



BIHAR STATE POWER TRANSMISSION COMPANY LIMITED

STANDARD MANUFACTURING QUALITY PLAN FOR G S EARTH WIRE

Manufacturer with Address	Customer BSPTCL	Vendor's Code	Item Galvanised Earth Wire	M.Q.P. No : 042 Rev. No : 00	Valid from : 15.01.2016 Valid up to : Till Revision
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<p>Code 1 Indicates place where testing is planned to be performed i.e. inspection location</p> <p>A At Equipment Manufacturer's works (Earthwire Manufacturer) B At Component Manufacturer's works (Wire Rod Supplier) C At Authorised Distributor's place D At Independent Lab E At Turn Key Contractor's location F Not specified</p>	<p>Code 2 Indicates who has to perform the tests i.e. Testing Agency</p> <p>J The Equipment Manufacturer K The Component Manufacturer L The Third Party M The Turnkey Contractor</p>
<p>Code 3 Indicates who shall witness the tests i.e. Witnessing Agency</p> <p>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</p>	<p>Code 4 Review of Test Report / Certificates.</p> <p>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</p>
<p>Code 5 Whether specific approval of sub-vendor / Component make is envisaged?</p> <p>E Envisaged N Not Envisaged</p>	<p>Code 6 Whether test records required to be submitted after final inspection for issuance of Dispatch Clearances /Instructions ?</p> <p>Y Yes N No</p>



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NOTES/GENERAL REQUIREMENTS TO BE CHECKED/ENSURED

- a) Proper co-relation of test certificates from raw material to finished GS Earth Wire for offered lot shall be maintained.
- b) The equipment manufacturer shall carry out all the Routine tests for correctness of stranding, no cuts, fins etc. on the strands, drums are as per Specification
- c) The Equipment Manufacturer will carry out the acceptance tests on steel strands on 10% of the drums offered for inspection and will submit the records at the time of final inspection. BSPTCL's Inspection Engineer will select 10% samples of drums offered for rewinding & acceptance testing & shall be witnessed by BSPTCL at Equipment Manufacturers works.
- d) Equipment manufacturer shall obtain the following test certificates from BSPTCL approved sources for Steel wire rods / Zinc ingots used for review by BSPTCL.
 - i) Chemical test certificate of Steel Wire Rod manufacturer
 - ii) Test certificate of Zinc manufacturer
 - iii) Test certificates of the tests carried out by steel wire rod manufacturer.
- e) Top end of the earth wire in each drum are sealed with adhesive tamper proof sticker duly signed by BSPTCL Inspection Engineer. The earth wire ends are required to be sealed with heat shrinkable sleeves & BSPTCL lead seal and shall be properly secured with the drum with the help of "U" clamps (nail) on the side of the flange at three locations 75mm apart to avoid loosening of earth wire during transit and handling.
- f) The following test equipments shall be calibrated by NABL accredited agencies and should be available at equipment manufacturer's works.
 - i) All testing and measuring equipment.
 - ii) Standard Resistance.
- g) All drums to be marked with **Dispatch Clearances /Instructions** number vide which the material has been cleared before dispatch.
- h) In case of any contradiction between Technical Specification / Approved Drawing and MQP, the details mentioned in the Technical Specification / Approved Drawing shall be final. The MQP should be read in conjunction with the technical specification against which the Earth Wire has been manufactured
- i) BSPTCL may review the effective implementation of the process during the product inspection / process inspection. In case any violation in process or process parameters are observed, the reason along with corrective & preventive measure shall be conveyed to BSPTCL.
- j) The manufacturer should progressively align their Quality System and sub-vendors Quality System to the requirements of ISO 9000 series Quality Standards and in due course of time should get their quality system certified to ISO 9001.
- k) All relevant IS standards shall be read along with the latest amendments.
- l) The size of the earthwires & test parameters shall be as per GTP/TS.
- m) Finished earthwire shall be checked for length verification and surface finish on separate rewinding machine at variable speed from 8 to 16 mtr/ minute. The rewinding facilities shall have appropriate clutch system and shall be free from vibration and jerks etc. with traverse laying facilities. If length is found less than declared length during rewinding, then two drums from the same lot shall be verified for declared length. In case any of these drums is found have less length, the lot will be rejected otherwise lot shall be accepted with the actual length restricted to declare length. In case of defects in surface finish, additional two drums shall be taken for rewinding & if same problem is observed the entire lot shall be rejected.



