# QUALITY CONTROL MANUAL
# FOR RGGVY WORKS

**PROPRIETARY STATEMENT**

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**Section 1.1**

## APPROVAL STATEMENT

The Quality Control Manual is consists of 34 pages, Annexure-I of 6 pages, Annexure-II of 72 pages II and Annexure-III of 232 pages. The Manual lays the procedure for the implementation of Quality Control mechanism for RGGVY works along with Formats and Quality Plans for guidance. This is issued and controlled by the REC Quality Control Coordinator as per the distribution mechanism placed at Section 1.6.

**Recommended by**

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**Section 1.3**

**AMENDMENT PROCEDURE**

1.3.1 All amendments to this Manual are approved by CMD.
1.3.2 The amendment record in Section 1.4 is duly filled in and signed by the controlled copy holder.
1.3.3 After approval, the revised documents will be issued by the REC Quality Control Coordinator (RQCC) to all controlled copyholders.
1.3.5 It is the responsibility of the controlled copyholders to destroy the superseded versions of documents and replace the same with new version so as to ensure against unintended use of obsolete documents.
1.3.6 It is also the responsibility of the controlled copyholders to fill in the Amendment Records in Section 1.4 of their respective documents after taking action as per 1.3.5 above.
1.3.7 The revision will come into effect only after it is formally issued by RQCC.

**Section 1.4**

## AMENDMENT RECORD

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**Section 1.5**
**LIST OF ABBREVIATIONS/DEFINITIONS**

| | |
|---|---|
| REC | Rural Electrification Corporation |
| RGGVY | Rajiv Gandhi Gramin Vidutikaran Yojna |
| BPL | Below Poverty Line |
| QCM | Quality Control Mechanism |
| PQCC | Project Quality Control Coordinator |
| RQCC | REC Quality Control Coordinator |
| RQM | REC Quality Monitor |
| NQM | National Quality Monitor |
| MQP | Manufacturing Quality Plan |
| FQP | Field Quality Plan |
| BOQ | Bill of Quantity |
| CPSU | Central Public Sector Undertaking |
| QE | Quality Engineer of Turnkey Contractor |
| MOP | Ministry of Power |
| CPRI | Central Power Research Institute |
| NABL | National Accreditation Board of Laboratories |
| ERTL | Electronics Regional Testing Laboratory |
| ERDA | ELECTRICAL RESEARCH AND DEVELOPMENT ASSOCIATION |
| PIA | Project Implementing Agency (Utility/CPSU) |
| TPIA | Third Party Inspection Agency of PIA |
| Village | Village means village with all associated Hamlets/Mauza/Dhani/Thanda etc. |

**Section 1.6**
**DISTRIBUTION MECHANISM**

This manual is a **controlled document** and copies are maintained by the RQCC. The holders of controlled copy are responsible for the upkeep. Controlled copies are identified by specific copy number and stamped as: **CONTROLLED**

| **Copy No.** | **Designation of the Personnel** |
|---|---|
| 1. | RQCC |
| 2. | GM (RGGVY) |
| 3. | ED (RGGVY) |

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**Section 2.0** **RGGVY SCHEME DESCRIPTION**
(For information only – Not subject to assessment.)

**Rajiv Gandhi Grameen Vidyutikaran Yojana- summary**

1. Scheme in the XI- Plan for attaining the goal of providing access to electricity to all households, electrification of about 1.15 lakh unelectrified villages and electricity connections to 2.34 crore BPL households by 2009. The approval has been accorded for capital subsidy of Rs. 28000 crore during the Eleventh Plan period, at this stage. This is in continuation of Office Memorandum No. 44/19/2004-D (RE) dated 18th March, 2005.

2. Rural Electrification Corporation (REC) would be the nodal agency for the scheme.

3. Ninety per cent capital subsidy would be provided towards overall cost of the projects under the scheme excluding the amount of state or local taxes, which will be borne by the concerned State/State utility. 10% of the project cost would be contributed by states through own resources/loan from financial institution.

4. The states will finalise their Rural Electrification plans in consultation with Ministry of Power and notify the same within six months. Rural Electrification plan will be roadmap for generation, transmission and distribution of electricity in the state which will ensure the achievements of objectives of the scheme.

5. For projects to be eligible for capital subsidy under the scheme, prior commitment of the States would also be obtained before sanction of projects under the scheme for:
   i) Guarantee by State Government for a minimum daily supply of 6-8 hours of electricity in the RGGVY network with the assurance of meeting any deficit in this context by supplying electricity at subsidized tariff as required under the Electricity Act 2003.
   ii) Deployment of franchisees for the management of rural distribution in projects financed under the scheme and to undertake steps necessary to operationalise the scheme.

**Section 3.0 Scope and Applicability**

**3.1** This manual describes the Quality Control Mechanism to be adopted for RGGVY Scheme in the XI-Plan by project implementing agencies, turnkey contractors, third party inspection agencies, REC Quality Control Coordinators & National Quality Monitors.

## Section : 4.0 THREE TIER QUALITY CONTROL MECHANISM

### 4.1 OVERVIEW OF METHODOLOGY

4.1.1 In order to ensure proper Quality of materials as well as in installations in RGGVY, three tier Quality Control Mechanism (QCM) has been developed. This Quality Control Manual established three tier QCM. The basic framework of the three tier QCM is stipulated below:

**(i) TIER-I**

The Project implementing agency (PIA) shall be responsible for first tier quality control. PIA shall designate a senior level officer as Project Implementing Agency's Quality Control Coordinator (PQCC). PIA shall prepare a detailed Quality Assurance Program, which should ensure quality checks as below:

a) **TURNKEY CONTRACTOR**

- Inspections of all material as per MQP/Drawings/Technical Specifications
- All villages to be inspected as per FQP
- All 33/11 kV sub stations for quality of material as per MQP/Drawings/Technical Specifications and works in the field as per FQP.
- 100% verification of BPL connections.

b) **PROJECT IMPLEMENTING AGENCY**

- Inspections of material as stipulated in MQP for all materials/equipment for which MQP requirement is indicated in Appendix-I. For other items, inspections/testing/ witnessing of acceptance tests shall be as per Drawings/Technical Specifications.
- All villages to be inspected as per FQP
- All 33/11 kV sub stations for quality of material as per MQP/Drawings/Technical Specifications and works in the field as per FQP.
- 100% verification of BPL connections.

c) **THIRD PARTY INSPCTION AGENCY of PIA (TPIA)**

- 10% randomly selected inspections as per MQP for Distribution transformers, conductors, energy meters, poles and insulators at pre-shipment stage at vendors' works/testing labs.
- 50 % Villages on random sampling basis including 100% verification of BPL connections in 10% of 50% of villages inspected i.e. 5% villages and in each of the remaining villages inspected i.e. 45% villages, at least 5 BPL connections shall be verified **randomly selected from the list of connections provided till the date of inspection.**

- 33/11 kV sub stations for quality of works in the field on random sampling basis
  - 100 % new sub stations
  - 50 % augmentation of sub stations

  Detailed responsibilities of first tier quality control are stipulated in Section-5.

**(ii) TIER-II**

Rural Electrification Corporation (REC) shall be responsible for second tier Quality Control Mechanism. REC shall designate a dedicated senior level officer as REC Quality Control Coordinator (RQCC) to coordinate and oversee the implementation of Quality Control Manual for RGGVY works.

For Second Tier Quality Control, REC shall appoint REC Quality Monitors (RQM) for RGGVY projects. The second tier Quality control shall ensure quality checks as below :

1. At least one inspection of major material like poles, transformers, Conductors and energy meters at pre-shipment stage at vendors' works on random sampling basis as per MQP.
2. 10 % villages on random sampling basis as per FQP.
3. 33/11 kV sub stations for quality of works in the field covering :
4. At least one new sub station.
5. At least one augmentation of sub station.
6. 100% verification of BPL connections in 25% of 10% villages inspected and at least 5 randomly selected BPL connections in other inspected villages i.e. 75% of 10% villages.
7. VIP references/complaints referred by REC relating to quality of works.

The responsibility and methodology of second tier Quality Control is detailed in Section-6.

**(iii) TIER-III**

MOP shall be responsible for third tier Quality Control Mechanism. For this, independent evaluators shall be engaged, who will be designated as National Quality Monitors (NQM). Third tier quality control shall ensure quality checks as below:

1. 1 % Villages on random sampling basis as per FQP
2. 33/11 kV sub stations for quality of works in the field covering :
   - At least one new sub station

- At least one augmentation of sub station

3. 100% BPL service connection verification in 50% of villages inspected i.e 0.5 % villages and in the remaining 0.5% villages at least 5 BPL connections shall be verified on randomly selected from the list of connections provided till the date of inspection.
4. Review of test records for major material like transformers, poles and conductors etc. on random sampling basis.
5. Any other study of RGGVY assigned by MOP.

**4.2** In this manual, Village means village with all associated hamlets/ Mauza/Dhani/Thanda etc.

**4.3** Linking of Release of funds with Quality Control :

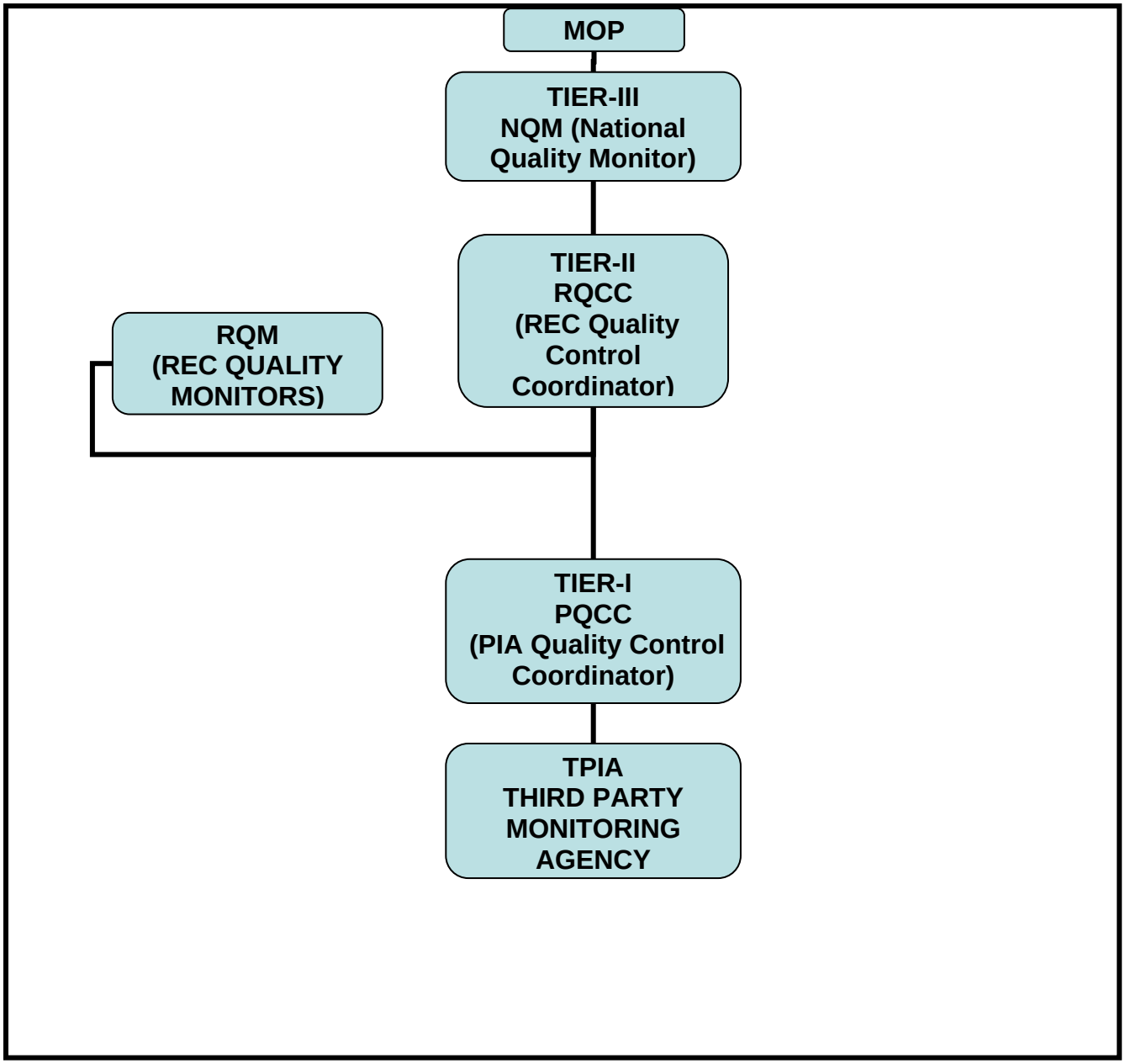
**4.3.1** Installments to PIA's shall be regulated based on the following methodology :

4.3.1.1 **2nd Installment -** After confirmation from PQCC that all MQP & FQP have been agreed as per Quality Manual.

