

Standard Manufacturing Quality Plan

For

Earthwire

(MQP no. CC/QA/SMQP/36 Rev 00)

Valid from 01-06-2021 to 31-05-2024

Instructions for Code Allocation



<p>Code 1 Indicate place where testing is planned to be performed i.e. Inspection location</p> <p>A At Equipment Manufacturer's works B At Component Manufacturer's works C At Authorised Distributor's works D At Independent Lab E At Turn Key Contractor's location F Not specified</p>	<p>Code 2 Indicate 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 Indicate 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 and/or Contractor and POWERGRID V Third Party itself</p>	<p>Code 4 Review of Test Reports/Certificates</p> <p>W By Equipment Manufacturer during raw material / bought out component inspection X By Contractor during product / process inspection Y By POWERGRID during product / process inspection Z By Contractor and / or POWERGRID 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 CIP/MICC</p> <p>Y Yes N No</p>

- Notes:**
- 1 The MQP should be read in conjunction with the applicable technical specification against which the Earthwire is being manufactured.
 - 2 In case of any contradiction between MQP and POWERGRID Technical specification/Approved Drawing, the Technical specifications/Approved Drawing of respective project shall have precedence over this MQP.
 - 3 Proper co-relation of materials with test certificates from Raw Material stage to finished Earthwire shall be maintained.
 - 4 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 specifications.
 - 5 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. POWERGRID's IE will select 10% sample of drums offered for rewinding & acceptance testing & shall be witnessed by POWERGRID at Equipment Manufacturer's works.
 - 6 Equipment manufacturer shall obtain the following test certificates from POWERGRID approved sources for Steel Wire Rods/Zinc Ingots used for review by POWERGRID.
 - a) Chemical test certificate of Steel Wire Rod Manufacturer
 - b) Test Certificate of Zinc Manufacturer
 - c) Test Certificates of the tests carried out by Steel Wire Rod Manufacturer



SI No.	Components/Operations & Description of Test	Type of check	Quantum of check/ Sampling with basis	Reference document for testing	Acceptance norms	Form of record	Applicable Codes						Remarks
							1	2	3	4	5	6	
1	RAW MATERIAL												
1.1	High Carbon Steel Wire Rod												
1.1.1	Steel wire rod Chemical composition	Chemical	1 Sample per heat per lot	IS 12776/ POWERGRID Spec.	POWERGRID Specification	Supplier TC	B	K	P	Z	E	N	
			4 Samples per Consignment (24 MT approx)			Plant Record	A	J	S	Z	E	N	
1.1.2	Diameter of Wire Rod and Ovality	Dimension	1 Sample per heat per lot	IS 7904	IS 7904	Supplier TC	B	K	P	Z	E	N	
			4 Samples per Consignment (24 MT approx)			Plant Record	A	J	S	Z	E	N	
1.1.3	Ultimate Tensile Test	Mechanical	1 Sample per heat per lot	IS 7904	IS 7904	Supplier TC	B	K	P	Z	E	N	
			4 Samples per Consignment (24 MT approx)			Plant Record	A	J	S	Z	E	N	
1.1.4	Percentage reduction of area	Mechanical	1 Sample per heat per lot	IS 7904	IS 7904	Supplier TC	B	K	P	Z	E	N	
			4 Samples per Consignment (24 MT approx)			Plant Record	A	J	S	Z	E	N	
1.1.5	Elongation	Mechanical	1 Sample per heat per lot	IS 7904	IS 7904	Supplier TC	B	K	P	Z	E	N	
			4 Samples per Consignment (24 MT approx)			Plant Record	A	J	S	Z	E	N	



