



BIHAR STATE POWER TRANSMISSION COMPANY LIMITED

MANUFACTURING QUALITY PLAN -- Multistrand AAAC

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|--|-----------------|----------------------|------------------------------------|--------------------------|--|
| Manufacturers Details (Name, Works, Address etc.) | Customer | Vendor's Code | ITEM : Multistrand AAAC | M.Q.P.No. 044 | Valid From : 15.01.2016 |
| | BSPTCL | | | Rev. No. 00 | Valid upto : Till Revision |
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| | |
|---------------|---|
| 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 distributors place |
| D | At independent Lab. |
| E | At turn key contractor's location |
| F | Not Specified |

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|---------------|---|
| 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 | The Turn key Contractor |
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|---------------|--|
| 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 |
| X | By Contractor during product/process inspection |
| Y | By BSPTCL during product/process inspection. |
| Z | By Contractor and /or BSPTCL during product/process inspection. |
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| Code 5 | Whether specific approval of sub-vendor / component make envisaged? |
| E | Envisaged |
| N | Not Envisaged |

| | |
|---------------|---|
| Code 6 | Whether test records required to be submitted after final inspection for issuance of Dispatch Clearances /Instructions ? |
| Y | Yes |
| N | No |



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| | | | | | | | 1 | 2 | 3 | 4 | 5 | 6 | | | | | | | | | | | | | | | | | | | | | | | |

NOTES :

1. Proper co-relation of materials with test certificates from Raw Materials stage to finished conductor shall be maintained.
2. Aluminium INGOTS/Aluminium Alloy Wire Rods:
The equipment manufacturer shall obtain the following test certificates for Aluminium ingots, alloying element, Al alloy rods for review by BSPTCL.
 - a) Chemical composition of Aluminium Wire Rods, Ingots, alloy rods and alloying elements
 - b) All the test results of the test carried out by equipment manufacturer on the finished Aluminium rods.
3. The equipment manufacturer will carry out the routine test on aluminium strands on 20% of the drums offered for inspection and will submit the records at the time of inspection. BSPTCL will the acceptance test on 10% of the offered drums.
4. All Aluminium Alloy wire strands and required to be tested for each sample drawn for Acceptance test.
5. The following Test facilities / Calibration certificate shall be available at equipment manufacturer's works.
 - a) Calibration of various testing and measuring equipments.
 - b) Standard Resistance for verification of Resistance bridges.
 - c) The tensile testing machine should be calibrated by NABL accredited agency/laboratory only.
6. The area where conductor is to be manufactured shall be covered completely with rubber mat/ coir mat/ Wooden floor.
7. All guides, rollers, pulleys etc. used for manufacturing conductor shall be of Nylon/ Hylum/ Teflon or other soft material instead of steel.
8. Finished conductor shall be checked for length verification and surface finish on separate rewinding machine at reduced speed (variable from 8 to 16 Meters per minute). The rewinding facilities shall have appropriate clutch system and shall be free from vibration and jerks etc. with traverse laying facilities.
9. The equipment manufacturer shall offer at least three drums for selection of samples required for conducting all type tests. The equipment manufacturer is required to conduct all acceptance tests as mentioned at clause 13 below, shall be carried out before sample selection.
10. The Aluminium Alloy Wire Rods/Ingots shall be procured only from primary producers. However in case it is intended to convert Aluminium ingots into Aluminium Alloy Wire rods from any conversion agents / contractors own facilities special approval in this regards is required to be obtained from BSPTCL. In the later event the Aluminium ingots would have to be necessarily procured from primary producers i.e. NALCO/ BALCO/ HINDALCO or any of the imported sources.
11. M/s Apar shall maintain separate register in shop floor indicating records of the joints for all the drums and shall submit the records to BSPTCL Representative for review at the time of Inspection.