4.3.1.2 **3rd Installment** – After completion of infrastructure in at least 10% village with satisfactory report by TPIA and at least 20% BPL connections in electrified villages.

4.3.1.3 **4th Installment** – After completion of 100% villages and Sub Stations with satisfactory report of PQCC/RQCC/NQM.

## 4.4 QUALITY CONTROL STRUCTURE



**Section : 5.0 Tier-I QUALITY CONTROL METHODOLOGY**

5.1 Tier – I quality control involves parallel quality control checks by the turnkey contractor, PIA & Independent Third party inspection agency (TPIA).

5.2 The Project Implementing agency shall be responsible for quality checks through turnkey contractor & independent third party inspection agency. PIA Quality Control Coordinator (PQCC) nominated by PIA, shall be responsible for ensuring implementation of all quality control checks under the first tier. PQCC shall be the nodal officer for any information regarding inspection, testing and quality control under first tier.

5.3 PQCC shall ensure inspection of material to be supplied by various sub-vendors, at their works, in line with Manufacturing Quality Plans (MQP) as finalized & agreed by PIA with turnkey contractor. He shall inform the third party inspection agency & REC quality coordinator (RQCC) of all the programs of testing of equipment at sub-vendors works so that RQCC can also depute their representatives for witnessing pre-dispatch inspection at the manufacturer's works on sample-basis. In exceptional cases, where due to non-availability of inspector from PIA/TPIA/RQCC, witnessing of testing may be waived by PIA and inform to RQCC. However, testing shall be carried out in line with MQP/IS/Specification and report shall be submitted to PQCC for approval.

5.4 Quality in the field shall be controlled in line with the Field quality plans (FQP) to be finalized & agreed by PIA with turnkey contractor.

5.5 PQCC shall be the custodian of all manufacturing and field-quality plans. He shall ensure that field-quality plan is available at all project sites, so that PIA/turnkey contractor/TPIA shall carryout testing and checks as per field quality plan. The site personnel shall maintain proper records of testing and checks made by them. The same shall be made available to RQCC & NQM whenever required. The PQCC shall ensure that Quality Control Manual and all the guidelines are strictly followed.

5.6 Wherever PIA have not formulated manufacturing and field quality plans with the turn-key contractors/manufacturers, Standard quality plans which are enclosed in this manual shall be used as guidance and MQP/FQP shall be finalized broadly based on these standard MQP/FQP.

5.7 **Turnkey contractor's set up for Quality Assurance and Audit**

5.7.1 The turnkey contractor shall be primarily responsible for ensuring the quality of material supplied & quality of works at site.

5.7.2 He shall submit all MQP and FQP to PQCC for approval and establish a proper procedure to ensure checks as indicated in MQP & FQP for the materials indicated in Appendix-I & works.

5.7.3 Turnkey contractor shall designate an experienced & qualified engineer as Quality Engineer (QE) who shall be responsible for ensuring that all the quality checks required are carried-out and shall ensure to keep proper records for quality maintained at site.

5.7.4 Quality Assurance shall be undertaken in the following areas of the project implementation:-

a) Quality of material/equipment being supplied.

b) Quality of works in the field.

5.7.5 **Quality of material/equipment being supplied-** For ensuring quality of material/equipment, the following system/procedure shall be adopted:-

5.7.5.1 A standard manufacturing quality plan shall be agreed with the turnkey contractor for every equipment/material as listed in Appendix-I which shall include the process of manufacturing, sourcing of raw-materials, quality checks of raw-material, stages of manufacturing, testing of final product – both type tests and routine/acceptance tests.

5.7.5.2 The turnkey contractor shall select the sub-vendors of various equipment based on a process, which ensures quality material in the project. Sub-vendors of items listed in Appendix-I shall be approved by PIA.

5.7.5.3 QE shall ensure the presence of their qualified representative during type tests and routine/acceptance tests, either at manufacturer's premises or at independent laboratories.

5.7.5.4 The type tests shall be carried out only at Govt. testing laboratories such as CPRI, ERTL, ERDA or NABL Accredited Laboratories. Manufacturers may carry out type tests at their works however in such cases testing shall be carried out in presence of representative of **TPIA or RQCC or PQCC**.

5.7.5.5 All materials shall be tested before dispatch in line with MQP/Drawings/Technical Specifications.

5.7.6 **Assurance of Quality at field-** The turnkey contractor shall establish a procedure for quality checks during execution of the project by finalizing field quality plans (FQP) with the PIA. The detailed field quality plan shall be made available and the same shall be explained to all the field engineers & supervisors of the Turnkey contractor. The field quality plan document shall clearly describe requirements for various raw materials used like steel, cement and sand etc.

The Turnkey contractor shall submit quality audit reports, on periodic basis to the PIA.

Following checks shall be carried out in the field:

- All villages to be inspected as per FQP
- All 33/11kV sub-stations for quality of material as per MQP/Drawings/Technical Specifications and works in the field as per FQP.
- 100% verification of BPL connections.

5.8 **PIA's set up for Quality Assurance and Audit**

5.8.1 PIA shall also depute its own teams to undertake quality audit for material and field execution. PIA shall be fully responsible for ensuring the quality of material supplied & quality of works at site. He shall put in place a proper procedure to ensure checks as per MQP & FQP.

5.8.2 PIA shall designate an experienced & qualified engineer as Quality Control Coordinator (PQCC) along with a dedicated team who shall be responsible for ensuring that all the quality checks are carried-out and shall ensure to keep proper records for quality maintained at site.

5.8.3 Third-party inspection agency, RQCC and NQM shall be given free access to all technical records by PIA through PQCC.

5.8.4 Quality Assurance shall be undertaken in the following areas of the project implementation:-

a) Quality of material/equipment being supplied.

b) Quality of works in the field.

5.8.5 **Quality of material/equipment being supplied-** For ensuring quality of material/equipment, the following system/procedure shall be adopted:-

5.8.5.1 A standard manufacturing quality plan shall be agreed with the turnkey contractor for every equipment/material as listed in Appendix-I which shall include the process of manufacturing, sourcing of raw-materials, quality checks of raw-material, stages of manufacturing, testing of final product – both type tests and routine/acceptance tests.

5.8.5.2 The turnkey contractor shall select the sub-vendors of various equipment based on a process, which ensures quality material in the project. All sub-vendors shall be approved by PIA.

5.8.5.3 PQCC shall ensure presence of their qualified representative during type tests and routine/acceptance tests, either at manufacturer's premises or at independent laboratories.

5.8.5.4 The type tests shall be carried out only at Govt. testing laboratories such as CPRI, ERTL, ERDA or NABL Accredited Laboratories. Manufacturers may carry out type tests at their works however in such cases testing shall be carried out in presence of representative of **TPIA or RQCC or PQCC**.

5.8.5.5 All materials shall be tested before dispatch in line with MQP/Drawings/Technical Specifications.

5.8.6 **Assurance of Quality at field-** The PIA shall establish a procedure for quality checks during execution of the project by finalizing field quality plans (FQP) with the turn-key contractor. The detailed field quality plan shall be made available and the same shall be explained to all the field engineers & supervisors of PIA. The field quality document shall clearly describe requirements for various raw materials used like steel, cement and sand etc.

The PIA shall submit a certificate to RQCC, certifying satisfactory quality assurance for every project on completion of all quality checks. PIA shall also forward summary of TPIA reports on field quality and action taken report to RQCC on monthly basis.

5.8.6.1 A list of BPL households shall be provided by PIA to REC. Payment for BPL connections shall be released only after receipt of BPL LIST. BPL connections shall be verified with respect to this list.

5.8.6.2 Following checks shall be carried out in the field:

- All villages to be inspected as per FQP
- All 33/11 kV sub stations for quality of material as per MQP/Drawings/Technical Specifications and works in the field as per FQP.
- 100% verification of BPL connections.

5.8.6.3 Proper records shall be maintained at field office of PIA for all the checks and tests made by the PIA and TPIA and will be shown to RQM during their inspection, if asked for.

5.9 Third Party inspection agency (TPIA) shall be engaged by PIA for carrying out independent quality checks. Their responsibility will be to inspect material at manufacturers' works before dispatch and to ensure that the works in the field are carried-out as per norms and standard engineering practices in line with the manufacturing and field quality plans. TPIA shall depute their personnel on receipt of notice from PQCC.

5.9.1 Quality Assurance shall be undertaken in the following areas of the project implementation:-

c) Quality of material/equipment being supplied.

d) Quality of works in the field.

5.9.2 **Quality of material/equipment being supplied.**
TPIA shall ensure presence of their qualified representative in 10% randomly selected inspections as per MQP for Distribution transformers, conductors, energy meters, poles and insulators at pre-shipment stage at vendors' works/testing labs.

5.9.3 **Assurance of Quality at field-** The detailed field quality plan shall be made available and the same shall be explained to all the field engineers & supervisors of TPIA.

Quality of works shall be verified with reference to FQP.

Reports of Field Quality checks shall be supported by photographs.

The TPIA shall submit a report to PQCC, certifying satisfactory quality assurance for every project on completion of all quality checks.

Following checks shall be carried out in the field:

- 50 % Villages on random sampling basis including 100% verification of BPL connections in 10% of 50% of villages inspected i.e. 5% villages and in each of the remaining villages inspected i.e. 45% villages, at least 5 BPL connections shall be verified **randomly selected from the list of connections provided till the date of inspection.**

- 33/11 kV sub stations for quality of works in the field on random sampling basis
  - 100% New sub stations
  - 50% Augmentation of sub stations (with min. one S/S)
- BOQ verification

5.9.4 **Stages and scope of Inspection:**

5.9.4.1 1st Stage- On completion of infrastructure in 10% villages of the entire project at site. Inspection shall be carried out as per FQP. Sampling shall be as follows:

(a) 10% randomly selected villages
(b) All districts and all turnkey contractors shall be covered.
(c) Electrified as well as un-electrified villages will be covered.
(d) The sample should include villages covering the entire area in the district.
(e) At least one New substation.
(f) At least one Augmentation of Substation.

5.9.4.2 2nd Stage- After completion of 90% works in the village, as notified by the PQCC. Inspection shall be carried out as per FQP. Sampling shall be as follows:

(a) 50% randomly selected villages as per FQP, including 10% villages inspected in the 1st stage.
(b) All districts and all turnkey contractors shall be covered.
(c) Electrified as well as un-electrified villages will be covered.
(d) The sample should include villages covering the entire area in the district.
(e) All New substations.
(f) 50 % Augmentation substations.
(g) 100% verification of BPL connections in 10% of villages inspected i.e. 5% villages and in each of the remaining villages inspected i.e. in 45%

villages, at least 5 BPL connections shall be verified randomly selected from the list of connections provided till the date of inspection.

5.9.5 Wherever works carried out are found unsatisfactory, compliance with respect to rectification shall be submitted by PIA to TPIA and RQCC and the same may be re-inspected by TPIA, if required. Recurrent adverse reports about quality of works in any project will entail withholding of release of funds.

5.10 The turn-key contractor shall make necessary arrangements at site for checking of earth-resistance, conductor size, route-length etc.

5.11 PQCC shall submit a monthly report to RQCC about the progress and quality-checks carried-out.

## Section : 6.0 Tier-II QUALITY CONTROL METHODOLOGY

6.1 REC shall be responsible for tier II quality control. REC shall nominate a General Manager level executive as REC quality control coordinator (RQCC). RQCC shall be the Nodal Officer of REC and shall be responsible for ensuring compliance of Quality Control Manual.

