



BIHAR STATE POWER TRANSMISSION COMPANY LIMITED

MANUFACTURING QUALITY PLAN -- For composite Long Rod Polymer Insulators upto 400kV and upto 160KN

Manufacturer Name and Address		Customer	Vendor code	ITEM	M.Q.P No - 32 Rev. 00	Valid From- 15.01.2016							
		BSPTCL		Composite long rod insulator (160kN and/or 120kN) applicable for 400kV System		Valid To- Till Revision							
						Date - 06.01.2016							
S.No	Component/ Operation & Description of test	Type of check	Sampling plan with basis	Reference document for testing	Acceptance Norms	Format of Records	1	2	3	4	5	6	Remarks
	Chemical Composition	Chemical	1/lot of 500 or part thereof	IS:1865 Grade:500/7		TPL	D	L	U	W/Z		Y	
B) Clamp for Grading ring (Cast Steel)													
	1. Carbon				3.55-3.75%								
	2. Manganese				0.40% (max)								
	3. Silicon				2.60-3.00%								
	4. Phosphorous				0.035% max								
	5. Sulphur				0.02% max								
	6. Magnesium				0.045-0.055%								
4.3	Dimensions(Ring & Clamp for Grading ring)	Physical	2 % /lot of 500 or part thereof		Conformance to drawings		A	J	U	W/Z		Y	
4.4	Clamp Galvanising												
	1. Mass of Zinc coating	Physical	5/lot of 1000 or part thereof		(600 g/m ²) 85 microns by Elcometer	EMTC	A	J	U	W/Z		Y	
	2. Uniformity of Zinc coating	Chemical	3/lot of 1000 or part thereof		Min 6 dips of 1 minute each	EMTC	A	J	U	W/Z		Y	
	3. Adhesion test	Physical	1/lot of 1000 or part thereof		IS:2629	EMTC	A	J	U	W/Z		Y	
	4. Purity of Zinc used	Chemical			Not less than 99.95% IS 209 & BSPTCL.S	CMTC	D	L	V	W/Z		Y	
B) IN PROCESS INSPECTION													
5.1	Modification of silicon rubber compound	Physical	Once/day	BSPTCL specification/ Approved drawing		QC-Working & Check Records							
	Silicone rubber compound				+/- 50g / roll		A	J	S	W		N	
	Pigment(Titanium dioxide)				+/- 1g		A	J	S	W		N	
	Rodent Repellant Chemical				+/- 0.1g		A	J	S	W		N	
5.2	Open mixing	Physical	Once/day	BSPTCL specification/ Approved drawing		QC-Working & Check Records							
	1. Roller gap				6 - 8mm		A	J	S	W		N	
	2. Weight for each roll of the silicone rubber compound				15 - 20kg		A	J	S	W		N	
5.3	Resting placement	Physical	Once/day	BSPTCL specification/ Approved drawing		QC-Working & Check Records	A	J	S	W		N	
	1. Resting time				>=24 hours								
5.4	Modified silicone rubber compound inspection		Once/day	BSPTCL specification/ Approved drawing	Plant Standard SQP-CI-02-1	QC-Working & Check Records	A	J	S	W		N	
The physical and electrical properties of modified silicone rubber compound													
a	Tear Resistance	Physical	500 gms per lot 500kgs or part thereof	ASTM D 624 Die-B	>=9N/mm	EMTR	A	J	S	W		N	
b	Hardness (Shore-A)	Physical		ASTM D 2240	65+/-5		A	J	S	W		N	
c	Dielectric strength in kV/mm	Electrical		ASTM D 149	15 Min.		A	J	S	W		N	
d	Tracking & Erosion	Electrical		IEC 60587	1A4.5		A	J	S	W		N	
e	DC Volume Resistivity	Electrical		ASTM D 257	1.0 x 10 ¹³		A	J	S	W		N	
f	Tensile Strength	Physical		ASTM D 412	3.5N/mm ²		A	J	S	W		N	
g	Elongation at break(%)	Physical		ASTM D 412	150 (Min)		A	J	S	W		N	
5.5	Injection Moulding Process												
5.5.1	Bonding agent applying on core rods	Physical	10/shift	Standard quality plan Doc.No:QP-CI-02	Standard quality plan Doc.No:QP-CI-02	Check sheet PS-CI-03/1	A	J	S	W		N	
5.5.2	Injection	Physical		Standard quality plan Doc.No:QP-CI-02	Standard quality plan Doc.No:QP-CI-02	Check sheet PS-CI-04/1	A	J	S	W		N	
	a Fixed platen Temperature (set value)		1 time/shift	155+/-5 deg.C	155+/-5 deg.C		A	J	S	W		N	
	b Movable Platen Temperature (set value)		1 time/shift	155+/-5 deg.C	155+/-5 deg.C		A	J	S	W		N	
	c Curing time(set value)		1 time/shift	640 to 660 Sec	640 to 660 Sec		A	J	S	W		N	