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| | | | | | | | 1 | 2 | 3 | 4 | 5 | 6 | |
| 12. | Both ends of the conductor are required to be sealed with heat shrinkable sleeves and shall be properly secured with the drum with the help of "U" clamps after covering the conductor below clamp with PVC adhesive tape to avoid loosening of conductor layers during transit and handling. | | | | | | | | | | | | |
| 13. | The drums shall be suitable for wheel mounting and letting off the conductor under an minimum controlled tension of the order of 5 KN. | | | | | | | | | | | | |
| 14. | The wood used for drum shall meet the requirement of BSPTCL specification. The equipment manufacturer shall furnish an undertaking to this effect, that the wood used is seasoned wood and drums have been treated in line with BSPTCL specification requirements. | | | | | | | | | | | | |
| 15. | The wood used in the drum shall preferably be neutral (non corrosive) with pH (aqueous extract) 5.5 to 7.5 and the wood preservative with preferably be compound like Zinc Nephthenate. Copper used compound shall be avoided. | | | | | | | | | | | | |
| 16. | A copy of Dispatch Clearances /Instructions along with the test reports should be sent to the site along with the dispatches. | | | | | | | | | | | | |
| 17. | The Lay ratio of any Aluminium Alloy layer shall not be greater than the lay ratio of Aluminium layer immediately beneath it. | | | | | | | | | | | | |
| 18. | The MQP should be read in conjunction with the applicable technical specification against which the conductor is been manufactured. | | | | | | | | | | | | |
| 19. | In case any contradiction between technical specification / Approved drawing and MQP, detailed mentioned in Technical Specification and Approved drawing shall be final. | | | | | | | | | | | | |
| 20. | BSPTCL may review the effective implementation of the process during product / process inspection. In case any violation in process or process parameters are observed, the reasons along with corrective and preventive measures shall be conveyed to BSPTCL within 2 weeks. | | | | | | | | | | | | |
| 21. | Any addition/ change in new Vendor /Design /Process shall call for review by BSPTCL and change in MQP, if necessary. | | | | | | | | | | | | |
| 22. | The list of Component Manufacturer for which Sub-vendor approval is envisaged is enclosed herewith. | | | | | | | | | | | | |
| | <u>Type Test on finished conductor</u> | | | | | | | | | | | | |
| | All type test are to be carried out as per IS-398 and BSPTCL specification by BSPTCL Engg. Dept. Approved type test reports or waiver by Engg. Dept. to be shown at the time of final inspection. | | | | | | | | | | | | |



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| A. Section: RAW MATERIAL INSPECTION | | | | | | | | | | | | | |
| 1.0 | Aluminium Ingots Outsourced | Sources | 100% | Suppliers TC | Only primary producers | BSPTCL Reports | | | | | E | | |
| 1.1 | Chemical Composition | Spectro Analysis | Suppliers TC- 1 sample per heat of 4 MT or part thereof In absence of Manufacturers T.C's and/or proper co-relation, one sample per lot of 100 MT or part thereof shall be tested | IS 4026 (Gr. II) and BSPTCL Spec. | AL 99.5 % (min) | BSPTCL Reports | A/B | J/K | S/P | W | - | N | |
| | | | | | | | D | L | V | W | - | N | |
| 1.2 | Alloying Element Silicon | Supplier TC | Suppliers TC- 1 sample per Lot | -- | Si. 99% Min. | BSPTCL Reports | A/B | J/K | S/P | W | - | N | |
| 1.3 | Alloying Element Mg. Ingots | Supplier TC | Suppliers TC- 1 sample per Lot | -- | Mg. 99 % Min. | BSPTCL Reports | A/B | J/K | S/P | W | - | N | |
| 1.4 | Tibor Rod (Titanium + Bvoron Rod) | Supplier TC | Suppliers TC- for each Coil. | -- | Ti - 5% ± 0.30% B - 1% ± 0.20% Al - Remainder | BSPTCL Reports | A/B | J/K | S/P | W | - | N | |



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| 2.0 | Aluminium Alloy Wire Rod Outsourced | | | Suppliers TC | | | | | | | E | | |
| 2.1 | Chemical Composition | Spectro Analysis | 1 sample per heat of 4 MT or part thereof In absence of Manufacturers T.C's and/or proper co-relation, one sample per lot of 100 MT or part thereof shall be tested at third party recognized laboratory. | IS 9997-1991 and BSPTCL Specification. | Si - 0.50-0.90% | BSPTCL Reports | A/B | J/K | S/P | W/Z | - | N | |
| | | | | | Mg - 0.60 – 0.90% | | | | | | | | |
| | | | | | Fe - 0.50% (Max.) | | D | L | V | W/Z | - | N | |
| | | | | | Cu - 0.1% (Max.) | | | | | | | | |
| | | | | | Mn. - 0.03 % (Max.) | | | | | | | | |
| | | | | | Cr. - 0.03 % (Max.) | | | | | | | | |
| | | | | | Zn - 0.1%(Max.) | | | | | | | | |
| | | | | | B - 0.06 % (Max.) | | | | | | | | |
| | | | | | Other Element - 0.03% (Max.) each | | | | | | | | |
| | | | | | Other Element - 0.10% (Max.) Total | | | | | | | | |
| | | | | | Al - Reminder | | | | | | | | |
| 2.2 | Diameter | Dimensional | 1 sample from each coil. | IS 9997-1991and BSPTCL Specification. | Min. 9.00 mm/7.50 mm Nom. 9.50 mm/7.60 mm Max. 10.00 mm/7.80 mm | BSPTCL Reports | A/B | J/K | S/P | W/Z | - | N | |
| 2.3 | Tensile Strength | Mechanical | 1 sample from each coil/ 20 % coils | IS 9997-1991and BSPTCL Specification.. | 160 Mpa Min | BSPTCL Reports | A/B | J/K | S/P | W/Z | - | N | |
| 2.4 | Elongation at break | Mechanical | 1 sample from each coil/ 20 % coils | IS 9997-1991 and BSPTCL Specification. | 7% on 250 mm gauge length. | BSPTCL Reports | A/B | J/K | S/P | W/Z | - | N | |
| 2.5 | Conductivity | Electrical | 1 sample from each coil/ 100 % coils | IS 9997-1991 | Min 53% of IACS. | BSPTCL Reports | A/B | J/K | S/P | W/Z | - | N | |