6.2 REC may out-source the work of quality checks & inspections of Tier-II

6.3 Quality Assurance by REC Quality Monitors shall be undertaken in the following areas of the project implementation:-

a) Quality of material/equipment being supplied.
b) Quality of works in the field.
c) BOQ verification
d) VIP references/complaints received by REC relating to quality of works

**6.4 Quality of material/equipment**

Based on the information given by the PIA Quality Control Coordinator (PQCC), REC Quality Control Coordinator (RQCC) shall deploy its' representatives for pre-shipment inspection at the manufacturers' works on sample-basis. Major equipment like transformers/poles/conductor/meter shall be inspected at manufacturer's works on sample basis. RQCC shall witness the inspection of material in line with MQP.

6.5 **Quality of works in the field**

6.5.1 RQCC shall depute its representatives for inspection in the field.

**Stages and scope of Inspection:**

6.5.1.1 1st Stage- On completion of 30 to 50% works of the entire project at site. Inspection shall be carried out as per FQP. Sampling shall be as follows:

(a) 5% randomly selected villages
(b) All districts and all turnkey contractors shall be covered.
(c) Electrified as well as un-electrified villages will be covered.
(d) The sample should include villages covering the entire area in the district.
(e) At least one New substation.
(f) At least one Augmentation of Substation.

**6.5.1.2** 2nd Stage- After completion of 90% works in the village, as notified by the PQCC after completion of TPIA inspection. Inspection shall be carried out as per FQP. Sampling shall be as follows:

1. 10% randomly selected villages, including 5% villages inspected in the 1st stage.
2. All districts and all turnkey contractors shall be covered.
3. Electrified as well as un-electrified villages will be covered.
4. The sample should include villages covering the entire area in the district.
5. 25 % (at least one) New substations including substation inspected in Stage-I.
6. 5 % (at least one) Augmentation substations including substation inspected in Stage-I.
7. 100% verification of BPL connections in 25% of villages inspected i.e. 2.5% villages and in each of the remaining villages inspected i.e. 7.5% villages, at least 5 BPL connections shall be verified on randomly selected from the list of connections provided till the date of inspection.

Quality of works shall be verified with reference to FQP. Reports of Field Quality checks may be supported by photographs.

6.6 Wherever works carried out are found unsatisfactory, compliance with respect to rectification shall be submitted by PIA to RQCC and the same may be re-inspected by RQM if required. Recurrent adverse reports about quality of works in any project will entail withholding of release of funds.

6.7 VIP references/complaints received by REC relating to quality of works/non completion of works etc. shall be taken up for verification by RQCC & if required, shall issue necessary instruction to PQCC to attend to the rectifications required. PQCC shall get rectifications done within 30 days & submit a certificate for the same to RQCC.

**Section : 7.0 Tier-III QUALITY CONTROL METHODOLOGY**

7.1 MOP shall engage independent evaluators for evaluation and random quality checks on supply and erection. They shall be designated as National Quality Monitors (NQM).

7.2 **Scope of works in the field**

- 1% randomly selected villages as per FQP.
- At least one New substation.
- At least one Augmentation substations.
- 100% BPL service connection verification in 50% of villages inspected i.e 0.5 % villages and in the remaining 0.5% villages at least 5 BPL connections shall be verified on randomly selected from the list of connections provided till the date of inspection.

7.3 The inspection frequency shall be as follows:

- As and when required by MOP.

7.4 Wherever works carried out are found unsatisfactory, compliance with respect to rectification shall be submitted by PIA to RQCC duly verified/endorsed by TPIA and the same may be re-inspected by RQM/NQM if required. Recurrent adverse reports about quality of works in any project will entail withholding of release of funds.

**Section : 8.0 PROCEDURE FOR IMPLEMENTATION OF THREE TIER QC MECHANISM**

8.1. PIA shall first nominate its PQCC who shall be nodal point for all agencies regarding Quality Control and inform RQCC that PQCC had been nominated alongwith his telephone nos., mobile nos, Fax nos. and E-Mail id for contact.

8.2. PQCC shall form his team for Quality Control and inform RQCC and Turnkey contractor about his team.

8.3. PQCC shall forward monthly progress report on Quality Control to RQCC as per FORMAT-E enclosed.

**8.4.** PQCC shall finalize MQP and FQP and forward a copy to his Quality Control team and RQCC

**8.5. Material Inspection**

8.5.1. Turnkey Contractor shall inform to PQCC regarding raw material and in process inspections and it is the responsibility of PQCC that all stage, raw material and in process inspections as listed in MQP shall be carried out in presence of representative of PQCC.

8.5.2. Program for inspections of finished product for Routine, Type and Acceptance tests shall be furnished by Turnkey Contractor to PQCC well in advance at least 10 days before the schedule date of inspection and the same shall confirmed by PQCC to RQCC with the complete address, mobile nos of contact person. PQCC shall depute its representative. It shall be ensured by PQCC that all tests shall be carried out in presence of representative of PQCC.

8.5.3. TPIA shall ensure presence of their qualified representative during 10% inspections either at manufacturer's premises or at independent laboratories**.**

8.5.4. RQCC may send his representative based on random sampling basis. In case, RQCC is not able to send his representative, inspections shall be carried out as scheduled in presence of representative of PQCC and TPIA.

8.5.5. All routine, type and acceptance tests records of various equipment/material shall be available with PQCC for each contract. The tests records may be reviewed by NQM if required. PQCC and Turnkey Contractor shall ensure that it shall be possible to trace out the equipment/material with respect to its tests records. PQCC and Turnkey contractors shall formulate detailed procedure in respect to this.

8.5.6. RQCC and NQM may demand the tests records of any material during village/substation inspection and that time PQCC representative should arrange the tests records of these equipment and furnish them to NQM/RQCC within two weeks.

**8.6. FLOW CHART FOR PRE DESPATCH INSPECTIONS**

| | |
|---|---|
| Step-I | Issue of inspection call by contractor 10 days in advance to PQCC. |
| Step-II | PQCC informs to TPIA/RQCC by E-mail/FAX/Telephone |
| Step-III | PQCC deputes its representative to manufacturer works. |
| Step-IV | RQCC/TPIA deputes its representative to manufacturer works on random selection basis. |
| Step-V | Inspections carried out as scheduled without waiting of representative of TPIA/RQCC. |
| Step-VI | Material shall be cleared by PQCC or his authorized representative for dispatch. |
| Step-VII | Records of inspections shall be submitted to PQCC. |

**8.7. FIELD INSPECTION**

8.7.1. Contractor shall fill the Format-A, Format-B and Format-C as enclosed in Annexure and may get verified by representative of PIA/TPIA/RQM/NQM whoever be available.

8.7.2. Inspection by TPIA shall be as per clause no. 5.9.5 of this manual.

8.7.3. Inspection by REC quality monitors (RQM) shall be as per clause no 6.5.1 of this manual.

8.7.4. Inspection by NQM shall be as per Clause no. 7.2 of this manual.

8.7.5. Inspecting agency TPIA/RQM/NQM shall give the report of their inspection as per FORMAT-D enclosed in Annexure.

**8.8.** VIP references/complaints received by REC relating to quality of works/non completion of works etc. shall be taken up for verification by RQCC & if required, shall issue necessary instruction to PQCC to attend to the rectifications required. PQCC shall get rectifications done within 30 days & submit a certificate for the same to RQCC.

**Section : 9.0**

## 9. INFORMATION FLOW PROCEDURE

9.1. Turnkey Contractor shall furnish all records of Quality of material/equipment and inspection report of Field checks performed during execution/installation by him to PQCC. The record must include at least followings:

a) Manufacturing Quality Plans (MQP) of equipment/material
b) FQP
c) List of sub-vendors
d) Acceptance tests report of equipment
e) Type tests reports of equipment
f) Routine tests reports of equipment
g) Field inspections reports as per FQP and in FORMAT-A, B and C

9.2. TPIA shall maintain the records of tests witnessed by them and furnish report in Fornmat-D. Any discrepancy shall be notified to PQCC. TPIA shall submit bi-monthly progress report and any other report as asked by PQCC.

9.3. PQCC shall submit monthly progress report regarding Quality to RQCC in the FORMAT No.-E as enclosed.

9.4. RQCC shall submit monthly progress report regarding Quality to NQM in the FORMAT No.-E.

**Section : 10.0**

## 10. RESOLUTION OF DISPUTES

### 10.1. SETTLEMENT OF DISPUTES

10.1.1. Any dispute(s) or difference(s) arising out of or in connection with the different tier of inspection shall, to the extent possible, be settled amicably between the parties. Hierarchical structure shall be respected and decision of NQM shall be final and binding. Wherever NQM is not able to inspect during a dispute, RQCC decision shall be final and binding.

10.1.2. If any dispute or difference of any kind whatsoever shall arise between the PIA and the Contractor, arising out of the Contract for the Quality of the Works after inspection of TPIA or RQCC or NQM, whether during the progress of the Works or after its completion or whether before or after the termination, abandonment or breach of the Contract, it shall in the first place, be referred to and settled by PIA within 30 days.

## Section : 11.0 GUIDELINES FOR QUALITY CONTROL DURING CONSTRUCTION

**11.1** **Documents required** - The supervision and inspection shall be carried out based on the following documents to be provided by the project implementing agency (PIA) :-

**(i)** Approved route map with pole schedule.

**(ii)** Quality assurance plan agreed upon by the PIA and the executing agency (turnkey contractor)

**(iii)** Contract documents/Letter of award & special conditions of the contract

**(iv)** Technical specifications of the turnkey contract, for supply and erection of all equipment and materials.

**(v)** Sanctioned detailed project report (DPR) for the project district with all revisions/ modifications.

**(vi)** Relevant drawings/ blue prints, area distribution maps and schematic diagrams.

**(vii)** REC Specifications and Construction Standards – [*CD available at REC for sale*]

**(viii)** Booklet of the Amendments to REC Specification and Construction Standards – [*available at REC and also on the CD* ]

**(ix)** Indian Electricity Rules (IER) [*pl. see http:// powermin.nic.in <Electricity Act 2003> < Rules under Act*.]

**(x)** L2 network/barchart/PERT network

**11.2** **PROJECT MONITORING & SUPERVISION**

**11.2.1** **Physical verification:** Physical verification has to be carried out in project villages, in each sanctioned project, in which electrification works & BPL services have been reported by the PIA to have been completed or carried out.

**11.2.2** **Monitoring teams:** The project is to be monitored by a dedicated monitoring team. The verification will be based on the village wise progress reported which will be provided periodically at the end of each month by PIA.

**11.2.3** **Monitoring Report of the Third Party Agency**

The third party inspection agency will report the progress & quality of works as per the Monitoring & Inspection Report Formats provided in these guidelines. These formats cover the following:

1. Project Parameter
2. Highlights of major project monitoring observations of the project
3. Village snap shots of each village visited covering
   - **(i)** Physical performance in the village
   - **(ii)** Workmanship and construction standards
   - **(iii)** Quality of materials & equipment in the village
   - **(iv)** Adherence to Indian Electricity Rules
   - **(v)** Photographs of deficiencies & defects requiring rectification in the village

11.2.4 Based on the report & recommendations of the TPIA/RQCC/NQM/PQCC, all discrepancies and defects noted in the progress report shall be rectified and set right within one month of submission of the report to PIA . A confirmation to this effect will be sent by PIA to PQCC with copy endorsed to RQCC, New Delhi for information and to ZM/CPM of concerned REC Project Office.

11.2.5 The TPIA/ RQM/ NQM team may re-visit if required, those areas / villages where rectification has been carried out by the turnkey contractor, within one month of confirmation from the PIA that necessary corrections have been made and that turnkey contractor has taken remedial action and defects observed had been rectified.

## 11.3 SUPERVISION OF QUALITY OF MATERIAL USED & WORKS EXECUTED AND CONSTRUCTION STANDARDS ADOPTED DURING CONSTRUCTION.

11.3.1 **SUPERVISION -** The supervision & inspection of quality of materials & equipment used and works executed and construction standards adopted during construction, should be guided by the relevant portions/ sections of following guidelines and documents in the sequence they are mentioned hereunder, for the type of works being undertaken as per the turnkey contract:-

- **(i)** Approved Drawings.
- **(ii)** The technical specifications, of the turnkey contract, for supply and erection of all equipment and materials, including the scope of works etc.
- **(iii)** REC Specifications & Construction Standards and amendments to REC Specification and Construction Standards, IS specifications
- **(iv)** Indian Electricity Rules (IER)

**11.3.2** The monitoring/supervising team of the TPIA/PQCC/RQCC/NQM should be familiar with specifications of the materials and equipment to be erected/ installed as per the contract.