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	d Injection Volume		1 time/shift	The set value may be adjusted according to different moulds/Machines. 88-258mm	The set value may be adjusted according to different moulds/Machines. 88-258mm		A	J	S	W		N	
5.6	Semi-finished products inspection		10%	Standard quality plan Doc.No:QP-CI-02	Standard quality plan Doc.No:QP-CI-02	Check sheet PS-CI-05/1	A	J	S	W		N	
	a Visual inspection The thickness of sheath	Physical	10%	Clause 8.2 IEC 61109 / Approved drawing	Clause 8.2 IEC 61109 / Approved drawing		A	J	S	W		N	
5.7	Flash-removing Process a) Appearance	Physical	100%	Standard quality plan Doc.No:QP-CI-02	No flash remains. No hurt to the surface of weather sheds	Check sheet PS-CI-05/1	A	J	S	W		N	
5.8	End fitting crimping process						A	J	S	W		N	
	a 120kN and 160kN Compression Pressure 120kN: 160kN:		100%	Standard quality plan Doc.No:QP-CI-02	235 to 305 kgf/sq.cm	Check sheet PS-CI-05/2	A	J	S	W		N	
C) FINAL ACCEPTANCE TEST													
6.1	Routine test						A	J	S	W/Z		N	
	a Identification of composite insulator	Physical	100%	IEC61109 Ci 8.1	IEC61109 Ci 8.1	EMTR	A	J	S	W/Z		N	
	b Visual inspection	Physical	100%	IEC61109 Ci 8.2	IEC61109 Ci 8.2	EMTR	A	J	S	W/Z		N	
	c Load test Mechanical routine test	Mechanical	100%	IEC61109 Ci 8.3	IEC61109 Ci 8.3(To withstand 50% of SML for 10s.)	EMTR	A	J	S	W/Z		N	
6.2	Acceptance Test						A	J	U	W/Z		Y	
	a Verification of Dimension	Physical	IEC61109 Ci 7.1	BSPTCL specification/ Approved drawing	IEC61109 Ci 7.2	EMTC	A	J	U	W/Z		Y	
	b Galvanising Test 1.Mass of zinc coating	Physical	IEC61109 Ci 7.1	BSPTCL specification/ Approved drawing	(600gm/sq m) 85 microns by Elcometer	EMTC	A	J	U	W/Z		Y	
	c Verification of the specified mechanical load	Mechanical	IEC61109 Ci 7.1	IEC61109 Ci 7.4	IEC61109 Ci 7.4	EMTC	A	J	U	W/Z		Y	
	d Verification of the locking system	Physical	IEC61109 Ci 7.1	IEC60383. BSPTCL Approved drawing/ Specification	IEC61109 ci 7.3	EMTC	A	J	U	W/Z		Y	
	e Recovery of hydrophobicity	Electrical	On 2 samples from one insulator of each rating per offered lot	BSPTCL specification/ Approved drawing	BSPTCL specification. Clause 2.2 Annexure-A	EMTC	A	J	U	W/Z		Y	
	f Verification of content of silicone	Physical	On 1 sample(one from any shed of each insulator)of each rating per offered lot	BSPTCL specification/ Approved drawing	Min. 30% by weight	EMTC	A	J	U	W/Z		Y	
7	Packing and Dispatch												