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							A	J	S	Z	E	N		
1.1.6	Cleanliness and Surface Smoothness (Visual Check)	Visual	100% on each coil	IS:7904	The wire rod shall be round & free from harmful defect like fins, splits, surface flaws, jagged surface & imperfect edges & other harmful defects	Plant Record	A	J	S	Z	E	N		
1.1.7	Microstructure										E			
1.1.7.1	Structure	Metallurgical	1 Sample per heat per lot	IS 7904	The Structure shall be fine perlite	Supplier TC Plant Record	B A	K J	P S	W W	E E	N N		
1.1.7.2	Grain Size	Metallurgical	1 Sample per heat per lot	IS:4748 & As per ASTM E-112	ASTM Grain Size No. - Minimum 6 at with 100X Magnification	Supplier TC Plant Record	B A	K J	P S	W W	E E	N N		
1.1.7.3	Inclusion Rating	Metallurgical	1 Sample per heat per lot	IS:7904 ASTM E -45	Max-2 in Thick Series	Supplier TC Plant Record	B A	K J	P S	W W	E E	N N		
1.1.7.4	Surface Defects	Metallurgical	1 Sample per heat per lot	IS 7904	Maximum 1.0 % of Diameter of base wire	Supplier TC Plant Record	B A	K J	P S	W W	E E	N N		
1.1.7.5	Decarburisation	Metallurgical	1 Sample per heat per lot	IS 7904	Maximum 1.0 % of Diameter of base wire	Supplier TC Plant Record	B A	K J	P S	W W	E E	N N		
1.2	Electrolytic Zinc													
1.2.1	Purity of Zinc	Chemical	1Nos. Sample per heat/per lot	IS:209 Purity Zinc	Min.99.95%	Supplier TC	B	K	P	W	E	N		
2	In-Process Testing													
2.1	Surface Preparation by Conventional Method (Using Hcl, Phosphate and Borax) or by Using Mechanical Descaling Method													
2.1.1	Pickling in HCL solution, followed by Rinsing in Cold Water (If Applicable)	Chemical	2 Samples from Pickling Bath Daily	IS 2629	Plant Standard	Plant Record	A	J	S	W		N		
2.1.2	Surface Coating of Phosphate (If Applicable)	Chemical	2 Samples from Bath Daily	IS 2629	Plant Standard	Plant Record	A	J	S	W		N		
2.1.3	Hot Borax Solution	Chemical	1 sample from Borax	Plant Standard	Plant Standard	Plant Record	A	J	S	W		N		
2.1.4	Temperature of Borax Solution	Thermal	Once in 12 Hrs	Plant Standard	Plant Standard	Plant Record	A	J	S	W		N		



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							A	J	S	W		N		
2.2	Steel Wire Drawing from Wire Rod													
2.2.1	Surface Finish and Winding	Visual	100% on each coil	As per POWERGRID Specification	As per POWERGRID Specification	Plant Record	A	J	S	W		N		
2.2.2	Diameter	Dimension	20% coil drawn from each wire rod coil	Plant Standard	Plant Standard	Plant Record	A	J	S	W		N		
2.2.3	Breaking Load/ Tensile Test	Mechanical	20% coil drawn from each wire rod coil	Plant Standard	Plant Standard	Plant Record	A	J	S	W		N		
2.2.4	Torsion	Mechanical	20% coil drawn from each wire rod coil	Plant Standard	Plant Standard	Plant Record	A	J	S	W		N		
2.2.5	Wrapping	Mechanical	20% coil drawn from each wire rod coil	Plant Standard	Plant Standard	Plant Record	A	J	S	W		N		
2.2.6	Joints	Visual	100% on each coil	As per POWERGRID Specification	No Joints Allowed	Plant Record	A	J	S	W		N		
2.3	Galvanizing													
2.3.1	Degreasing Caustic Soda	Chemical and Measurement	1 sample from Bath Daily	Plant Standard	Conc Min 25 g/ltr Temp 40-70 Deg C	Plant Record	A	J	S	W		N		
2.3.2	Acid Cleaning	Chemical and Measurement	1 sample from Bath Daily	Plant Standard	HCL Conc 12-25% Iron Max.12%	Plant Record	A	J	S	W		N		
2.3.3	Rinsing	Chemical and Measurement	1 sample from Bath Daily	Plant Standard	Plant Standard	Plant Record	A	J	S	W		N		
2.3.4	Flux Coating Mixture of NH4Cl ZnCl2	Chemical & Measurement	1 Sample from bath daily	Plant Standard	Sp. Gravity 1.05-1.15 Temp.40-60° C	Plant Record	A	J	S	W		N		
2.3.5	Molten Zinc Bath Temperature	Measurement	After every 2 Hrs	IS 2629	Temperature 450± 10° C	Plant Record	A	J	S	W		N		
2.3.6	Chemical analysis of molten Zinc in Bath	Spectro Analysis	1 sample in 15 days	IS 209	Min 98.50%	Plant Record	A	J	S	W		N		
2.4	Finished Galvanized Steel Wire													
2.4.1	Surface Smoothness	Visual	100% on each coil	As per POWERGRID Specification	As per POWERGRID Specification	Plant Record	A	J	S	W		N		