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- n) Rejection & retests shall be as per IS 398.
- o) The drums shall be suitable for wheel mounting and letting off the conductor under an minimum controlled tension of the order of 5 KN.
- p) The inner cheek of the flanges & drum barrels surface shall be painted with Bitumen based paint. Before reeling, thick bituminized water proof bamboo paper shall be secured on the drum barrel and inside of the flanges of drum. After reeling the conductor, the exposed surface of the outer layer of the conductor shall be wrapped with water proof thick bituminised bamboo paper & then transparent plastic sheet.
- q) In case of rejection of the offered lot of earthwire after testing as per MQP/Technical Specification/IS, the rejected material and the samples already tested shall be scrapped and strictly disposed off as follows:
- 1) The rejected lot/tested samples shall be clearly identified and stored separately to avoid any mix up with any in-process/finished lot till the same is disposed off.
 - 2) The supplier shall arrange for cutting of the rejected earthwire lot in bits & pieces which shall be sold as scrap
 - 3) In case supplier intends to dispose off rejected material through any other mode, the same shall be done with approval of BSPTCL.
 - 4) Necessary supporting documents in regard to (2) and (3) above, shall be submitted for verification of BSPTCL and record shall be maintained at manufacturer's works



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1.6		Cleaniness & Surface Smoothness (Visual)	100% on each coil	IS 7904 & BSPTCL Specn.	The wire rod shall be round and free from fins, flaws and other harmful surface defects	BSPTCL REPORTS	A	J	S	Z			N
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Section : RAW MATERIAL INSPECTION

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	
1.7		Micro Structures											
		a) Structure	1 Samples per heat	IS 7904	The structure shall be fine perlite	Supplier TC	B	K	P	Z	-	N	
		b) Grain Size	1 Samples per heat	IS 4748	Min – 6 @ 100 X	Supplier TC	B	K	P	Z	-	N	
		c) Inclusion Rating	1 Samples per heat	IS 7904 & IS 4163	Max – 2 Thick Series	Supplier TC	B	K	P	Z	-	N	
		d) Surface Defects	1 Samples per heat	IS 7904	Max – 1% of Dia	Supplier TC	B	K	P	Z	-	N	
	e) Decarburisation	1 Samples per heat	IS 7904 & IS 6396	Max – 1% of Dia	Supplier TC	B	K	P	Z	-	N		
2	ELECTROLYTIC ZINC										E	Records of suppliers test	



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2.1		Chemical Analysis	Supplier TC	IS 209 & BSPTCL Specn.	Purity 99.95 % Min	Supplier TC	B	K	P	Z	-	N	certificate are to be maintained.
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Section : INPROCESS INSPECTION

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	
3	SURFACE PREPARATION												
3.1	Pickling	chemical	1 Sample from pickling bath daily	IS 2629	IS 2629 / Manufacturer plant standard	BSPTCL REPORTS	A	J	S	Z	-	N	
3.2	Surface Coating	Chemical	1 Sample from the bath daily	IS 2629	Manufacturer plant standard	BSPTCL REPORTS	A	J	S	Z	-	N	
4	DRAWING OF STEEL WIRE ROD TO WIRE (BLACK)												
4.1		Surface finish (Visual Check)	100% on each coil	IS 398 Part II and BSPTCL Specn	IS 398 Part II and BSPTCL Specn	BSPTCL REPORTS	A	J	S	Z	-	N	



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4.2		Diameter	20% coil drawn from each wire rod	Plant Standard	Plant Standard	BSPTCL REPORTS	A	J	S	Z	-	N	
4.3		Breaking Load / Tensile Test	20% coil drawn from each wire rod	Plant Standard	Plant Standard	BSPTCL REPORTS	A	J	S	Z	-	N	
4.4		Torsion	20% coil drawn from each wire rod	Plant Standard	Plant Standard	BSPTCL REPORTS	A	J	S	Z	-	N	
4.5		Wrapping Test	20% coil drawn from each wire rod	Plant Standard	Plant Standard	BSPTCL REPORTS	A	J	S	Z	-	N	
4.6		Joints	100% on each coil	BSPTCL Spec.	No joints allowed	BSPTCL REPORTS	A	J	S	Z	-	N	

Section : IN PROCESS INSPECTION

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	
5.	GALVANISING	Molten Zinc bath temperature	Every 2 Hour	IS 2629	Min – 440 °C Max – 460 °C	BSPTCL REPORTS	A	J	S	Z	-	N	Galvanizing process as per IS 2629 & Plant standard
		Chemical Analysis of molten zinc from bath	1 Sample in 30 days	IS 209	IS 209	Independent lab test report	D	L	V	Z	-	N	