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7.1	Verification of soundness of packing	Visual	100%	BSPTCL specification/ Approved drawing	BSPTCL specification/ Approved drawing	EM Rcord	A	J	S	W		N	
7.2	Marking destination details as per BSPTCL norms	Visual	100%	BSPTCL specification/ Approved drawing	BSPTCL specification/ Approved drawing	EM Rcord	A	J	S	W		N	
7.3	Verifivation of Dispatch Clearance/ Instructions/PACKING LIST	Verification	100%	Dispatch Clearance/ Instructions	Dispatch Clearance/ Instructions	EM Rcord	A	J	S	W		N	



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Manufacturing Quality plan -- For composite Long Rod Polymer Insulators upto 400kV and upto 160KN

	Manufacturer Name and Address	Customer BSPTCL	Vendor code	ITEM Composite long rod insulator (160kN and/or 120kN) applicable for 400kV System	M.Q.P No - 32 Rev. 00	
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CODE DESCRIPTION

Code 1: Indicate place where testing is planned to be performed i.e inspection location	Code 2: Indicate who has to perform the tests i.e Testing Agency	
A. At Equipment Manufacturer's works	J. The Equipment Manufacturer	
B. At Component Manufacturer's works	K. The Component Manufacturer	
C. At Authorised Distributor's works	L. The Third Party	
D. At independent Laboratory	M. The Turn Key Contractor	
E. At the Turn Key Contractor's Location		
F. Not specified		Dispatch Clearance/ Instructions
Code 3: Indicate who shall witness the test i.e Witnessing Agency	Code 4: Review of Test Reports / Certificates	
P. Component Manufacturer itself	W. By Equipment Manufacturer.	
O. Component Manufacturer and Equipment Manufacturer	X. By Contractor during Product/Process Inspection	
R. Component Manufacturer and Equipment Manufacturer and Contractor	Y. By BSPTCL during Product/Process Inspection	
S. Equipment Manufacturer himself	Z. By Contractor or BSPTCL during Product/Process Inspection	
T. Equipment Manufacturer and Contractor		
U. Equipment Manufacturer, Contractor and BSPTCL		
V. Third Party.		
Code 5: Whether specific approval of sub-vendor / component make is envisaged?	Code 6: Whether test records to be submitted after final inspection for issue of Dispatch Clearance/ Instructions	
E. Envisaged	Y. Yes	
N. Not Envisaged	N. No	

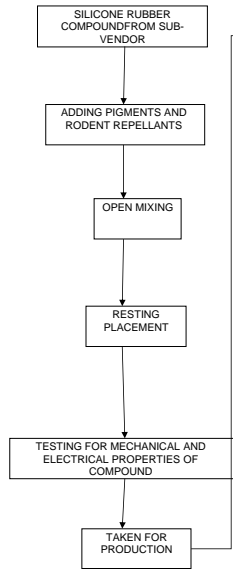


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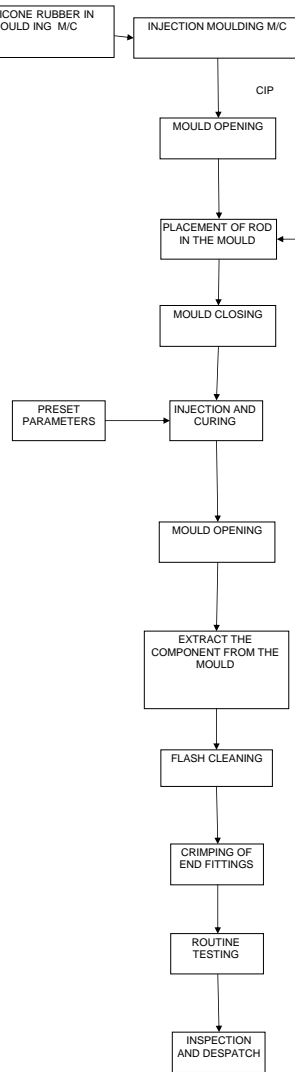
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PROCESS FLOW CHART FOR- Composite Long Rod Polymer Insulators upto 400kV and upto 160KN