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| | | | | | | | 1 | 2 | 3 | 4 | 5 | 6 | |
| 2.6 | Cleanliness and surface smoothness | Visual | 100% on each coil | IS 9997-1991 and BSPTCL Specification. | The wire rod shall be smooth and free from pipes laps, cracks,kinks,twists, scams & other injurious defects within the limits of good commercial practice | BSPTCL Reports | A | J | S | W/Z | - | N | |
| 2.7 | Winding | Visual | 100% on each coil | IS 9997-1991 & IS 398(Part IV) & BSPTCL Spec. | Shall be free from entanglement | - | A | J | S | W/Z | - | N | |
| 2.8 | Microstructure | Mechanical | One Sample per 100 MT or part thereof | | Fine Grains | BSPTCL Reports | A/D | J/L | S/V | W/Z | | N | |
| 3.0 | Wooden Drums and packing materials | | | | | | | | | | | | |
| 3.1 | Visual check of wooden drums | Dimentional | 20 % Drums | IS : 1778 & BSPTCL approved Drum drawing & BSPTCL specification | As per BSPTCL Specification . | BSPTCL Reports | A | J | S | W | - | N | |
| 3.2 | Workmanship check of wooden drums | Visual | 100 % Drums | IS : 1778 & BSPTCL approved Drum drawing & BSPTCL specification | The inner cheek of the flanges & drum barrels surface shall be painted with Bitumen based paint. Before reeling, card board or double corrugated or Thick bituminized water proof bamboo paper shall be secured to the drum barrel and inside of the flanges of the Drum. | BSPTCL Reports | A | J | S | W | - | N | |
| B. Section: IN PROCESS INSPECTION | | | | | | | | | | | | | |
| 4.0 | Aluminium Alloy Wire Rod Manufacturing (Continuous Casting and Rolling- CCR Process) | | | | | | | | | | | | |
| 4.1 | Temperature of Metal at the exit of Melting Furnace | Temperature | Twice / shift | BSPTCL Specification. | 690 ±30 °C | BSPTCL Reports | A | J | S | W | | N | |