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							A	J	S	W		N		
2.4.2	Diameter	Measurement	1 Sample from every 10 Coils	IS 12776/POWERGRID Specification	IS 12776/ POWERGRID Specification	Plant Record	A	J	S	W		N		
2.4.3	Breaking Load/ Tensile Test	Mechanical	1 Sample from every 10 Coils			Plant Record	A	J	S	W		N		
2.4.4	% Elongation	Mechanical	1 Sample from every 10 Coils			Plant Record	A	J	S	W		N		
2.4.5	Torsion	Mechanical	1 Sample from every 10 Coils			Plant Record	A	J	S	W		N		
2.4.6	Wrapping Test	Mechanical	1 Sample from every 10 Coils			Plant Record	A	J	S	W		N		
2.4.7	Preece Test	Chemical	1 Sample from every 10 Coils			Plant Record	A	J	S	W		N		
2.4.8	Mass of Zinc Coating	Chemical	1 Sample from every 10 Coils			Plant Record	A	J	S	W		N		
2.4.9	Adhesion Test	Physical	1 Sample from every 10 Coils			IS 4826/ POWERGRID Specification	IS 4826/ POWERGRID Specification	Plant Record	A	J	S	W		N
2.4.10	DC Resistance Test	Electrical	100% on each coil	IS 12776/POWERGRID Specification	IS 12776 /POWERGRID Specification	Plant Record	A	J	S	W		N		
2.4.11	Check for Joints	Visual	1 Sample from every 10 Coils	As per POWERGRID Specification	No Joints are Allowed	Plant Record	A	J	S	W		N		
2.5	Stranding													
2.5.1	Lay Length/ Direction & Compactness	Measurement	Each Length of Strand	As per POWERGRID Specification	As per POWERGRID Specification	Plant Record	A	J	S	W		N		
2.5.2	Surface Cleanliness	Visual	100%	As per POWERGRID Specification	As per POWERGRID Specification	Plant Record	A	J	S	W		N		




Sl No.	Components/Operations & Description of Test	Type of check	Quantum of check/ Sampling with basis	Reference document for testing	Acceptance norms	Form of record	Applicable Codes						Remarks	
							A	J	S	W		N		
2.5.3	Overall Dia	Measurement	1 sample from Each Drum	IS 12776/ POWERGRID Specification	IS 12776/ POWERGRID	Plant Record	A	J	S	W		N		
2.5.4	Pre forming and Post forming	Visual	100%	As per POWERGRID Specification	No spreading when cut	Plant Record	A	J	S	W		N		
2.5.5	Standard Length	Measurement	100%	IS 12776/ POWERGRID Specification	IS 12776/ POWERGRID Specification	Plant Record	A	J	S	W		N		
2.5.6	Joints	Visual	100%	As per POWERGRID Specification	No Joints are Allowed	Plant Record	A	J	S	W		N		
2.5.7	Check for Linseed Oil Application	Visual	100% on all drums	As per POWERGRID Specification	100% Oil Coating	Plant Record	A	J	S	W		N		
3	Final Testing													
3.1	Routine Testing for Earthwire													
3.1.1	Check for Correctness of Stranding	Visual	20% of the drums	As per POWERGRID Specification	As per POWERGRID Specification	Test Report	A	J	S	W,Z		N		
3.1.2	Check that there are no cuts, fins etc. on the strands	Visual	20% of the drums	As per POWERGRID Specification	As per POWERGRID Specification	Test Report	A	J	S	W,Z		N		
3.1.3	Check that the drums are as per specification	Visual	20% of the drums	As per POWERGRID Specification/Drum Drawing	As per POWERGRID Specification/Drum Drawing	Test Report	A	J	S	W,Z		N		
3.3	Acceptance Test on Earthwire													
	Tests on Complete Earthwire													
3.3.1	Check for Joints, Surface Smoothness, Cleanliness and Length Measurement by Rewinding	Visual & Measurement	1 Sample from every 10 Drums or part thereof	As per POWERGRID Specification	As per POWERGRID Specification	Test Report	A	J	U	Z		Y	CIP	
3.3.2	Lay Length/ Direction & Compactness	Measurement	1 Sample from every 10 Drums or part thereof	IS/12776/ POWERGRID Specification	As per GTP/POWERGRID Specification	Test Report	A	J	U	Z		Y	CIP	
3.3.3	Overall Dia	Measurement	1 Sample from every 10 Drums or part thereof	IS/12776/ POWERGRID Specification	As per GTP/POWERGRID Specification	Test Report	A	J	U	Z		Y	CIP	
3.3.4	DC Resistance Test	Measurement	1 Sample from every 10 Drums or part thereof	IS/12776/ POWERGRID Specification	As per GTP/POWERGRID Specification	Test Report	A	J	U	Z		Y	CIP	