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6	Finished Galvanized Steel wire	Surface smoothness (Visual Check)	100% on each coil	IS 398 Pt 2 & Plant Standard	IS 398 Pt 2 & Plant Standard	BSPTCL REPORTS	A	J	S	Z	-	N	
6.1		Diameter	1 sample from every 10 coils	IS 398 Pt 2 & Plant Standard	IS 398 Pt 2 & Plant Standard	BSPTCL REPORTS	A	J	S	Z	-	N	
6.2		Breaking Load / Tensile Test	1 sample from every 10 coils	IS 398 Pt 2 & Plant Standard	IS 398 Pt 2 & Plant Standard	BSPTCL REPORTS	A	J	S	Z	-	N	
6.3		% Elongation	1 sample from every 10 coils	IS 398 Pt 2 & Plant Standard	IS 398 Pt 2 & Plant Standard	BSPTCL REPORTS	A	J	S	Z	-	N	
6.4		Torsion	1 sample from every 10 coils	IS 398 Pt 2 & Plant Standard	IS 398 Pt 2 & Plant Standard	BSPTCL REPORTS	A	J	S	Z	-	N	
6.5		Wrapping Test	1 sample from every 10 coils	IS 398 Pt 2 & Plant Standard	IS 398 Pt 2 & Plant Standard	BSPTCL REPORTS	A	J	S	Z	-	N	

Section : IN PROCESS INSPECTION

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	
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6.6		Preece Test	1 sample from every 10 coils	IS 398 Pt 2 & IS 4826	IS 398 Pt 2 & IS 4826	BSPTCL REPORTS	A	J	S	Z	-	N	
6.7		Weight of Zinc coating	1 sample from every 10 coils	IS 398 Pt 2 & IS 4826	IS 398 Pt 2 & IS 4826	BSPTCL REPORTS	A	J	S	Z	-	N	
6.8		Adhesion Test	1 sample from every 10 coils	IS 398 Pt 2 & IS 4826	IS 398 Pt 2 & IS 4826	BSPTCL REPORTS	A	J	S	Z	-	N	
6.9		Joints	100% on each coil	BSPTCL Specn.	No Joint allowed	BSPTCL REPORTS	A	J	S	Z	-	N	
6.10		DC Resistance test	1 sample from every 10 coils	Plant Standard	Plant Standard	BSPTCL REPORTS	A	J	S	Z	-	N	



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							1	2	3	4	5	6	
7	STRANDING												
7.1		Lay Length / Direction & Compactness	100 %	BSPTCL Specn.	As per GTP	BSPTCL REPORTS	A	J	S	Z	-	N	
7.2		Overall Dia of stranded Earth Wire	1 Sample from each drum	BSPTCL Specn.	GTP/ IS 398 Pt 2	BSPTCL REPORTS	A	J	S	Z	-	N	
7.3		Pre forming and Post forming of Earth Wire	100%	BSPTCL Specn.	No spreading when cut	BSPTCL REPORTS	A	J	S	Z	-	N	
7.4		Standard Length	100%	BSPTCL Specn.	2000±5 % mtr	BSPTCL REPORTS	A	J	S	Z	-	N	
7.5		Joints	100%	BSPTCL Specn.	No Joints allowed	BSPTCL REPORTS	A	J	S	Z	-	N	
7.6		Check for Linseed oil application	100% on all drums	BSPTCL Specn.	100% Oil Coating	BSPTCL REPORTS	A	J	S	Z	-	N	
7.7		Surface Cleanliness (Visual Check)	100%	BSPTCL Specn.	100% Clean Surface	BSPTCL REPORTS	A	J	S	Z	-	N	



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Section : FINAL INSPECTION & TESTING

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	
8	ACCEPTANCE TESTS ON G.S EARTH WIRE												
8.1		Lay Length & Direction	1 Sample from every 10 drums or part thereof	IS 398 (Pt.2) & BSPTCL Specn.	GTP	BSPTCL REPORTS	A	J	U	Z		Y	
8.2		Overall Dia	1 Sample from every 10 drums or part thereof	IS 398 (Pt.2) & BSPTCL Specn.	GTP	BSPTCL REPORTS	A	J	U	Z		Y	
8.3		Resistance	1 Sample from every 10 drums or part thereof	IS 398 (Pt.2) & BSPTCL Specn.	GTP	BSPTCL REPORTS	A	J	U	Z		Y	
8.4		Pre forming & Post forming	1 Sample from every 10 drums or part thereof	IS 398 (Pt.2) & BSPTCL Specn.	No spreading when cut	BSPTCL REPORTS	A	J	U	Z		Y	



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8.5	Checks for Joints, surface smoothness, cleanliness and length measurement by Rewinding	Visual & Measurement	1 Sample from every 10 drums or part thereof	IS 398 (Pt.2) & BSPTCL Specn.	No surface defects and no joints allowed	BSPTCL REPORTS	A	J	U	Z		Y	
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FINAL INSPECTION & TESTING