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| 4.2 | Holding furnace | Temperature | Twice / shift | BSPTCL Specification. | 710 ± 15°C | BSPTCL Reports | A | J | S | W/Z | | N | |
| 4.3 | Chemical Composition | Spectro Analysis | 100 % on each coil | IS 9997-1991 and BSPTCL Specification. | Si - 0.50-0.90% | BSPTCL Reports | A | J | S | W/Z | | N | |
| | | | | | Mg - 0.60 – 0.90% | | D | L | V | W/Z | - | N | |
| | | | | | Fe - 0.50% (Max.) | | | | | | | | |
| | | | | | Cu - 0.1% (Max.) | | | | | | | | |
| | | | | | Mn. - 0.03 % (Max.) | | | | | | | | |
| | | | | | Cr. - 0.03 % ((Max.) | | | | | | | | |
| | | | | | Zn - 0.1%(Max.) | | | | | | | | |
| | | | | | B - 0.06 % (Max.) | | | | | | | | |
| | | | | | Other Element - 0.03% (Max.) each | | | | | | | | |
| | | | | | Other Element - 0.10% (Max.) Total | | | | | | | | |
| Al - Reminder | | | | | | | | | | | | | |
| 4.4 | Molten metal Temperature at casting | Temperature | Continuous, Record twice/shift | BSPTCL Specification. | 700±15°C | BSPTCL Reports | A | J | S | W/Z | | N | |
| 4.5 | Molten metal filtration | Cleanliness | Continuous, Record twice/shift | BSPTCL Specification. | Shall be free from Oxides | BSPTCL Reports | A | J | S | W/Z | | N | |
| 4.6 | Casting Speed | RPM | Twice / shift | BSPTCL Specification. | To ensure | BSPTCL Reports | A | J | S | W/Z | | N | |
| 4.7 | Casting (Inlet) | Water Temperature | Twice / shift | BSPTCL Specification. | 30-45 °C | BSPTCL Reports | A | J | S | W/Z | | N | |
| 4.8 | Casting | Water Pressure | Twice / shift | BSPTCL Specification. | 1.5-3.0 Kg/cm ² | BSPTCL Reports | A | J | S | W/Z | | N | |
| 4.9 | Cast bar | Visual | Continuous, Record twice/shift | BSPTCL Specification. | Shall be free from overfills/ lap | BSPTCL Reports | A | J | S | W/Z | | N | |
| 4.10 | On line solution treatment of Alloy Cast Bar by INDUCTION FURNACE | Temperature | Continous Monitoring Record every third coil. | -- | Temperature range 500 ⁰ C to 540 ⁰ C (At the entry of Rolling Mill) | BSPTCL Reports | A/B | J/K | S/P | W/Z | - | N | |



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| 4.11 | Load of main motor | Ampere | Twice/Shift | BSPTCL Specification. | To ensure as per the Guidelines | BSPTCL Reports | A | J | S | W/Z | | N | |
| 4.12 | Cooling of Rolling unit | Emulsion temperature | Twice / shift | BSPTCL Specification. | 60-75 °C | BSPTCL Reports | A | J | S | W/Z | | N | |
| 4.13 | Cooling of Rolling unit | Emulsion Concentration | Once/Shift | BSPTCL Specification. | 20-25 % | BSPTCL Reports | A | J | S | W/Z | | N | |
| 4.14 | Rolling of Aluminium Alloy Rods followed by quenching & Coiling. | Temperature | Every Hour | -- | Temperature range 50 ⁰ C to 100 ⁰ C (After quenching) | BSPTCL Reports | A | J | S | W/Z | | N | |
| 4.15 | Cooling Water Ph | Chemical | Once/ day | IS 3025 - 1964 / Testing Kit | 6.5 to 7.5 | BSPTCL Reports | A | J | S | W/Z | | N | |
| 4.16 | Cooling water TDS | Chemical | Once/ day | IS 3025 - 1964 / Testing Kit | Max 2000 ppm | BSPTCL Reports | A | J | S | W/Z | | N | |
| 4.17 | Cooling water Chlorides | Chemical | Once/ day | IS 3025 - 1964 / Testing Kit | Max 500 ppm | BSPTCL Reports | A | J | S | W/Z | | N | |
| 4.18 | Cooling water Total Hardness | Chemical | Once/ day | IS 3025 - 1964 / Testing Kit | Max 500 ppm | BSPTCL Reports | A | J | S | W/Z | | N | |
| 4.19 | Cooling Water Total Alkalinity | Chemical | Once/ day | IS 3025 - 1964 / Testing Kit | Max 200 ppm | BSPTCL Reports | A | J | S | W/Z | | N | |
| 5.0 | Aluminium Wire Rod Product/ Component from Continuous Casting and Rolling-CCR Process | | | | | | | | | | | | |
| 5.1 | Identification tag | - | 100% | IS 9997-1991and BSPTCL Specification. | - | BSPTCL Reports | A | J | S | W/Z | | N | |
| 5.2 | Wire Rod Diameter | Dimensional | 1 sample from each coil. | IS 9997-1991and BSPTCL Specification. | Min. 9.00 mm/7.50 mm Nom. 9.50 mm/7.60 mm Max. 10.00 mm/7.80 mm | BSPTCL Reports | A | J | S | W/Z | | N | |
| 5.3 | Tensile Strength | Mechanical | 1 sample from each coil/ 20 % coils | IS 9997-1991and BSPTCL Specification.. | 160 Mpa Min | BSPTCL Reports | A | J | S | W/Z | | N | |