The important REC specifications for major & key material/ equipments and the relevant IS standards/ specifications their code numbers generally applicable to projects being implemented under the RGGVY scheme, which need to be kept in consideration during the course of monitoring/ supervision/ inspection are detailed in Table-I below [to be read in conjunction with the relevant construction standard]: -

**11.4 ADHERENCE TO INDIAN ELECTRICITY RULES (IER)**

The implementing agency shall adhere to the conditions stipulated in the relevant sections of Indian Electricity Rules, 1956 (as amended upto November. 2000 and subsequent amendments if any) in regard to construction, erection and commissioning of electric supply lines (overhead and underground) as well installations, systems and equipment, apparatus etc for generation, transmission, supply and use of electrical energy as per the purpose and objects of the Indian Electricity Act.

**Appendix –I**

**List of Equipment/material which should have MQP**

| S.No. | Equipment/material |
|---|---|
| 1. | Cable (Power/control/Aerial Bunched) |
| 2. | Transformers |
| 3. | Insulators (Disc/Pin/Post) |
| 4. | Conductors |
| 5. | CT/PTs |
| 6. | Vacuum Circuit Breaker |
| 7. | Isolator/AB Switch |
| 8. | Surge/Lightening Arrestor |
| 9. | HG/DO Fuse set |
| 10. | LT Distribution BOX |
| 11. | PSC/RCC Poles |
| 12. | Battery Chargers |
| 13. | ACDB/DCDBs |
| 14. | Energy Meters |

**Note:- Above List shall be updated by PIA as and when required.**

**TABLE-I** **EQUIPMENT SPECIFICATIONS**

| Sl. No. | Particulars | REC Code | BIS code |
|---|---|---|---|
| **A.** | **Pre-stressed cement concrete poles [PCC]** | | |
| 1 | For 11 KV and LT overhead lines | 15/1979 | IS: 1678/2905/7321 |
| 2 | For 33 KV overhead lines | 24/1987 | IS: 1678/2905/7321 |
| 3 | High tensile steel wires for PCC poles | 62/1993 | IS: 6003 or 1785 |
| **B.** | **Bare conductors, insulated cables & wires** | | |
| 1 | Bare Conductors – ACSR & AAC | 1/1993 | IS: 398 |
| 2 | Bare Conductors – AAAC | 33/1994 | IS: 398 |
| 3 | Aerial bunched cables (ABC) for 11 KV lines | 64/1993 | IS: 7098/8130/ 398/ ST-3 of IEC 502 |
| 4 | 11 KV XLPE cables | 63/1993 | IS: 7098/8130 |
| 5 | Aerial bunched cables (ABC) for LT lines–1.1 KV | 32/1984 | IS: 10810/8130/6474/ 398 |
| 6 | PVC insulated LT cables for LT services & DTs-1.1KV | 26/1983 | IS: 694/4288/1554 |
| 7 | PVC insulated LT cables with embedded bearer wire for LT services -1.1KV | 27/1983 | IS: 694/4288/1554 |
| 8 | Galvanised iron wires | 45/1988 | IS: 280/7887/4826 |
| 9 | Galvanised iron stay wires | 46/1988 | IS: 2141/4826/6594/ |
| **C.** | **Distribution & Power transformers** | | |
| 1 | 11 KV/433-250 volts for 16 & 25 KVA with amorphous metal core | 70/1993 | IS: 1180/2026 |
| 2 | Single phase distribution transformers (P to N) & (P to P) | 78/2007 & Amd.-I | IS: 1180/2026 |
| 3 | Transformer oil for power & distribution transfr. | 39/1993 | IS: 335/1866 |
| 4 | 33/11 KV step-down power transformers | 7/1993 | IS: 2026/2099/3347 |
| 5 | On load tap changers for 33/11 KV transformers | 17/1981 | IS: 8468/2026 |
| **D.** | **Insulators & fittings** | | |
| 1 | Porcelain insulators & fittings for 11 KV O/h lines | 3/1993 | IS: 731/3188/2486 |
| 2 | Preformed helically formed fittings | 25/1983 | IS: 12048/2486/2004 |
| 3 | Porcelain insulators & fittings for LT O/h lines | 4/1979 | IS: 1445/7935/1445/ 7935 |
| 4 | Porcelain insulators & fittings for 33 KV O/h lines | 13/1979 | IS: 731/2486 |
| 5 | Composite insulators | 77/2007 | |

| Sl. No. | Particulars | REC Code | BIS code |
|---|---|---|---|
| **E.** | **Circuit breakers, Lightning Arrestors, isolators switches, CT/PT etc** | | |
| 1 | 11 KV vacuum circuit breakers | 22/1983 & Amnd.-I | IS: 13118/3156/ 2705 |
| 2 | 11 KV auto reclosers | 38/1987 | IS: 2516/2705/ ANSI IEEE C37.60 |
| 3 | 11 KV lightning arrestors | 10/1976 | IS: 3070 |
| 4 | 11 KV drop out fuse cutouts for DTs | 53/1987 | IS: 9385/2633/1364 |
| 5 | 11 KV air-break switches | 43/1987 | IS: 9920 |
| 6 | 33 KV vacuum circuit breakers | 12/1993 & Amnd.-I | IS: 13118/3156/2705 |
| 7 | 33 KV lightning arrestors | 16/1981 | IS: 3070 |
| 8 | 33 KV switch isolators | 52/1987 | IS: 9920/2544/5350/ 4736/ 1161 |
| 9 | 33 KV load break switches | 54/1993 | IS: 9920/5561/4736/ 1161 |
| 10 | LT circuit breakers | 18/1983 | IS: 2516 |
| 11 | Miniature circuit breaker (MCB) | 61/1993 | IS: 8828 |
| 12 | 11 KV current transformers | 59/1993 | IS: 2705 |
| 13 | 11 KV voltage transformers | 60/1993 | IS: 3156 |
| 14 | Danger Boards | 57/1993 | IS: 5/2551/8709 |
| 15 | Ni-Cd. Battery & Battery Chargers for 33kV S/S | 34/2008 | |

# ANNEXURE - I
# FORMATS

| | | | | |
|---|---|---|---|---|
| | | | | **FORMAT-A** |
| **Format For Field Quality For Village With All Associated Hamlets/Mauza/Dhani/Thanda Etc. ( To Be Filled By Contractor)** | | | | |
| Site Inspection Report | | | Report No. | |
| Site Inspection Was Carried Out On | | | Report Date | |
| Project Details | | | | |
| Contractor | | | | |
| Block | | | | |
| Village With All Associated Hamlets/Mauza/Dhani/Thanda Etc. | | | | |
| Census Code | | | | |
| **Sl. No.** | **Applicable Standard/Manual** | **Item/Job Description** | **Confirm Compliance** | **Deviations/ Corrective Actions** |
| | | | | |
| A1- LT & 11kV Lines A1-POLES | | | | |
| 1 | REC Construction Manual and Standards | Pole-Concreting wherever applicable | Yes/NO | |
| 2 | REC Construction Manual and Standards | Base Plate | Yes/NO | |
| 3 | REC Construction Manual and Standards | Earthing | Yes/NO | |
| 4 | REC Construction Manual and Standards | Numbering, Anti-climbing, devices & Danger Plate for DT pole & wherever applicable | Yes/NO | |
| A2-POLE ACCESSORIES & HARDWARES | | | | |
| 1 | REC Construction Manual and Standards | Mounting of Pole-Hardware's & accessories | Yes/NO | |
| A3-STAY SET Yes/NO | | | | |
| 1 | REC Construction Manual and Standards | Provision as per contract and standards | Yes/NO | |
| 2 | REC Construction Manual and Standards | Proper Tightening | Yes/NO | |
| 3<br>REC Construction Manual and Standards<br>Stay Set, Turn buckle & concreting -proper installation<br>Yes/NO<br>A4-JUMPERING | | | | |
| 1 | | P.G. Clamps-provision & proper installation | Yes/NO | |
| B. DISTRIBUTION TRANSFORMER | | | | |
| 1 | REC Construction Manual and Standards | a. Mounting | Yes/NO | |

| | | | | |
|---|---|---|---|---|
| 2 | REC Construction Manual and Standards | b.Termination through bi-mettalic clamps | Yes/NO | |
| 3 | REC Construction Manual and Standards | c.Jumpering | Yes/NO | |
| 4 | REC Construction Manual and Standards | d.Earthing | Yes/NO | |
| 5 | REC Construction Manual and Standards | Pre-commissioning checks | Yes/NO | |
| C- TPMO/GO/AP SWITH | | | | |
| 1 | REC Construction Manual and Standards | Earthing & switch operation | Yes/NO | |
| 2 | REC Construction Manual and Standards | Jumpering from TPMO switch to drop out fuse for Trf. | Yes/NO | |
| D-METERING DISTRIBUTION LT PANEL /SERVICE CONNECTION Yes/NO | | | | |
| 1 | REC Construction Manual and Standards | Termination of LT cable, Bearer wire and support at house | Yes/NO | |
| | | Energy meter & earthing | Yes/NO | |
| 2 | REC Construction Manual and Standards | AB Cable with piercing connector | Yes/NO | |
| Signed By | | | | |
| Representative of Turnkey Contractor | | | | |
| Representative of PQCC if checked | | | | |
| Representative of TPIA /RQM/NQM if checked | | | | |

| | | | | |
|---|---|---|---|---|
| | | | | **FORMAT-B** |
| **FORMAT FOR FIELD QUALITY OF SUBSTATIONS ( TO BE FILLED BY CONTRACTOR)** | | | | |
| | | | | |
| Site Inspection Report | | | Report No. | |
| Site Inspection Was Carried Out On | | | Report Date | |
| Inspecting Officer | | | | |
| Project Details | | | | |
| Contractor | | | | |
| Substation Location | | | | |
| Sl. No. | Rec Tech Specs | Item/Job Description | Confirm Compliance | Deviations/ Corrective Actions |
| 33kv/11kV Substation | | | | |
| 1 | REC Construction Manual and Standards | Earthing | Yes/NO | |
| 2 | REC Construction Manual and Standards | Civil Works | Yes/NO | |
| 3 | REC Construction Manual and Standards | Construction and general layout | Yes/NO | |
| 4 | REC Construction Manual and Standards | Safety clearances as per IE rule. | Yes/NO | |
| 5 | REC Construction Manual and Standards | Bimettalic terminal connecters for transformer connections | Yes/NO | |
| 6 | REC Construction Manual and Standards | Operation | Yes/NO | |
| Signed By | | | | |
| Representative of Turnkey Contractor | | | | |
| Representative of PQCC if checked | | | | |
| Representative of TPIA /RQM/NQM if checked | | | | |

| | | | | |
|---|---|---|---|---|
| | | | | **FORMAT-C** |
| **CONTRACTOR's FORMAT BOQ FOR VILLAGES with all associated Hamlets/Mauza/Dhani/Thanda etc. ( TO BE FILLED BY CONTRACTOR)** | | | | |
| SITE INSPECTION REPORT | | | REPORT NO. | |
| SITE INSPECTION WAS CARRIED OUT ON | | | REPORT DATE | |
| PROJECT DETAILS | | | | |
| CONTRACTOR | | | | |
| BLOCK | | | | |
| VILLAGE | | | | |
| CENSUS CODE | | | | |
| **S.No.** | **Name of material/Items** | **Unit** | **Provision as per Approved drg.** | **Quantity at site** |
| (i) | | | | |
| | PCC Poles | | | |
| | a) Single Pole | | | |
| | 1. 8.5 Meter | No. | | |
| | 2. 9.5 Meter | No. | | |
| | 3. 11.0 Meter | No. | | |
| | 4. Strut Pole | No. | | |
| | b) Double Pole | | | |
| (ii) | LT & 11 KV Conductor | | | |
| | length (ACSR/AAAC/ | | | |
| | Length | | | |
| | a) Main Line & Size | Mtr./mm | | |
| | b) Spur Line & Size | Mtr./mm | | |
| (iii) | LT Cable Length | Mtr. | | |
| (iv) | Insulator (11 KV) | | | |
| | a) Disc. | No. | | |
| | (b)Pin | No. | | |
| | Insulator (LT) | | | |
| | a) Disc. | No. | | |
| | (b)Pin | No. | | |
| (v) | Ligthening arrester | No. | | |
| (vi) | Distribution Transfm. | | | |
| | a) 10 kVA | No. | | |
| | b)16 kVA | No. | | |
| | c) 25 kVA | No. | | |
| (vii) | Stay set | No. | | |
| (viii) | Service connections | No. | | |
| Signed By | | | | |
| Representative of Turnkey Contractor | | | | |
| Representative of PQCC if checked | | | | |
| Representative of TPIA /RQM/NQM if checked | | | | |