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	
9	ACCEPTANCE TESTS ON GALVANISED WIRE												
9.1		Diameter	1 Sample from every 10 drums or part thereof	IS 398 (Pt.2) & BSPTCL Specn.	As per GTP	BSPTCL REPORTS	A	J	U	Z		Y	
9.2		Breaking Load / Tensile Test	1 Sample from every 10 drums or part thereof	IS 398 (Pt.2) & BSPTCL Specn.	As per GTP	BSPTCL REPORTS	A	J	U	Z		Y	



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9.3		% Elongation	1 Sample from every 10 drums or part thereof	IS 398 (Pt.2) & BSPTCL Specn.	As per GTP, IS 398 Pt-2	BSPTCL REPORTS	A	J	U	Z		Y	
9.4		Torsion	1 Sample from every 10 drums or part thereof	IS 398 (Pt-II) & BSPTCL Specn.	As per GTP	BSPTCL REPORTS	A	J	U	Z		Y	
9.5		Wrapping Test	1 Sample from every 10 drums or part thereof	IS 398 (Pt.2) & BSPTCL Specn.	IS 398 Pt-2	BSPTCL REPORTS	A	J	U	Z		Y	
9.6		Preece Test	1 Sample from every 10 drums or part thereof	IS 4826, IS 2633 & BSPTCL Specn.	As per GTP	BSPTCL REPORTS	A	J	U	Z		Y	

FINAL INSPECTION & TESTING

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							1	2	3	4	5	6	
9.7		Weight of zinc coating	1 Sample from every 10 drums or part thereof	IS 4826, IS 6745 & BSPTCL Specn.	As per GTP	BSPTCL REPORTS	A	J	U	Z		Y	



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9.8		Adhesion Test	1 Sample from every 10 drums or part thereof	IS 4826, & BSPTCL Specn	IS 4826	BSPTCL REPORTS	A	J	U	Z		Y	
9.9.		Chemical Analysis of Steel	1 Sample per lot	IS 7904 & BSPTCL Specn.	% C – 0.55 max % Mn-0.40 to 0.90 % Si- 0.15 to 0.35 % S -0.04 max % P – 0.04 max	BSPTCL REPORTS	A	J	U	Z	-	Y	
9.11	MICRO STRUCTURE												
		a) Structure	1 Sample per Lot	IS 7904	The structure shall be fine perlite	BSPTCL REPORTS	A	J	U	Z	-	Y	
		b) Grain Size	1 Sample per Lot	IS 4748	Min – 6 @ 100 X	BSPTCL REPORTS	A	J	U	Z	-	Y	
		c) Inclusion Rating	1 Sample per Lot	IS 7904 & IS 4163	Max – 2 Thick Series	BSPTCL REPORTS	A	J	U	Z	-	Y	
		d) Surface Defects	1 Sample per Lot	IS 7904	Max – 1% of Dia	BSPTCL REPORTS	A	J	U	Z	-	Y	
		e) Decarburisation	1 Sample per Lot	IS 7904 & IS 6396	Max – 1% of Dia	BSPTCL REPORTS	A	J	U	Z	-	Y	

Section : FINAL INSPECTION & TESTING



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							1	2	3	4	5	6	
10	WOODEN DRUM												
10.1		Dimension	1 Sample from every 10 drums or part thereof	IS 1778 & approved drawings	As per IS 1778 & approved drawings, BSPTCL Spec.	BSPTCL REPORTS	A	J	U	Z		Y	
10.2		Barrel batten strength	1 Sample from every 10 drums or part thereof	IS 1778 & approved drawings	Approved drawing	BSPTCL REPORTS	A	J	U	Z		Y	



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Section : PACKING & DESPATCH

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							1	2	3	4	5	6	
11	Checks during Packing												
11.1		Proper packing	100%	BSPTCL Specn.	As per BSPTCL Specn.	BSPTCL REPORTS	A	J	S / U *	Z	-	Y	*10% by BSPTCL & 100% by earthwire manufacturer
11.2		LOA No on Drum											
12.3		Manufacturer's name and address											
12.4		Name and address of the consignee											
12.5		Drum No.											
12.6		Size of earth wire											
12.7		Length of earth wire in meters											
12.8		Gross weight with earth wire & lagging											
12.9		Weight of empty drum with lagging											
12.10		Arrow marking for unwinding											
12.11		Position of the earth wire											
12.12		Distance between outermost layer of earthwire & inner surface of lagging (min. 50 mm)											



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12.13		Sealing of earth wire in each drum by a) Plain heat shrinkable sleeve at both ends. b) Lead sealing with BSPTCL plier at both ends. c) Adhesive tamper proof sticker indicating drum number duly signed by BSPTCL Inspection Engineer at both ends of earhwire.	100%	BSPTCL Specn.	As per BSPTCL Specn.	BSPTCL REPORTS	A	J	U	Z	Y	
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