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| | | | | | | | 1 | 2 | 3 | 4 | 5 | 6 | | | | | | | | | | | |
| 6.6 | Capstan | Visual | Once / Shift | BSPTCL Specification. | Free from play | BSPTCL Reports | A | J | S | W/Z | N | | | | | | | | | | | | |
| 6.7 | Capstan ring | Visual | Once/ week | BSPTCL Specification. | Shall be free from surface defect | BSPTCL Reports | A | J | S | W/Z | N | | | | | | | | | | | | |
| 6.8 | Wire tension | Physical | Once / shift | BSPTCL Specification. | Wire shall be free from stretch | BSPTCL Reports | A | J | S | W/Z | N | | | | | | | | | | | | |
| 6.9 | Guide rollers and pulley | Visual | Once/ day | BSPTCL Specification. | Shall be free from surface defect | BSPTCL Reports | A | J | S | W/Z | N | | | | | | | | | | | | |
| 6.10 | Length counter working | Visual | Once/ week | BSPTCL Specification. | Shall be free from error | BSPTCL Reports | A | J | S | W/Z | N | | | | | | | | | | | | |
| 6.11 | Wire take-up tension | Visual | Once/ Day | BSPTCL Specification. | Shall be free from stretch and wavyness | BSPTCL Reports | A | J | S | W/Z | N | | | | | | | | | | | | |
| 6.12 | Winding of wire in the spool | Visual | 100% | BSPTCL Specification. | Shall be free from entanglement | BSPTCL Reports | A | J | S | W/Z | N | | | | | | | | | | | | |
| 7.0 | ALUMINIUM ALLOY DRAWN WIRE BEFORE AGEING. | | | | | BSPTCL Reports | | | | | | | | | | | | | | | | | |
| 7.1 | Identification tag | - | 100% | IS 398(Part- IV) and BSPTCL Spec. | AILS/R/OP - 15C | BSPTCL Reports | A | J | S | W/Z | N | | | | | | | | | | | | |
| 7.2 | Diameter of Drawn Aluminium Wire | Dimensional | One sample from each spool | IS 398(Part- IV) and BSPTCL Spec. | As per data sheet | BSPTCL Reports | A | J | S | W/Z | N | | | | | | | | | | | | |
| 7.3 | Breaking Load/ Tensile strength | Mechanical | One sample from each spool | IS 398(Part- IV) and BSPTCL Spec. | Min. – 27 KG/mm ² | BSPTCL Reports | A | J | S | W/Z | N | | | | | | | | | | | | |
| 7.4 | Resistivity | Electrical | One sample from each spool | IS 398(Part- IV) and BSPTCL Spec. | Max. – 34.5 Ohm-mm ² /km at 20° C | BSPTCL Reports | A | J | S | W/Z | N | | | | | | | | | | | | |
| 7.5 | Surface and cleanliness | Visual | One sample from each spool | IS 398(Part- IV) and BSPTCL Spec. | Shall be free from imperfection, fins, chips, dirt etc | BSPTCL Reports | A | J | S | W/Z | N | | | | | | | | | | | | |



BIHAR STATE POWER TRANSMISSION COMPANY LIMITED

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| | | BSPTCL | | | | | | Rev. No. 00 | | Valid upto : Till Revision | | | | | | | | | | | | | |
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| | | | | | | | | | | | | | | | | | | | | | | | |
| Sr. 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 | | | | | | | | | | | |
| 8.0 | ALUMINIUM ALLOY WIRE AGEING PROCESS. | | | | | | | | | | | | | | | | | | | | | | |
| 8.1 | Aluminium Alloy Wire Ageing Process Time & Temperature during | Temperature | For every batch. | Internal Plant Standard | | BSPTCL Reports | A | J | S | W/Z | | N | | | | | | | | | | | |
| 9.0 | ALUMINIUM ALLOY WIRE AFTER AGEING. | | | | | | | | | | | | | | | | | | | | | | |
| 9.1 | Identification tags on every wire from spool | - | 100% | IS 398(Part- IV) and BSPTCL Spec. | - | BSPTCL Reports | A | J | S | W/Z | | N | | | | | | | | | | | |
| 9.2 | Surface Finish & Winding (Visual Check) | Visual | 100% on each spool | IS 398 (IV)1994 & BSPTCL Spec. | The wire shall be smooth, uniform & free from all imperfections such as spills, splits, scale, inclusion, die marks, scratches, abrasions, blowholes etc. | BSPTCL Reports | A | J | S | W/Z | | N | | | | | | | | | | | |
| 9.3 | Diameter of drawn Aluminium Alloy wire | Dimensional | One sample from each spool | IS 398(Part- IV) and BSPTCL Spec. | As per data sheet | BSPTCL Reports | A | J | S | W/Z | | N | | | | | | | | | | | |
| 9.4 | Breaking Load/Tensile Test | Mechanical | One sample from each spool | IS 398(Part- IV) and BSPTCL Spec. | As per data sheet | BSPTCL Reports | A | J | S | W/Z | | N | | | | | | | | | | | |
| 9.5 | Resistance | Electrical | One sample from each spool | IS 398(Part- IV) and BSPTCL Spec. | As per data sheet | BSPTCL Reports | A | J | S | W/Z | | N | | | | | | | | | | | |
| 9.6 | Wrapping Test | Mechanical | One sample from each spool | IS 398(Part- IV) and BSPTCL Spec. | As per data sheet | BSPTCL Reports | A | J | S | W/Z | | N | | | | | | | | | | | |
| 9.7 | Elongation | Mechanical | One sample from each spool | IS 398(Part- IV) and BSPTCL Spec. | As per data sheet | BSPTCL Reports | A | J | S | W/Z | | N | | | | | | | | | | | |
| 9.8 | MICRO Structure Test | Metallurgical | 1 Sample per 40 MT or part thereof. | BSPTCL Spec. | Fine Grains. | - | A | J | S | W/Z | | N | | | | | | | | | | | |