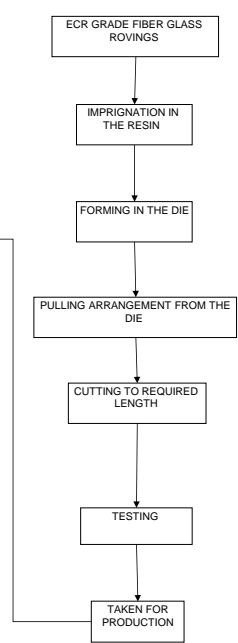
SILICONE RUBBER COMPOUND



MANUFACTURING OF INSULATORS



FRP ROD





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GENERAL NOTES:

NOTE:

1. This MQP should be read in conjunction with BSPTCL specification and shall deem to include additional tests if any required as per the contract.
2. BSPTCL specification shall include provisions of letter of award, BSPTCL approved drawings/technical data sheet/BOM/ guaranteed technical particulars/test schedule/ test procedures as applicable to the specific contract.
3. In case of any contradiction between the manufacturer's plant standards, this MQP and BSPTCL specifications, following precedence shall be followed:
 - a. BSPTCL specification
 - b. This Manufacturing Quality Plan
 - c. Manufacturer's Plant Standards.
4. It shall be ensured by the manufacturer, that this document is readily available at their works, as well as the relevant portion of document (along with these notes) are available at the works of their sub-vendors, in order to avoid any problem at the time of inspection.
5. The manufacturer shall ensure that their, as well as, their sub-vendor's control, Metering and Testing instruments are duly calibrated and should have calibrated certificates traceable to National/International standards. Calibration records should be available during inspection by BSPTCL.
6. In case of any tests being carried out at third party laboratory, such laboratory/facility should be NABL accredited / acceptable to BSPTCL.
7. All main raw material/bought-out items should be procured from BSPTCL approved source only.
8. The manufacturer shall maintain proper co-relation (consistent with the process) of test certificates from the raw material stage to finished product stage and the records should be available during inspection by BSPTCL.
9. Manufacturer shall show the approval of BSPTCL Engineering for all contract specific Type Tests including special test if any as per BSPTCL specification, at the time of final inspection.
10. All packing cases / crates should be marked with BSPTCL LOA details, name of project, item description and unique number marked on the cartons / crates / cases.
11. One copy of the test report, Dispatch Clearance/ Instructions shall be sent along with the consignment to every destination.
12. Inspection of spare items ordered by BSPTCL shall also be governed by the provisions of this MQP.
13. Any material rejected during BSPTCL inspection shall be indelibly marked (to prevent mixing), stacked in separate place within the works of the manufacturer, and offered to BSPTCL inspector for verification of marking. Documentary evidence of disposal shall be submitted for review by the Inspecting Engineer.
14. The manufacturer shall align their Quality System and that of their sub-vendors to the requirements of latest series of ISO 9001 Quality standards in a time bound manner.
15. Each insulator shall be legibly and indelibly marked with the trade mark of manufacturer, month and year of manufacture and the name of BSPTCL. One 20mm thick spot of suitable quality of paint shall be marked on socket of each insulator of particular strength for easy identification as per specification (Yellow for 120kN, Green for 160kN). Paint shall not have deteriorating effect on performance of insulator.
16. The guaranteed Electro-Mechanical Strength shall be indicated in kN.
17. The insulators offered shall be in packed condition in cartons / crates / cases at the time of final inspection. Offered list will describe the unique numbers marked on the cartons / crates / cases.
18. 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.
19. The out-sourced activity shown in the process flow diagram shall also be in the ambit of process-inspection by BSPTCL.
20. Any addition / change in vendor / design / process shall call for review by BSPTCL and change in MQP, if necessary.
21. DESIGN AND TYPE TEST: ALL DESIGN AND TYPE TEST TO BE CARRIED OUT AS PER BSPTCL SPECIFICATION AND AS PER AGREEMENT WITH BSPTCL . APPROVAL OF DESIGN AND TYPE TEST BY BSPTCL OR WAIVAL THEREOF TO BE SHOWN AT THE FINAL INSPECTION TO ENABLE ISSUE OF Dispatch Clearance/ Instructions