| | | | | |
|---|---|---|---|---|
| | | | | **FORMAT-D** |
| **Inspection Format For TPIA/RQM/NQM** | | | | |
| Site Inspection Report No. | | | | |
| Site Inspection Was Carried Out On/ Report Date | | | | |
| Inspecting Agency<br>Inspecting Officer<br>Project Details<br>Contractor<br>Block<br>Village<br>Census Code<br>Discom's Representative<br>Contractor | | | | |
| **Sl. No.** | **Reference Document** | **Item/Job Description** | **Whether Meet Construction Standard** | **Deviations/ Corrective Actions** |
| 1 | Quality Control Manual | LT & 11kV Lines-POLE ERECTION | YES/NO | |
| 3 | Quality Control Manual | 11kV Line Erection | YES/NO | |
| 4 | Quality Control Manual | Earthing | YES/NO | |
| 5 | Quality Control Manual | DISTRIBUTION TRANSFORMER -installation | YES/NO | |
| 6 | Quality Control Manual | TPMO/GO/AB switch -operation | YES/NO | |
| 7 | Quality Control Manual | METERING -DT/LT PANEL /SERVICE CONNECTION | YES/NO | |
| 8 | Quality Control Manual | Substation Erection-Transformer, VCB, CT/PT, C&R Panel, Battery and Control Room | YES/NO | |
| | | | | |
| 9 | DPR/Contract Document | BOQ Verification | YES/NO | |
| Signed By | | | | |
| DISCOM<br>CONTRACTOR | | | | REC/NQM |
| | PQCC | M/s | | RQM/NQM |

| | | | | |
|---|---|---|---|---|
| | | | | **FORMAT-E** |
| **Monthly Quality Control Report** | | | | |
| Discom | | | | |
| Project Details | | | | |
| Contractor | | | | |
| Sl. No. | Name Of Village | Name Of District/Block | Census Code | Whether Comply The Quality Control Manual |
| 1 | | | | |
| 2 | | | | |
| 3 | | | | |
| 4 | | | | |
| 5 | | | | |
| 6 | | | | |
| 7 | | | | |
| 8 | | | | |
| Signed By | | | | |
| DISCOM | | CONTRACTOR | | |
| PQCC | | | | |

# ANNEXURE - II

# FQP

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | FIELD QUALITY PLAN-- CONDUCTOR, EARTH WIRE & AB CABLE ERECTION (HT &LT) | | | | | |
| | | | | | Item: CONDUCTOR, EARTH WIRE & AB CABLE (HT & LT) | | | | | |
| Contractor/Sub Contractor/ Agency Name & Address: | | | | | | | | | | |
| | | | | | SYSTEM: CONDUCTOR, EARTH WIRE & AB CABLE | | | | | |
| | | | | | | | | | | |
| SUB-SYSTEM: 1 CONDUCTOR(AAAC,AAC,ACSR) ERECTION | | | | | | | | | | |
| SL.NO | MAIN ACTIVITY& OPERATION | CHARAC-TERISTICS/ INSTRU-MENTS | CLASS OF CHECK | TYPE OF CHECK | QUANTUM OF CHECK - CONTRAC-TOR/PQCC | QUANTUM OF CHECK - TPIA/REC/ NQM | REFERENCE DOCUMENT | ACCEPTANCE NORMS | FORMAT OF RECORD | RE MARKS |
| 1 | RECEIPT AND STOR-AGE | 1) RECEIPT AT STORES | C | VISUAL CHECK | 100% | RANDOM | DELIVERY CHLLAN | CORRELATION OF THE LOT RECEIVED WITH THE DELIVERY CHLLAN/MDCC DESCRIPTIONS | STORES REGISTER | COMPONENETS WHICH ARE INSPECTED AND CLEARED BY PIA SHALL ONLY BE ACCEPTED ON RECEIPT |
| | | 2) VISUAL INSPECTION | C | VISUAL CHECK | 100% | RANDOM | | DRUMS FOUND DAMAGED DURING TRANSIT ARE STACKED SEPARATELY | STORES REGISTER | |
| | | 3) STORAGE | C | VISUAL CHECK | 100% | RANDOM | STANDARD PRACTICE | DRUMS ARE STORED ON HARD SURFACE AREA | STORES REGISTER | |
| 2 | ERECTION OF CON-DUCTOR | 1) HAN-DLING OF THE CON-DUCTOR | C | VISUAL | 100% | RANDOM | UTILITY SPEC-IFICATION or AS PER ACCEPTANCE NORMS | CONDUCTOR SHOULD NOT BE DRAGGED ON THE GROUND | | SCRATCHES OR DAMAGES TO THE STRANDS WOULD OCCUR IF NOT HANDLED PROP-ERLY |
| | | 2) SE-QUENCE OF CONDUC-TOR EREC-TION | C | VISUAL | 100% | RANDOM | UTILITY SPEC-IFICATION or AS PER ACCEPTANCE NORMS | SEQUENCE OF RUNNING OUT SHALL BE FROM TOP TO BOTTOM, i.e.. THE TOP CONDUCTOR SHALL RUN OUT FIRST, FOLLOWED BY THE SIDE CONDUCTORS | | |

| SL.NO | MAIN ACTIVITY& OPERATION | CHARAC-TERISTICS/ INSTRU-MENTS | CLASS OF CHECK | TYPE OF CHECK | QUANTUM OF CHECK - CONTRAC-TOR/PQCC | QUANTUM OF CHECK - TPIA/REC/ NQM | REFERENCE DOCUMENT | ACCEPTANCE NORMS | FORMAT OF RECORD | RE MARKS |
|---|---|---|---|---|---|---|---|---|---|---|
| | | 3) STRING-ING OF THE CONDUC-TORS | C | VISUAL | 100% | RANDOM | UTILITY SPEC-IFICATION or AS PER ACCEPTANCE NORMS | ANY DAMAGES TO THE STRANDS SHALL BE RE-PAIRED WITH REPAIR SLEEVES | | |
| | | 4) MID SPAN JOINTING | B | VISUAL | 100% | RANDOM | UTILITY SPEC-IFICATION or AS PER ACCEPTANCE NORMS | COMPRESSION TYPE NOT MORE ONE JOINT PER SUB CONDUCTOR PER SPAN | | ALL JOINTS AND SPLICES SHOULD BE 15 METERS AWAY FROM THE POLE |
| | | 5) BIND-ING THE CONDUC-TOR TO THE INSULATOR | C | VISUAL | 100% | RANDOM | UTILITY SPEC-IFICATION or AS PER ACCEPTANCE NORMS | AS PER THE REC SPECIFICA-TIONS | | |
| | | 6) EREC-TION AT ROAD CROSSINGS | B | VISUAL | 100% | RANDOM | UTILITY SPEC-IFICATION or AS PER ACCEPTANCE NORMS | GUARDING SHALL BE PRO-VIDED AT MAJOR CROSS-INGS | | THE GROUND CLEARANCES AT ROAD CROSS-INGS SHALL BE AS PER RELAVENT IE RULES |
| | | 7) ANTI-CLIMBLING DEVICES | B | VISUAL | 100% | RANDOM | UTILITY SPEC-IFICATION or AS PER ACCEPTANCE NORMS | APPROVED DRAWINGS | ss | |

| SL.NO | MAIN ACTIVITY& OPERATION | CHARAC-TERISTICS/ INSTRU-MENTS | CLASS OF CHECK | TYPE OF CHECK | QUANTUM OF CHECK - CONTRAC-TOR/PQCC | QUANTUM OF CHECK - TPIA/REC/ NQM | REFERENCE DOCUMENT | ACCEPTANCE NORMS | FORMAT OF RECORD | RE MARKS |
|---|---|---|---|---|---|---|---|---|---|---|
| | | 8) DANGER BOARDS | B | VISUAL | 100% | RANDOM | UTILITY SPEC-IFICATION or AS PER ACCEPTANCE NORMS | APPROVED DRAWINGS | | |
| 3 | TENSION-ING AND SAGGING | 1) MEA-SUREMENT OF SAG-GING | B | VISUAL | 100% | RANDOM | AS PER SAG-TENSION CHARTS | AS PER IE NORMS | | TENSIONING AND SAGGNG OPERA-TIONS ARE CARRIED IN CALM WEATHER, WHEN RAPID CHANG-ES IN TEMPERATURE ARE NOT LIKELY TO OCCUR |
| 4 | CLIPPING | 1) CLIPPING THE CON-DUCTOR IN POSITION | C | VISUAL | 100% | RANDOM | UTILITY SPEC-IFICATION or AS PER ACCEPTANCE NORMS | MANUFACTURER'S RECOMMENDATION | | |
| | | 2) JUMP-ERING AT SECTION AND ANGLE TOWERS | C | VISUAL | 100% | RANDOM | UTILITY SPEC-IFICATION or AS PER ACCEPTANCE NORMS | JUMPERS FORMED TO PARABOLIC SHAPE | | TO ENSURE MAXI-MUM CLEARANCE TO EQUIPMENT |

SUB-SYSTEM:2 ERECTION OF AERIAL BUNCHED CABLE

| SL.NO | MAIN ACTIVITY& OPERATION | CHARAC-TERISTICS/ INSTRU-MENTS | CLASS OF CHECK | TYPE OF CHECK | QUANTUM OF CHECK - CONTRAC-TOR/PQCC | QUANTUM OF CHECK - TPIA/REC/ NQM | REFER-ENCE DOCUMENT | ACCEPTANCE NORMS | FORMAT OF RECORD | RE MARKS |
|---|---|---|---|---|---|---|---|---|---|---|
| 4 | RECEIPT AND STOR-AGE | 1) RECEIPT AT STORES | C | VISUAL | 100% | RANDOM | DELIVERY CHLLAN/ MDCC | CORRELATION OF THE LOT RECEIVED WITH THE DELIVERY CHLLAN/ MDCC DESCRIPTIONS | STORES REGISTER | COMPONENETS WHICH ARE INSPECTED AND CLEARED BY PIA SHALL ONLY BE ACCEPTED ON RECEIPT |
| | | 2) VISUAL INSPECTION | C | VISUAL | 100% | RANDOM | | DRUMS FOUND DAM-AGED DURING TRANSIT ARE STACKED SEPA-RATELY | STORES REGISTER | |
| | | 3) STORAGE | C | VISUAL | 100% | RANDOM | STANDARD PRACTICE | DRUMS ARE STORED ON HARD SURFACE AREA | STORES REGISTER | |
| 5 | FIXING OF EYE HOOK AND SUS-PENSION / DEAD END CLAMPS | A) EYE HOOK WITH POLE THROUGH BOLT | | | | | | | | |
| | | 1) CHECK THE THREAD-INGS OVER THE THROUGH BOLT | C | VISUAL | 100% | RANDOM | UTILITY SPECIFICA-TION or AS PER AC-CEPTANCE NORMS | AS PER APPROVED DRAWING | SITE REGIS-TER | |
| | | 2) FIX THE THROUGH BOLT INTO THE POLE | C | VISUAL | 100% | RANDOM | UTILITY SPECIFICA-TION or AS PER AC-CEPTANCE NORMS | APPROVED DRAWING | SITE REGIS-TER | |