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| Sr. 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 | |
| 10.0 | Final Conductor Stranding Process | | | | | | | | | | | | |
| 10.1 | Spool identification and loading | - | 100% | IS 398(Part- IV) and BSPTCL Spec. | - | BSPTCL Reports | A | J | S | W/Z | - | N | |
| 10.2 | Spool Brake tension | Physical | Twice/ Load | BSPTCL Spec. | Shall be free from excessive tension and stretch | BSPTCL Reports | A | J | S | W/Z | - | N | |
| 10.3 | Size of Nylon bushes | Physical | Once per shift | BSPTCL Spec. | Shall be free from excessive tension and stretch | BSPTCL Reports | A | J | S | W/Z | - | N | |
| 10.4 | Condition of Nylon bushes | Physical | Twice/ Load | BSPTCL Spec. | Shall be free from damage and jamming | BSPTCL Reports | A | J | S | W/Z | - | N | |
| 10.5 | Rollers and pulley | Physical | Once per shift | BSPTCL Spec. | Shall be free from jamming and surface defect | BSPTCL Reports | A | J | S | W/Z | - | N | |
| 10.6 | Gears for lay setting | Physical | At the beginning of change over | BSPTCL Spec. | As per data sheet | BSPTCL Reports | A | J | S | W/Z | - | N | |
| 10.7 | Length counter working | Physical | Once per shift | BSPTCL Spec. | Counter wheel shall be free from defect and error | BSPTCL Reports | A | J | S | W/Z | - | N | |
| 10.8 | Capstan surface | Visual | Once/ week | BSPTCL Spec. | Shall be free from surface defect | BSPTCL Reports | A | J | S | W/Z | - | N | |
| 10.9 | Guide rollers | Visual | Once per shift | BSPTCL Spec. | Shall be free from surface defect and jamming | BSPTCL Reports | A | J | S | W/Z | - | N | |
| 10.10 | Traversing unit | Visual | Once per shift | BSPTCL Spec. | Shall be free from jamming | BSPTCL Reports | A | J | S | W/Z | - | N | |
| 10.11 | Takeup Tension | Physical | Once /shift | BSPTCL Spec. | Shall be free from excessive tension and stretch | BSPTCL Reports | A | J | S | W/Z | - | N | |
| 10.12 | Lay Ratio/ Direction & Compactness | Physical | During each set up | IS 398(Part- IV) and BSPTCL Spec. | As per Data Sheet | BSPTCL Reports | A | J | S | W/Z | - | N | |
| 10.13 | Winding of conductor in drum | Visual | 100% | BSPTCL Spec. | Shall be smooth and uniform | BSPTCL Reports | A | J | S | W/Z | - | N | |