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							A	J	U	Z		Y	CIP	
3.3.5	Pre forming and Post forming	Measurement	1 Sample from every 10 Drums or part thereof	As per POWERGRID Specification	No spreading when cut	Test Report	A	J	U	Z		Y	CIP	
Tests on Individual Galvanized Wire of all Strands of the Sample(s)														
3.3.6	Diameter	Measurement	1 Sample from every 10 Drums or part thereof	IS 12776/POWERGRID Specification	As per GTP/POWERGRID Specification	Test Report	A	J	U	Z		Y	CIP	
3.3.7	Breaking Load/ Tensile Test	Mechanical	1 Sample from every 10 Drums or part thereof			Test Report	A	J	U	Z		Y	CIP	
3.3.8	% Elongation	Mechanical	1 Sample from every 10 Drums or part thereof			Test Report	A	J	U	Z		Y	CIP	
3.3.9	Torsion	Mechanical	1 Sample from every 10 Drums or part thereof			Test Report	A	J	U	Z		Y	CIP	
3.3.10	Wrapping Test	Mechanical	1 Sample from every 10 Drums or part thereof			Test Report	A	J	U	Z		Y	CIP	
3.3.11	Preece Test	Chemical	1 Sample from every 10 Drums or part thereof	IS 12776/IS 2633/POWERGRID Specification	As per GTP/POWERGRID Specification	Test Report	A	J	U	Z		Y	CIP	
3.3.12	Mass of Zinc Coating	Chemical	1 Sample from every 10 Drums or part thereof	IS 12776/IS 6745/POWERGRID Specification	As per GTP/POWERGRID Specification	Test Report	A	J	U	Z		Y	CIP	
3.3.13	Adhesion Test	Chemical	1 Sample from every 10 Drums or part thereof	IS 4826/POWERGRID Specification	IS 4826/POWERGRID Specification	Test Report	A	J	U	Z		Y	CIP	
3.3.14	DC Resistance Test	Electrical	1 Sample from every 10 Drums or part thereof	IS 12776/POWERGRID Specification	As per GTP/POWERGRID Specification	Test Report	A	J	U	Z		Y	CIP	
3.3.15	Chemical Analysis	Chemical	1 sample per lot	As per POWERGRID Specification	As per POWERGRID Specification	Test Report	A	J	U	Z		Y	CIP	