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| SL.NO | MAIN ACTIVITY& OPERATION | CHARAC-TERISTICS/ INSTRU-MENTS | CLASS OF CHECK | TYPE OF CHECK | QUANTUM OF CHECK - CONTRAC-TOR/PQCC | QUANTUM OF CHECK - TPIA/REC/ NQM | REFER-ENCE DOCUMENT | ACCEPTANCE NORMS | FORMAT OF RECORD | RE MARKS |
|---|---|---|---|---|---|---|---|---|---|---|
| | | 3) CHECK THE ALIGN-MENT OF BOLT WITH THE POLE | C | VISUAL | 100% | RANDOM | UTILITY SPECIFICA-TION or AS PER AC-CEPTANCE NORMS | AS PER APPROVED DRAWING | SITE REGIS-TER | |
| | | B) EYE HOOK WITH EYE HOOK CLAMP | | | | | | | | |
| | | 1) CHECK THE DIMEN-SIONS OF THE CLAMP AND FIX THE CLAMP TO THE POLE | C | VISUAL | 100% | RANDOM | UTILITY SPECIFICA-TION or AS PER AC-CEPTANCE NORMS | AS PER APPROVED DRAWING | SITE REGIS-TER | |
| | | 2) CHECK THE ALIGN-MENT OF CLAMP WITH THE POLE | C | VISUAL | 100% | RANDOM | UTILITY SPECIFICA-TION or AS PER AC-CEPTANCE NORMS | AS PER APPROVED DRAWING | SITE REGIS-TER | THE CLAMP SHOULD BE EXACTLY PERPENDICU-LAR TO POLE |
| | | C) CHECK THE ALIGN-MENT OF THE EYE HOOKS ALONG THE LINE | C | VISUAL | 100% | RANDOM | STANDARD PRACTICE | HOOKS SHALL BE ERECTED AT SAME ELEVATION | SITE REGIS-TER | WHERE EVER HOOKS ARE MISALIGNED THERE SHOULD BE REPLACED BEFORE CONDUCT RING |

| SL.NO | MAIN ACTIVITY& OPERATION | CHARAC-TERISTICS/ INSTRU-MENTS | CLASS OF CHECK | TYPE OF CHECK | QUANTUM OF CHECK - CONTRAC-TOR/PQCC | QUANTUM OF CHECK - TPIA/REC/ NQM | REFER-ENCE DOCUMENT | ACCEPTANCE NORMS | FORMAT OF RECORD | RE MARKS |
|---|---|---|---|---|---|---|---|---|---|---|
| | | D) FIXING OF SUS-PENSION CLAMS / DEAD END CLAMPS | C | VISUAL | 100% | RANDOM | UTILITY SPECIFICA-TION or AS PER AC-CEPTANCE NORMS | AS PER APPROVED DRAWING | SITE REGIS-TER | |
| 6 | ERECTION OF CABLE | 1) HAN-DLING OF THE CABLE | C | VISUAL | 100% | RANDOM | UTILITY SPECIFICA-TION or AS PER AC-CEPTANCE NORMS | CABLE SHOULD be care-fully handled to avoid any damage | | CABLE SURFACE SHALL BE FREE FROM FAULTS, FLAWS e.t.c |
| | | 2) SE-QUENCE OF CABLE ERECTION | C | VISUAL | 100% | RANDOM | UTILITY SPECIFICA-TION or AS PER AC-CEPTANCE NORMS | SEQUENCE OF RUN-NING OUT SHALL BE FROM TOP TO BOTTOM, i.e.. THE TOP CABLE SHALL RUN OUT FIRST, FOLLOWED BY THE SIDE CABLES | | |
| | | 3) FIX THE MESSEN-GER WIRE OF AB CABLE TO CLAMPS (SUSPEN-SION/ DEAD END CLAMP) | C | VISUAL | 100% | 10% | UTILITY SPECIFICA-TION or AS PER AC-CEPTANCE NORMS | PIA SPECIFICATION/ AS PER APPROVED DRAW-ING | | |
| | | 4) CHECK THE TIGHT-NESS OF CABLE WITH CLAMPS | C | VISUAL | 100% | RANDOM | UTILITY SPECIFICA-TION or AS PER AC-CEPTANCE NORMS | AS PER THE STANDARD PRACTICE | | |



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| SL.NO | MAIN ACTIVITY& OPERATION | CHARAC-TERISTICS/ INSTRU-MENTS | CLASS OF CHECK | TYPE OF CHECK | QUANTUM OF CHECK - CONTRAC-TOR/PQCC | QUANTUM OF CHECK - TPIA/REC/ NQM | REFER-ENCE DOCUMENT | ACCEPTANCE NORMS | FORMAT OF RECORD | RE MARKS |
|---|---|---|---|---|---|---|---|---|---|---|
| | | 5) CHECK THE GROUND CLEARANC-ES AFTER ERECTION OF THE AB CABLE | C | VISUAL | 100% | RANDOM | UTILITY SPECIFICA-TION or AS PER AC-CEPTANCE NORMS | AS PER IE RULES | | THE MINIMUM GROUND CLEARANCES SHOULD BE MAINTAINED |
| SUB-SYSTEM:3 ERECTION OF EARTH WIRE | | | | | | | | | | |
| 7 | RECEIPT AND STOR-AGE | 1) RECEIPT AT STORES | C | VISUAL CHECK | 100% | RANDOM | DELIVERY CHLLAN | CORRELATION OF THE LOT RECEIVED WITH THE DELIVERY CHLLAN | STORES REGISTER | COMPONENETS WHICH ARE INSPECTED AND CLEARED BY PIA SHALL ONLY BE ACCEPTED ON RECEIPT |
| | | 2) VISUAL INSPECTION | C | VISUAL CHECK | 100% | RANDOM | | THE SURFACE OF EARTH WIRE SHOULD BE FREE FROM FLAWS AND DUST | STORES REGISTER | |
| | | 3) STORAGE | C | VISUAL CHECK | 100% | RANDOM | STANDARD PRACTICE | EARTH WIRE SHOULD BE STORED IN DRY AREAS | STORES REGISTER | |
| 8 | ERECTION OF EARTH WIRE | 1) HAN-DLING OF THE EARTH WIRE | C | VISUAL | 100% | RANDOM | UTILITY SPECIFICA-TION or AS PER AC-CEPTANCE NORMS | Earth Wire should be care-fully handled to avoid any damage | | SCRATCHES OR DAM-AGES TO THE SURFACE WOULD OCCUR IF NOT HANDLED PROPERLY |

| SL.NO | MAIN ACTIVITY& OPERATION | CHARAC-TERISTICS/ INSTRU-MENTS | CLASS OF CHECK | TYPE OF CHECK | QUANTUM OF CHECK - CONTRAC-TOR/PQCC | QUANTUM OF CHECK - TPIA/REC/ NQM | REFER-ENCE DOCUMENT | ACCEPTANCE NORMS | FORMAT OF RECORD | RE MARKS |
|---|---|---|---|---|---|---|---|---|---|---|
| | | 2) EREC-TION OF EARTH KNOB | C | VISUAL | 100% | 10% | UTILITY SPECIFICA-TION or AS PER AC-CEPTANCE NORMS | SEQUENCE OF RUNNING OUT SHALL BE FROM TOP TO BOTTOM, i.e. THE TOP EARTH WIRE SHALL RUN OUT FIRST, FOLLOWED BY THE SIDE EARTH WIRES | | CHECK THE CLEARANCE BETWEEN EARTH KNOB AND PIN INSULATORS AND THE COMPONENTS SHALL BE ERECTED AS PER DRAWING AND AS PER SPEC |
| | | 3) STRING-ING OF THE EARTH WIRES | C | VISUAL | 100% | RANDOM | UTILITY SPECIFICA-TION or AS PER AC-CEPTANCE NORMS | ALL JOINTS SHALL BE COMPRESSION TYPE | | GROUND CLEARANCES SHOULD BE MAINTAINED |

CLASS OF CHECK:
A -- CRITICAL
B -- MAJOR
C-- MINOR

NAME/ SIGNATURE OF THE SUB-CONTRACTOR/ ERECTION AGENCY



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| PROJECT / UTILITY :<br>CONTRACT No.<br>CONTRACTOR :<br>PACKAGE: | STANDARD FIELDQUALITY PLAN FOR<br>Cable | ITEM :<br>SUB SYSTEM :<br>QAP NO. :<br>REV. NO.: | ERECTION WORK<br>CABLES |
|---|---|---|---|

| Sr. No. | CHARACTERISTICES / ITEMS | Type of Check | Instru-ments | Class | QUANTUM OF CHECK - CONTRAC-TOR/PQCC | QUANTUM OF CHECK - TPIA/REC/ NQM | Reference Documents & Acceptance Standard | "Format Of Records" | Remarks |
|---|---|---|---|---|---|---|---|---|---|
| | | DATE | | | | | | | |
| 1 | 2 | 3 | 4 | 5 | 6 | | 7 | 8 | 9 |
| 1 | RECEIPT & STORAGE | | | | | | | | |
| 1.1 | Receiving inspection (Completeness of documents, test certificates, etc.) | V | - | B | 100% | RANDOM | Delivery Challan | MRC | |
| 1.2 | Unloading | V | - | B | 100% | RANDOM | Instruction Manual | - | |
| 1.3 | Visual exmination | V | - | B | 100% | RANDOM | Packing list / Instruction Manual | - | |
| 1.4 | Proper storage | V | - | B | 100% | RANDOM | Instruction Manual/ IS: 1255 | - | |
| 1.5 | End Sealing ( Cable ends are sealed by PVC cap to avoid ingress of moisture ) | V | _ | B | 100% | RANDOM | IS: 1255 | Site Record | |
| 2 | PRE INSTALLATION | | | | | | | | |
| 2.1 | Unloading of Drums | | | | | | | | |
| A | Check for drum mounting - cable wheel/ jack | V | - | B | 100% | RANDOM | IS: 1255 | Site Record | |
| B | Check for cable unwinding - cable wheel/ jack | V | - | B | 100% | RANDOM | IS: 1255 | Site Record | |
| C | Check for proper unrolling - Cable Wheel/ Jack | V | - | B | 100% | RANDOM | IS: 1255 | Site Record | |
| D | Check for cable end sealing | V | - | B | 100% | RANDOM | IS: 1255 | Site Record | |
| 2.2 | Availability of bricks at site for buried cables | V | - | C | 100% | RANDOM | | Site Record | |
| 2.3 | Excavation of trench for U/G cable laying | V | - | C | 100% | RANDOM | UTILITY SPECIFICA-TION or AS PER AC-CEPTANCE NORMS | Site Record | |

| Sr. No. | CHARACTERISTICES / ITEMS | Type of Check | Instru-ments | Class | QUANTUM OF CHECK - CONTRAC-TOR/PQCC | QUANTUM OF CHECK - TPIA/REC/ NQM | Reference Documents & Acceptance Standard | "Format Of Records" | Remarks |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 | | 7 | 8 | 9 |
| 2.4 | Sand Cushioning for buried cables | V | - | C | 100% | RANDOM | | Site Record | |
| 2.5 | Ascertaining cable route and length | V | - | B | 100% | 10% | Cable Route | Site Record | |
| 2.6 | Conformity with cable schedule | V | - | B | 100% | RANDOM | Cable Schedule | Site Record | |
| 2.7 | Insulation resistance checking - Meggar ( 500 V for LT & 1000V for Cables upto 11kV) | Electrical | Meggar | A | 100% | 10% | IS: 1255 | Site Record | |
| 2.8 | Proper route maintaining during cable laying | V | - | B | 100% | RANDOM | Cable Route | Site Record | |
| 2.9 | identification and dressing of cables | V | - | B | 100% | RANDOM | standard Practice | Site Record | |
| 2.10 | Use of trefoil clamps for single core cables | V | - | B | 100% | RANDOM | standard Practice | Site Record | |
| 2.11 | Proper verticality of multicore cables | V | - | B | 100% | RANDOM | standard Practice | Site Record | |
| | | | | | | | | | |
| 3 | INSTALLATION | | | | | | | | |
| 3.1 | Removal of wooden planks from cable drum | V | - | B | 100% | RANDOM | UTILITY SPECIFICA-TION or AS PER AC-CEPTANCE NORMS | - | |
| 3.2 | Check cable is not dragged on hard ground | V | - | B | 100% | RANDOM | UTILITY SPECIFICA-TION or AS PER AC-CEPTANCE NORMS | - | |
| 3.3 | Check size of cable & cutting of cable length | V | - | B | 100% | 10% | UTILITY SPECIFICA-TION or AS PER AC-CEPTANCE NORMS | - | |
| 3.4 | Check the separation between different types of cables laid nearby. | V | - | B | 100% | RANDOM | UTILITY SPECIFICA-TION or AS PER AC-CEPTANCE NORMS | - | |