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| | | | | | | | 1 | 2 | 3 | 4 | 5 | 6 | |
| 10.14 | Check for Joints | Visual | 100 % on each drum | IS 398(Part- IV) and BSPTCL Spec. | There shall be NO JOINT in on the outermost layer. Joints are allowed in inner layers but no two such joints shall be less than 15 meters apart in completed conductor. | BSPTCL Reports | A | J | S | W/Z | - | N | |
| 10.15 | Quality of Joints | Visual | Each joint | IS 398(Part- IV) and BSPTCL Spec. | Shall be approved by Shift Supervisor | BSPTCL Reports | A | J | S | W/Z | - | N | |
| 10.16 | Conductor end preparation | Visual | 100% | AILS/WI/OP-13C | Shall be properly tied and secured by | BSPTCL Reports | A | J | S | W/Z | - | N | |
| 10.17 | Surface smoothness of Strands and stranded conductor | Visual | 100% | IS 398(Part- IV) and BSPTCL Spec. | The finished conductor shall be smooth, compact, uniform and free from all imperfections including kinks (protrusion of wires), wires cross over, over riding, looseness (wire being dislocated by finger/hand pressure and or unusual bangle noise on tapping) | BSPTCL Reports | A | J | S | W/Z | - | N | |
| 10.18 | Surface cleanliness | Visual | 100% | IS 398(Part- IV) and BSPTCL Spec. | Medium grade Kraft/crepe paper/ polythene sheet shall be used in between the layers of conductor. After reeling the conductor, the exposed surface of the outermost layer of conductor shall be wrapped with water proof thick bituminized paper or polythene | - | A | J | S | W/Z | - | N | |



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| Sr. 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 | |
| C. Section: FINAL TESTING | | | | | | | | | | | | | |
| 11.0 | Routine Test on Finished Conductor | | | | | | | | | | | | |
| 11.1 | All acceptance tests as per clause no. 12.0 | - | 20 % of the drums | IS 398(Part- IV) and BSPTCL Spec. | Shall pass all the requirements. | BSPTCL Reports | A | J | S | W/Z | - | N | |
| 11.2 | Check for Joints, Surface condition of strands and stranded conductor. | - | 20 % of the drums | IS 398(Part- IV) and BSPTCL Spec. | Shall pass all the requirements. | BSPTCL Reports | A | J | S | W/Z | - | N | |
| 11.3 | Declaration of Finished Goods. | - | - | - | Shall be Accepted by Quality Control and Production Deppt. | BSPTCL Reports | A | J | S | W/Z | - | N | |
| 12.0 | Acceptance Tests of Finished Conductor. | | | | | BSPTCL Reports | | | | | | | |
| 12.1 | Lay Ratio/ Direction & Compactness | Physical | One sample from every 10 drums or part thereof | IS 398(Part- IV) and BSPTCL Spec. | As per Data Sheet | BSPTCL Reports | A | J | U | W/Z | - | Y | |
| 13.0 | Acceptance Tests on Aluminium strands of Finished Conductor. | | | | | BSPTCL Reports | | | | | | | |
| 13.1 | Lay Ratio/ Direction & Compactness | Physical | One sample from every 10 drums or part thereof | IS 398(Part- IV) and BSPTCL Spec. | As per Data Sheet | BSPTCL Reports | A | J | U | W/Z | - | Y | |
| 13.2 | Diameter of Aluminium strands | Dimensional | One sample from every 10 drums or part thereof | IS 398(Part- IV) and BSPTCL Spec. | As per Data Sheet | BSPTCL Reports | A | J | U | W/Z | - | Y | |
| 13.3 | Breaking Load/ Tensile strength | Mechanical | One sample from every 10 drums or part thereof | IS 398(Part- IV) and BSPTCL Spec. | As per Data Sheet | BSPTCL Reports | A | J | U | W/Z | - | Y | |



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| | | | | | | | 1 | 2 | 3 | 4 | 5 | 6 | |
| 13.4 | Resistance | Electrical | One sample from every 10 drums or part thereof | IS 398(Part- IV) and BSPTCL Spec. | As per Data Sheet | BSPTCL Reports | A | J | U | W/Z | - | Y | |
| 13.5 | Wrapping Test | Mechanical | One sample from every 10 drums or part thereof | IS 398(Part- IV) and BSPTCL Spec. | As per Data Sheet | BSPTCL Reports | A | J | U | W/Z | - | Y | |
| 13.6 | UTS test on welded joints of Aluminium strands by cold pressure butt welding machine | Mechanical | 5 samples from each lot | IS 398(Part- IV) and BSPTCL Spec. | As per Data Sheet | - | A | J | U | W/Z | - | Y | |
| 14.0 | Length measurement of Finished Conductor | | | | | | | | | | | | |
| 14.1 | Check for joints, surface finish and length measurement by rewinding | Visual & Measurement | One sample from every 10 drums or part thereof | IS 398(Part- IV) and BSPTCL Spec. | No scale on the surface and the surface shall be free from any imperfections. No joint on the outermost layer. The Conductor length should be as per the approved drum drawing /Technical specification and Offered packing list. | Inspn. Report | A | J | U | W/Z | - | Y | |
| 15.0 | Wooden Drums and packing materials | | | | | | | | | | | | |
| 15.1 | Dimensional check of wooden drums | Dimensional | 100% | IS : 1778 & BSPTCL approved Drum drawing | As per BSPTCL Specification . | Inspn. Report | A | J | U | W/Z | - | Y | |
| 15.2 | Barrel Batten Test | Mechanical | One sample from every 10 drums or part thereof | IS 1778 | Barrel Baten strength Min. 300 Kgf. | Inspn. Report | A | J | U | W/Z | - | Y | |
| 15.3 | Test on Packing paper and plastic. | Chemical | One sample from batch | - | Chloride - 0.05 % max., Sulphate- 0.25 % max., Copper - 0.01 % Max., pH- 5.5 to 7.5 | Independent Lab. Report | A | J | U | W/Z | - | Y | |



