.	Visu.	Mfg. Std.	Spec./ADS	Spec./ADS	-do-	A	J	S	W		N	----
13.3	c) Diameter/ Thickness	Maj.	Measu.	Mfg. Std.	Spec./ADS	Spec./ADS	-do-	A	J	S	W		N	----
<b>14.0</b>	<b>Armouring (If applicable)</b>													
14.1	a) Surface Finish	Maj.	Visu.	Mfg. Std.	Smooth, free from visual defects like rusting etc.	Smooth, free from visual defects like rusting etc.	In process Log Sheet	A	J	S	W		N	----
14.2	b) Direction of Lay and Coverage	Maj.	Visu.	Mfg. Std.	Spec./ADS	Spec./ADS	-do-	A	J	S	W		N	----
14.3	c) Size of wire/ strip	Maj.	Measu.	Mfg. Std.	ADS	ADS	-do-	A	J	S	W		N	----
14.4	d) Diameter over armouring	Maj.	Measu.	Mfg. Std.	ADS	ADS	-do-	A	J	S	W		N	----
<b>15.0</b>	<b>Outer Sheathing</b>													
15.1	a) Surface Finish	Maj.	Visu.	Mfg. Std.	Smooth free from visual defects	Smooth free from visual defects	In process Log Sheet	A	J	S	W		N	----
15.2	b) Colour/Marking/Embossing	Maj.	Visu.	Mfg. Std.	Spec./ADS	Spec./ADS	-do-	A	J	S	W		N	----
15.3	c) Overall diameter, Thickness	Maj.	Measu.	Mfg. Std.	Spec./ADS	Spec./ADS	-do-	A	J	S	W		N	----
15.4	d) TS & % Elongation	Maj.	Mech.	Mfg. Std.	Spec./ADS	Spec./ADS	-do-	A	J	S	W		N	----