| Sr. No. | CHARACTERISTICES / ITEMS | Type of Check | Instru-ments | Class | QUANTUM OF CHECK - CONTRAC-TOR/PQCC | QUANTUM OF CHECK - TPIA/REC/ NQM | Reference Documents & Acceptance Standard | "Format Of Records" | Remarks |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 | | 7 | 8 | 9 |
| 3.5 | Check the laying of cables as per cable schedule. | V | - | B | 100% | RANDOM | UTILITY SPECIFICA-TION or AS PER AC-CEPTANCE NORMS | - | |
| 3.6 | Check the cable tray are earthed as per the drawing. | V | - | B | 100% | 10% | UTILITY SPECIFICA-TION or AS PER AC-CEPTANCE NORMS | - | |
| 3.7 | Check the cable glands, lugs, ferrules, cable tag/ marker are provided as per requirement. | V | - | B | 100% | 10% | UTILITY SPECIFICA-TION or AS PER AC-CEPTANCE NORMS | - | |
| 3.8 | Check the cable cable drum/ cable to be laid for any external damage. | V | - | B | 100% | RANDOM | UTILITY SPECIFICA-TION or AS PER AC-CEPTANCE NORMS | - | |
| 3.9 | Check the availability and functionality of the rollers. | V | - | B | 100% | RANDOM | UTILITY SPECIFICA-TION or AS PER AC-CEPTANCE NORMS | - | |
| 3.10 | Check there are no damage / twisting of cables during laying. | V | - | B | 100% | RANDOM | UTILITY SPECIFICA-TION or AS PER AC-CEPTANCE NORMS | - | |
| 3.11 | Check that cables are protected from the sharp bends while laying. | V | - | B | 100% | RANDOM | UTILITY SPECIFICA-TION or AS PER AC-CEPTANCE NORMS | - | |
| 3.12 | Check that the power cables are separated from the control cables. | V | - | B | 100% | RANDOM | UTILITY SPECIFICA-TION or AS PER AC-CEPTANCE NORMS | - | |
| 3.13 | Check the phase matching at both end after each joint. | V | - | B | 100% | RANDOM | UTILITY SPECIFICA-TION or AS PER AC-CEPTANCE NORMS | - | |

| Sr. No. | CHARACTERISTICES / ITEMS | Type of Check | Instru-ments | Class | QUANTUM OF CHECK - CONTRAC-TOR/PQCC | QUANTUM OF CHECK - TPIA/REC/ NQM | Reference Documents & Acceptance Standard | "Format Of Records" | Remarks |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 | | 7 | 8 | 9 |
| 3.14 | Check cable tags are provided at required intervals/required places and both end as per cable schedule. | V | - | B | 100% | RANDOM | UTILITY SPECIFICA-TION or AS PER AC-CEPTANCE NORMS | - | |
| 3.15 | Check the cables are dressed, clamped and supported properly as per the drawing. | V | - | B | 100% | RANDOM | UTILITY SPECIFICA-TION or AS PER AC-CEPTANCE NORMS | - | |
| 3.16 | Insulation Resistance Check | Electrical | Meggar | B | 100% | 10% | UTILITY SPECIFICA-TION or AS PER AC-CEPTANCE NORMS | Site Record | |
| 3.17 | Check whether some extra length ( 1.5 mtr.) is kept in each cable run for future use | Physical | - | B | 100% | RANDOM | UTILITY SPECIFICA-TION or AS PER AC-CEPTANCE NORMS | Site Record | |
| 3.18 | Check that all wall openings/ pipes/ sleeves are sealed to avoid seepage of water | Physical | - | B | 100% | RANDOM | UTILITY SPECIFICA-TION or AS PER AC-CEPTANCE NORMS | Site Record | |
| 3.19 | check that buried cables are covered with sand layers and by protective bricks | Physical | - | B | 100% | RANDOM | UTILITY SPECIFICA-TION or AS PER AC-CEPTANCE NORMS | Site Record | |
| 3.20 | Ensure that the location of underground cable joints are identified. | Physical | - | B | 100% | RANDOM | UTILITY SPECIFICA-TION or AS PER AC-CEPTANCE NORMS | Site Record | |

CONTRACTOR'S SIGNATURE

NAME & SIGN OF APPROVING AUTHORITY

Legends :

A -- CRITICAL

B -- MAJOR

C-- MINOR

TC : Test Certificate

V : Verify

EIC : Engineer In Charge



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| | | | STANDARD FIELD QUALITY PLAN for Power Transformer (Outdoor Type) | | | | QP No. | | Re-viewed By: | Approved By: |
|---|---|---|---|---|---|---|---|---|---|---|
| S.No. | Activity and Operation | Characteristics/ instru-ments | Class of Check | Type of Check | QUANTUM OF CHECK - CON-TRACTOR /PQCC | QUANTUM OF CHECK - TPIA/REC/ NQM | Reference Docu-ment | Acceptance Norms | Format of Records | Remarks |
| 1 | 2 | 3 | 4 | 5 | 6 | 6 | 7 | 8 | 9 | 10 |
| 1.00 | RECEIPT | | | | | | | | | |
| 1.01 | Main Unit | a) Physical damage & Oil leakage from valves/ flanges & other part of body | B | Visual | 100% | .... | No Physical damage & Leakage from valves/ flanges and other parts of main unit. | | | |
| 1.02 | | b) Unloading with the help of lifting lugs & hydra on foun-dation or at suiatble location in absecnce of foundation. | B | Physical | 100% | .... | | | | |
| | | c) Check S.No. & rating | B | Verify | 100% | .... | BBU No. | | | |
| 1.03 | Accessories/ Loose Items | a) Physical damage | B | Visual | 100% | .... | No Physical damage | | | |
| | | b) Unloading of Marshalling Box, radiator, Conservator tank, Bucholz Relay, current transformer, MOG, PRD, Breather, Silica gel, terminal Connector & boxes. | B | Visual | 100% | .... | | | | |
| | | c) Leakage of oil from drums | B | Visual | 100% | .... | No leakage | Log Record | | |
| 1.04 | Accessories/ Loose Items | d) All Packing cases are sealed/ packed with packing list | C | Visual | 100% once | .... | No opening/ break-ing of seal/ packing | Log Record | | |
| | | e) Verification of items as per packing list | C | Verify | 100% once | .... | No shortage | Log Record | | |
| 2.00 | STORAGE | | | | | | | | | |

| S.No. | Activity and Operation | Characteristics/ instruments | Class of Check | Type of Check | QUANTUM OF CHECK - CON-TRACTOR /PQCC | QUANTUM OF CHECK - TPIA/REC/ NQM | Reference Docu-ment | Acceptance Norms | Format of Records | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 | 6 | 7 | 8 | 9 | 10 |
| 2.01 | | a) Oil drums are placed at protected area & not stored on their side faces. | C | Physical | 100% once | Manufacturer's Instruction Manual | No leakage | Log Record | | Surveilance check by NE-SCL Erection. |
| | | b) All components/ equipment are stored at suitable location till they are used for erection. | C | Visual | 100% once | Manufacturer's Instruction Manual | .... | Log Record | | Surveilance check by NE-SCL Erection. |
| | | c) Fitting of breather on main unit in case of long storage period. | C | Visual | 100% once | Manufacturer's Instruction Manual | .... | Log Record | | Surveilance check by NE-SCL Erection. |
| | | d) All instruments such as MOG, PRD, silica gel, Marshalling Box, Breather, terminal connector, bucholz Relay, WTI, OTI, CT are stored indoor. | C | Physical | 100% once | Manufacturer's Instruction Manual | .... | Log Record | | Marshalling box are stored vertical in their respective cases. |
| | | e) Flushing of radiators & pipes for missing blanks with oil and blanking of pipes and radiator ends. | B | Physical | 100% once | .... | No dirt should remain inside the pipe & radiators and blanking of pipe after cleaning/ flushing. | | | |
| | | f) Radiators, Pipes and con-servator tanks are stored at raised platform to avoid direct contact with water. | B | Physical | 100% once | Manufacturer's Instruction Manual | .... | | | |
| 3.00 | ERECTION | | | | | | | | | |
| 3.01 | | a) Availability of tools and tackles | B | Visual | 100% | Manufacturer's Instruction Manual | .... | | | |
| | | b) Availability of transformer foundation as per drawing. | B | Visual | 100% | .... | .... | | | |

| S.No. | Activity and Operation | Characteristics/ instruments | Class of Check | Type of Check | QUANTUM OF CHECK - CONTRACTOR /PQCC | QUANTUM OF CHECK - TPIA/REC/ NQM | Reference Document | Acceptance Norms | Format of Records | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 | 6 | 7 | 8 | 9 | 10 |
| | | c) Fixing and greasing of rollers with transformer for smooth shifting of main unit from storage area to site of erection. | B | Physical | 100% | .... | .... | | | |
| | | d) Shifting/ haulage of main unit from storage area upto foundation site with the help of hydra, ropes, pulleys etc. | B | Physical | 100% | .... | .... | | | |
| | | e) Installation of Transformer on its foundation | B | Visual | 100% | Manufacturer's Instruction Manual & NESCL layout Drawing | .... | | | |
| | | f) Ensure radiators were in flushed condition before erection with main unit. | B | Visual | 100% | .... | .... | | | |
| | | g) mounting of pipes, radiators, explosion vent, cable box, earthing flat as per drawing. | B | Visual | 100% | .... | .... | | | |
| | | h) Availability of required capacity filteration machine and its healthiness. | B | Visual | 100% | .... | .... | | | |
| | | I) Prior to start of vacuum test, breakdown voltage of oil sample taken from separate tank in which oil is stored for filtration. | B | Test | 100% | Manufacturer's Instruction Manual | .... | | | |
| | | j) Drying out of transformer with complete assembly with help of machine. | B | Visual | 100% | Manufacturer's Instruction Manual | .... | | | |

| S.No. | Activity and Operation | Characteristics/ instruments | Class of Check | Type of Check | QUANTUM OF CHECK - CON-TRACTOR /PQCC | QUANTUM OF CHECK - TPIA/ REC/NQM | Reference Document | Acceptance Norms | Format of Records | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 | 6 | 7 | 8 | 9 | 10 |
| | | k) Oil filling in transformer under vacuum through filtration machine. | B | Test | 100% | Manufacturer's Instruction Manual | .... | | | |
| | | l) Testing of oil after completion of filtration. | B | Test | 100% | Manufacturer's Instruction Manual | .... | | | |
| | | m) Oil level & leakage in trans-former tank, radiators. | B | Test | 100% | Manufacturer's Instruction Manual | .... | | | |
| | | n) Wiring and termination of cable from instrument, Bucholz Relay, OTI/WTI, MOG. | B | Physical | 100% | Manufacturer's Instruction Manual & Wiring Details/ Drgs. | .... | | | |
| | | o) Tap switch position | B | Physical | 100% | Manufacturer's Instruction Manual & Wiring Details/ Drgs. | .... | | | |
| | | p) Polarity and connection of CTs with leads, otherwise CTs secondary to be shorted. | B | Physical | 100% | Manufacturer's Instruction Manual & Wiring Details/ Drgs. | .... | | | |
| | | q) IR value between terminal and flange bushing. | B | Physical | 100% | .... | .... | | | |
| | | r) Earthing of Transformer as per drawing and IE rules. | B | Physical | 100% | As per drawing | As per drawing | | | |
| | | s) General appearance for paint condition.(Retouching of paint if required.) | B | Physical | 100% | .... | .... | | | |
| | | t) Whole assembly for tightness and general appearance. | B | Physical | 100% | .... | .... | | | |

CLASS OF CHECK:

A -- CRITICAL

B -- MAJOR

C-- MINOR

NAME/ SIGNATURE OF THE SUB-CONTRACTOR/ ERECTION AGENCY



REC
Endless energy. Infinite possibilities.