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| Sr. 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 | | | | | | | | | | | |
| 15.4 | Test on Adhesive Glue | Chemical | 100% | - | Chloride - 0.05 % max., Sulphate- 0.25 % max., Copper - 0.01 % Max., pH- 5.5 to 7.5 | Independent Lab. Report | D | L | V | Z | - | N | | | | | | | | | | | |
| 15.5 | Test on Bitumen | Chemical | 100% | - | Chloride - 0.05 % max., Sulphate- 0.25 % max., Copper - 0.01 % Max., pH- 5.5 to 7.5 | Independent Lab. Report | D | L | V | Z | - | N | | | | | | | | | | | |
| 15.6 | Visual check of wooden drums | Visual | 100% | IS : 1778 & BSPTCL approved Drum drawing & BSPTCL specification | The inner cheek of the flanges & drum barrels surface shall be painted with Bitumen based paint. Before reeling, card board or double corrugated or Thick bituminized water proof bamboo paper shall be secured to the drum barrel and inside of the flanges of | Inspn. Report | A | J | U | W/Z | - | Y | | | | | | | | | | | |
| 16.0 | Packing, Marking and Dispatch | | | | | | | | | | | | | | | | | | | | | | |
| 16.1 | Application of water proof paper | Visual | 100% | BSPTCL Spec. | BSPTCL Spec. | Inspn. Report | A | J | U | W/Z | - | Y | | | | | | | | | | | |
| 16.2 | Packing of drum with external laggings | Visual | 100% | IS : 1778 & BSPTCL approved Drum drawing | BSPTCL Spec. | Inspn. Report | A | J | U | W/Z | - | Y | | | | | | | | | | | |
| 16.3 | Binders over external laggings. | Visual | 100% | IS : 1778 & BSPTCL approved Drum drawing | BSPTCL Spec. | Inspn. Report | A | J | U | W/Z | - | Y | | | | | | | | | | | |
| 16.4 | Distance between outermost layer and inner surface of protective laggings | Visual | 100% | BSPTCL Spec. | BSPTCL Spec. (Min - 75mm) | Packing List, AILS/CL/OP/02 | A | J | U | W/Z | - | Y | | | | | | | | | | | |



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| | | | | | | | 1 | 2 | 3 | 4 | 5 | 6 | |
| 16.15 | A) Sealing of conductor ends with heat shrinkable sleeves and signature of Inspecting official at outer end. B) Lead sealing with plier and identification no. at both ends. | Visual | 100% | BSPTCL Spec. | BSPTCL Spec. | BSPTCL Reports | A | J | U | W/Z | - | Y | |
| 16.16 | Position of conductor ends | Visual | 100% | BSPTCL Spec.- By arrow mark | BSPTCL Spec. | BSPTCL Reports | A | J | U | W/Z | - | Y | |
| 16.17 | Tack welding on Nuts on the barrel and Hub Plates. | Visual | 100% | BSPTCL Spec. | BSPTCL Spec. | BSPTCL Reports | A | J | U | W/Z | - | Y | |
| 16.18 | Marking of CIP/MICC No. | Visual | 100% | BSPTCL Spec. | BSPTCL Spec. | BSPTCL Reports | A | J | U | W/Z | - | Y | |
| 16.19 | Name and address of consignee | Visual | 100% | BSPTCL Spec. | BSPTCL Spec. | BSPTCL Reports | A | J | U | W/Z | - | Y | |
| 17.0 | Inspection at Site | | | | | | | | | | | | |
| 17.1 | Visual Examination for surface | Visual | 100% | BSPTCL Spec. | No surface defect/ damage | - | - | - | U | Z | N | N | |
| 17.2 | Length measurement by Weighment of Drums received. | Physical | 100% | BSPTCL Spec. | BSPTCL Spec. | - | - | - | U | Z | N | N | |