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Sr. No.	Components / Operations & Description of Test	Class	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>C</b>	<b>Final Inspection &amp; testing</b>														
16.0	Type test as per IS:1554 P-1 & approved GTP						Type Test Certificate								
<b>17.0</b>	<b>ROUTINE TEST</b>														
17.1	a) Cond. Resistance ( Cable& drain wire)	Cri.	Elec.	100%	Spec. /ADS	Spec. /ADS	Routine Test Certificate	A	J	S	Y		N	----	
17.2	b) HV Test	Cri.	Elec.	100%	Spec. /ADS	Spec. /ADS	-do-	A	J	S	Y		N	----	
17.3	c) IR test( on drum Length)	Cri.	Elec.	100%	Spec. /ADS	Spec. /ADS	-do-	A	J	S	Y		N	----	
17.4	d)Drain wire Continuity	Cri.	Elec.	100%	Spec. /ADS	Spec. /ADS	-do-	A	J	S	Y		N	----	
<b>18.00</b>	<b>Acceptance Test</b>														
18.01	a)Cond resistance & continuity (Cable & Drain wire)	Cri.	Elec.	10%	Spec. /ADS	Spec. /ADS	Acceptance Test Certificate	A	J	U	Y		Y	<b>Dispatch Instructions/Clearance of BSPTCL</b>	
18.02	b) HV Test	Cri.	Elec.	100%	Spec. /ADS	Spec. /ADS	-do-	A	J	U	Y		Y	-do-	
18.03	c) IR test	Cri.	Elec.	100%	Spec. /ADS	Spec. /ADS	-do-	A	J	U	Y		Y	-do-	
18.04	d)Thickness of Insulation	Cri.	Elec.	One Sample for every 10 Drums or part there of per Size	Spec. /ADS	Spec. /ADS	-do-	A	J	U	Y		Y	-do-	
18.05	i)Diameter over outersheath	Maj.	Visual	-do-	Spec. /ADS	Spec. /ADS	-do-	A	J	U	Y		Y	-do-	
18.06	ii) Shield Al-Mylar Tape	Maj.	Measu.	-do-	Spec. /ADS	Spec. /ADS	-do-	A	J	U	Y		Y	-do-	
18.07	iii)Inner/Outer thickness (as applicable)	Maj.	Measu.	-do-	Spec. /ADS	Spec. /ADS	-do-	A	J	U	Y		Y	-do-	
18.08	Outersheath- colour, Marking/Embossing	Maj.	Visual	-do-	Spec. /ADS	Spec. /ADS	-do-	A	J	U	Y		Y	-do-	
18.09	TS & %Elongation test of insulation & sheath (before aging)	Maj.	Mech	-do-	Spec. /ADS	Spec. /ADS	-do-	A	J	U	Y		Y	-do-	
18.10	Core- Band marking/ Numbering, Colour (As Applicable)	Maj.	Visual	-do-	Spec. /ADS	Spec. /ADS	-do-	A	J	U	Y		Y	-do-	
18.11	Overall coverage/overlap of shield & continuity of drain wire	Maj.	Visual	-do-	Spec. /ADS	Spec. /ADS	-do-	A	J	U	Y		Y	-do-	
18.12	Thermal Stability( insulation & sheath)	Maj.	Thermal	-do-	Spec. /ADS	Spec. /ADS	-do-	A	J	U	Y		Y	-do-	
18.13	Electrical Parameters ( Mutual Capacitance, Cross Talk, Attenuation, Characteristic Impedance - as applicable)	Maj.	Elect	-do-	Spec. /ADS	Spec. /ADS	-do-	A	J	U	Y		Y	-do-	
18.14	Persulphate test( tinned Coated Conductor only)	Maj.	Chem	-do-	Spec. /ADS	Spec. /ADS	-do-	A	J	U	Y		Y	-do-	
18.15	Swidish Chimney Test (overall cable)	Maj.	Thermal	-do-	Spec. /ADS	Spec. /ADS	-do-	A	J	U	Y		Y	-do-	
18.16	FR test for outersheath (for oxygen index, Temperature Index)	Maj.	Thermal	-do-	Spec. /ADS	Spec. /ADS	-do-	A	J	U	Y		Y	-do-	
18.17	Volume resistivity( at room and Elevated Temperature)	Maj.	Elect	-do-	Spec. /ADS	Spec. /ADS	-do-	A	J	U	Y		Y	-do-	
18.18	Surface Finish & length Measurement	Maj.	Visual	-do-	Smooth , free from visual defects	Smooth , free from visual defects	-do-	A	J	U	Y		Y	-do-	
18.19	Armouring Dimension& uniformity of Zinc coating ( if applicable)- all test on armour to be carried as per sl. No. 5.0 above	Maj.	Measu.	-do-	Spec. /ADS	Spec. /ADS	-do-	A	J	U	Y		Y	-do-	
D	Stenciling completeness & verification with packing list	Maj.	Visual	100%	Mfg. Practice	----	----							----	

- (a) ADS- approved Data Sheet  
(b) List of Raw material shall be as per Annexure to MQP of Instrumentation Cable  
(c) The ITP shall be read inline with TS, approved GTP & relevant Standard.



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*Annexure to MQP of Instrumentation Cable Page: 8 of 8*

LIST OF RAW MATERIAL SUPPLIER

COPPER	: BIRLA COPPER, STERLITE & IMPORTED
PVC	: SHRIRAM, KUND KUND POLYMER, KALPANA, PARAGON, SCJ, KLJ PLASTICS
GI Wires/Strips	: BANSAL INDUSTRIES, BANSAL STRIP, MICA INDUSTRIES, TATA STEEL LTD.
ALUMINIUM MYLAR /POLYESTER TAPE	: VAISHNO LAMINATIONS, PC LAMINATIONS, ADVES LAMINATIONS, SR INTERNATIONAL, AAVEES LAMINATIONS, AVSL FOILS PVT. LTD.
PACKING DRUM(WOODEN/STEEL)	: LOCAL