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3.3.16	Microstructure																
3.3.16.1	Structure	Metallurgical	1 sample per lot	IS 7904	The Structure shall be fine perlite	Test Report	A	J	U	Z				Y	CIP		
3.3.16.2	Grain Size	Metallurgical	1 sample per lot	IS 4748	Min 6 @ 100X	Test Report	A	J	U	Z				Y	CIP		
3.3.16.3	Inclusion Rating	Metallurgical	1 sample per lot	IS 7904 & IS 4163	Max 2 Thick Series	Test Report	A	J	U	Z				Y	CIP		
3.3.16.4	Surface Defects	Metallurgical	1 sample per lot	IS 7904	Max 1% of Dia	Test Report	A	J	U	Z				Y	CIP		
3.3.16.5	Decarburisation	Metallurgical	1 sample per lot	IS 7904 & IS 6396	Max 1% of Dia	Test Report	A	J	U	Z				Y	CIP		
3.4	Tests on Drums																
3.4.1	Visual Check of Drums	Visual	100%	As per POWERGRID Specification	As per POWERGRID Specification	Test Report	A	J	U	Z				Y	CIP		
3.4.2	Dimension	Measurement	1 Sample from every 10 Drums or part thereof	As per POWERGRID Specification	As per POWERGRID Specification	Test Report	A	J	U	Z				Y	CIP		
3.4.3	Barrel Batten Test (For Wooden Drum)	Mechanical	1 Sample from every 10 Drums or part thereof	IS 1778	As per POWERGRID Specification	Test Report	A	J	U	Z				Y	CIP		
4	Packing and Dispatch																
4.1	Earthwire																
4.1.1	Packing of Drum	Visual	100%	As per POWERGRID Specification	As per POWERGRID Specification		A	J	S/U*	Z				N	This Information shall be stenciled on each drum in indelible ink. *100% verification by Earthwire Manufacturer and 10% by POWERGRID		
4.1.2	Contract/Award Letter No.	Visual	100%	As per POWERGRID Specification	As per POWERGRID Specification	Packing List	A	J	S/U*	Z				N			
4.1.3	Name and Address of Consignee	Visual	100%	As per POWERGRID Specification	As per POWERGRID Specification		A	J	S/U*	Z				N			
4.1.4	Manufacturer's name and Address	Visual	100%	As per POWERGRID Specification	As per POWERGRID Specification	Packing List	A	J	S/U*	Z				N			
4.1.5	Drum No.	Visual	100%	As per POWERGRID Specification	As per POWERGRID Specification	Packing List	A	J	S/U*	Z				N			



SI No.	Components/Operations & Description of Test	Type of check	Quantum of check/ Sampling with basis	Reference document for testing	Acceptance norms	Form of record	Applicable Codes								
							A	J	S/U*	Z		N	Remarks		
4.1.6	Size of Earthwire	Visual	100%	As per POWERGRID Specification	As per POWERGRID Specification	Packing List	A	J	S/U*	Z		N	This Information shall be stenciled on each drum in indelible ink.		
4.1.7	Length of Earthwire in Meters	Visual	100%	As per POWERGRID Specification	As per POWERGRID Specification	Packing List	A	J	S/U*	Z		N			
4.1.8	Gross weight of Drum with Earthwire and Lagging	Visual	100%	As per POWERGRID Specification	As per POWERGRID Specification	Packing List	A	J	S/U*	Z		N			
4.1.9	Weight of Empty drum with lagging	Visual	100%	As per POWERGRID Specification	As per POWERGRID Specification	Packing List	A	J	S/U*	Z		N			
4.1.10	Arrow marking for unwinding	Visual	100%	As per POWERGRID Specification	As per POWERGRID Specification	Packing List	A	J	S/U*	Z		N		*100% verification by Earthwire Manufacturer and 10% by POWERGRID	
4.1.11	Position of the Earth wire ends	Visual	100%	As per POWERGRID Specification	As per POWERGRID Specification	Packing List	A	J	S/U*	Z		N			
4.1.12	No. of turns in the outer most layer	Visual	100%	As per POWERGRID Specification	As per POWERGRID Specification	Packing List	A	J	S/U*	Z		N			
4.1.13	Barrel Diameter at three locations and an arrow marking at the location of measurement	Visual	100%	As per POWERGRID Specification	As per POWERGRID Specification	Packing List	A	J	S/U*	Z		N			
4.1.14	CIP/MICC no	Visual	100%	As per POWERGRID Specification	As per POWERGRID Specification	Packing List	A	J	S			N			
4.1.15	Sealing of Drums 100% by using	Visual	100%	As per POWERGRID Specification	As per POWERGRID Specification		A	J	U	Z		Y	CIP 100% verification by POWERGRID		
	a) Plain Heat shrinkable sleeve at both ends														
	b) Lead Sealing with plier at both ends														
	c) Adhesive Tamper Proof Sticker Duly Signed by POWERGRID IE (in case of Physical inspection) or by Contractor/Manufacturer's representative (in case of Virtual Inspection)														

Note: Earthwire Manufacturer has to ensure marking of CIP/MICC no. on all drums before dispatch and a copy of CIP/MICC along with the test reports should be sent to the site along with the dispatches.