# FIELD QUALITY PLAN FOR CIVIL WORKS

QAP NO. :
REV. NO.:
DATE :

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | DOCUMENTS AND DRAWING | | | | | | | | | |
| 1.1 | Check that the instruction manuals for all equipments have been received. | | B | Physical | 100% | RANDOM | Bill of Material | | Office record | |
| 1.2 | Check that the approved civil foundation plan of equipment are available. | | B | Physical | 100% | RANDOM | Bill of Material | | Office record | |
| | | | | | | | | | | |
| 2 | CIVIL WORKS FOR EQUIPMENT FOUNDATIONS | | | | | | | | | |
| | | | | | | | | | | |
| 2.1 | Earth Work | | | | | | | | | |
| 2.1.1 | Before excavation | | | | | | | | | |
| 2.1.1.1 | Chck the pegs conditions as per line and alignment w.r.t. existing structure | Measure Tape | B | Visual | 100% | RANDOM | As per site EIC | As per site EIC | Office record | |
| 2.1.1.2 | Checking of pit marking as per drawing. | Measure Tape | B | Visual | 100% | RANDOM | Foundation plan | Foundation plan | | |
| | | | | | | | | | | |
| 2.1.2 | Excavation work | | | | | | | | | |
| 2.1.2.1 | Checking of pit marking / location | Measure Tape | B | Physical | 100% | RANDOM | Foundation Plan | Foundation Plan | Site record | |
| 2.1.2.2 | Check the dimension of pit at bottom (Lx Bx D) | Measure Tape | B | Physical | 100% | RANDOM | Foundation Plan | Foundation Plan | Site record | |
| 2.1.2.3 | Check the type of soil, if BC soil is confirmed follow the instruction on drawing for stone soling | Measure Tape | B | Physical/ Hammering crobar | 100% | RANDOM | Foundation Plan | Foundation Plan | Site record | |

| Sr. No. | ACTIVITY AND OPERATION | Characteristics / Instruments | Class of Check | Type of Check | QUANTUM OF CHECK - CONTRAC-TOR/PQCC | QUANTUM OF CHECK - TPIA/REC/ NQM | Reference Documents | Acceptance Norms | "Format Of Records" | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|
| 2.1.2.4 | Check the type of soil, if Non BC soil is confirmed follow the drawing. | Measure Tape | B | Physical/ Hammer-ing crobar | 100% | RANDOM | Foundation Plan | Foundation Plan | Site record | |
| | | | | | | | | | | |
| 2.3 | Shuttering | | | | | | | | | |
| 2.3.1 | Check the shuttering board which are made to shape with steel tape including cleaning & proper surface preparation . | Measure tape | B | Visual | 100% | RANDOM | Foundation Plan | Foundation Plan | Site record | |
| 2.3.2 | Placment of shuttering boards including supports, tie rod etc. | Tackiling equip-ment | B | Visual | 100% | RANDOM | Foundation Plan | Foundation Plan | Site record | Required as per site condition |
| 2.3.3 | Measurement, line and level with steel tape & water level. | Steel tape & water level | B | Visual | 100% | RANDOM | Foundation Plan | Foundation Plan | Site record | |
| 2.3.4 | Check placement, alignment & embedment of anchor bolts, Check no oil on inserts (For foundation bolts) | Measure tape | B | Visual | 100% | RANDOM | Foundation Plan | Foundation Plan | Site record | |
| 2.3.5 | Check bolt setting with tem-plates. | Measure tape | B | Visual | 100% | RANDOM | Foundation Plan | Foundation Plan | Site record | |
| | | | | | | | | | | |
| 2.4 | Cement | | | | | | | | | |
| 2.4.1 | Cement - Received from Sup-plier | Review of TC/ As per IS | A | Visual | One of con-signment | RANDOM | IS: 11269 | Manufacturer's Test Certificate | Site Record | |
| 2.4.2 | Setting Time & Compressive strength | Review of TC/ As per IS | A | Visual | One of con-signment | RANDOM | IS: 11269 | Manufacturer's Test Certificate | Site Record | |
| | | | | | | | | | | |
| 2.5 | Reinforced Steel | | | | | | | | | |
| 2.5.1 | Visual Examination to ensure free from cracks, surface flaws, imperfect edges and dimen-sional checks | | B | Visual | 100% | RANDOM | IS: 1786 & Approved Drawings | Approved Draw-ings | Site Record | |

| Sr. No. | ACTIVITY AND OPERATION | Characteristics / Instruments | Class of Check | Type of Check | QUANTUM OF CHECK - CONTRACTOR/PQCC | QUANTUM OF CHECK - TPIA/REC/ NQM | Reference Documents | Acceptance Norms | "Format Of Records" | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|
| 2.5.2 | Cutting, Bending, placing of reinforced steel bars & lapping | Tackling Equipment | B | Visual | 100% | RANDOM | Approved Drawings | Approved Drawings | Site Record | |
| | | | | | | | | | | |
| 2.6 | Concreting | | | | | | | | | |
| 2.6.1 | Mixing of cement (OPC, 53 Grade, ISI mark), sand & coarse aggregate as per ratio 1:4:8/1:2:4/1:5:8/ 1:1.5:3 | Tackling equipment | B | Visual | 100% | RANDOM | As per instructions of manufacturer's | As per instructions of manufacturer's | Site record | |
| 2.6.2 | Check workability of concrete | Tackling equipment | B | Visual | 100% | RANDOM | As per instructions of manufacturer's | As per instructions of manufacturer's | Site record | |
| 2.6.3 | Placing concrete, poking and compacting. | Tackling equipment | B | Visual | 100% | RANDOM | As per instructions of manufacturer's | As per instructions of manufacturer's | Site record | |
| 2.6.4 | Testing of concrete cubes for compression strength. 7 Days or 28 Days. | Compression machine | A | Third party lab test | One set per substation | RANDOM | IS 456, IS 516 | IS 456, IS 516 | Site record | |
| 2.6.5 | Check whether curing period of the foundation is completed. | | C | Visual | 100% | RANDOM | Visual check for min 7 days | Visual check for min 7 days | Site record | |
| 2.6.6 | Check the backfilling and compaction is completed upto ground level. | Tackling equipment | A | Visual | 100% | RANDOM | Foundation Plan | Foundation Plan | Site record | |
| | | | | | | | | | | |
| 2.7 | Masonary work | | | | | | | | | |
| 2.7.1 | Check the proportion, mixing & placement of mortar. | Tackling equipment | B | Visual | Random | RANDOM | Foundation Plan | Foundation Plan | Site record | |
| 2.7.2 | Plumb & alignment | Tackling equipment | B | Visual | Random | RANDOM | Foundation Plan | Foundation Plan | | |
| 2.7.3 | Curing | | B | Visual | 100% | RANDOM | Visual check for min 7 days | Visual check for min 7 days | Site record | |

| Sr. No. | ACTIVITY AND OPERATION | Characteristics / Instruments | Class of Check | Type of Check | QUANTUM OF CHECK - CONTRAC-TOR/PQCC | QUANTUM OF CHECK - TPIA/REC/ NQM | Reference Documents | Acceptance Norms | "Format Of Records" | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|
| 2.7.4 | Control brick height " In day work" | Measure tape | B | Visual | 100% | RANDOM | Foundation Plan | Foundation Plan | | |
| | | | | | | | | | | |
| 2.8 | Plastering work | | | | | | | | | |
| 2.8.1 | Plastering thickness and even-ness | | B | Visual | Random | RANDOM | Visual check | Visual check | | |
| 2.8.2 | Mortar mix / proportion | Tackling equip-ment | B | Visual | Random | RANDOM | Foundation Plan | Foundation Plan | Site record | |
| 2.8.3 | Check the placement, thickness of plaster, line & level of plaster | Tackling equip-ment | B | Visual | Random | RANDOM | Foundation Plan | Foundation Plan | Site record | |
| 2.8.4 | Curing | | B | Visual | 100% | RANDOM | Visual check for min 7 days | Visual check for min 7 days | Site record | |
| | | | | | | | | | | |

Legends :
"CLASS OF CHECK:
A -- CRITICAL -- TO BE WITNESSED BY PIA SITE AND SURVEILLANCE BY PIA, CC.
B -- MAJOR -- TO BE WITNESSED BY CONTRACTOR AND PIA SITE
C-- MINOR -- TO BE WITNESSED BY CONTRACTOR AND SURVEILLANCE BY PIA SITE"

TC : Test Certificate
V : Verify
W : Witness
EIC : Engineer In Charge

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | FIELD QUALITY PLAN-- PSC POLES (11KV& LT), POLE EARTHING AND GUY ERECTION | | | | | |
| Contractor's Name: | | | | | Item: PSCC Poles(11KV& LT) | | | | QP No: | |
| Sub Contractor/ agency Name & Address: | | | | | | | | | REV.No: | |
| | | | | | Sub-system: POLE ERECTION ,EARTHING, GUY ERECTION | | | | DATE: | |
| | | | | | | | | | PAGE: | |
| SL.NO | MAIN ACTIV-ITY& OPERA-TION | CHARAC-TERISTICS / INSTRU-MENTS | CLASS OF CHECK | TYPE OF CHECK | QUANTUM OF CHECK - CONTRAC-TOR/PQCC | QUANTUM OF CHECK - TPIA/REC/ NQM | REFER-ENCE DOCUMENT | ACCEPTANCE NORMS | FORMAT OF RECORD | RE MARKS |
| 1 | RECEIPT AND STORAGE | 1) RECEIPT AT STORES | C | VISUAL | 100% | RANDOM | SUPPLIER TC | CORRELATION OF THE LOT RECEIVED WITH THE TC | SUPPLIER TC | POLES WHICH ARE INSPECTED AND CLEARED BY PIA SHALL ONLY BE AC-CEPTED ON RECEIPT |
| | | 2) VISUAL INSPECTION | C | VISUAL | 100% | RANDOM | | BROKEN, DAMAGED POLES SHALL BE STACKED SEPA-RATELY | SITE REGISTER | |
| | | 3) PROPER STORAGE | C | VISUAL | 100% | RANDOM | UTILITY / REC SPECI-FICATION or AS PER AC-CEPTANCE NORMS | "1)POLES SHALL BE STACKED IN SUCH A MANNER THAT BROAD SIDE IS VERTICAL. 2)EACH TIER IN THE STACK IS SUPPORT-ED ON WOODEN SLEEPERS LOCAT-ED AT 1.2Mtr APART, WOODEN SUP-PORTS ALIGNED IN VERTICAL LINE. " | SITE REGISTER | |

| SL.NO | MAIN ACTIVITY& OPERATION | CHARACTERISTICS / INSTRUMENTS | CLASS OF CHECK | TYPE OF CHECK | QUANTUM OF CHECK - CONTRACTOR/PQCC | QUANTUM OF CHECK - TPIA/REC/ NQM | REFERENCE DOCUMENT | ACCEPTANCE NORMS | FORMAT OF RECORD | RE MARKS |
|---|---|---|---|---|---|---|---|---|---|---|
| 2 | TRANSPORTATION OF POLES | TRANSPORTATION | C | VISUAL | 100% | - | UTILITY SPECIFICATION or AS PER ACCEPTANCE NORMS | "1)POLES SHALL BE TRANSPORTED WITH BROAD FACES PLACED VERTICALLY 2)SUPPORTS ARE LOCATED AT 1.2Mtr APART THROUGH OUT THE LENGTH OF THE POLE" | | |
| 3 | PRE INSTALLATION | AVAILABILITY OF APPROVED DRAWINGS ALL CONSTRUCTIONAL MATERIAL. | C | VISUAL | 100% | RANDOM CHECK | UTILITY / REC SPECIFICATION or AS PER ACCEPTANCE NORMS | "1)ENSURE APPROVED DRAWINGS FOR INSTALLATION OF THE POLES ARE AVAILABLE AT WORK PLACE 2)ENSURE ALL CONSTRUCTION MATERIAL LIKE BOULDERS, SAND , CEMENT , STONE CHIPS ARE ALSO AVAILABLE AT WORK PLACE " | SITE REGISTER | |
| | | AVAILABILITY OF ROUTE SURVEY MAP AT WORK PLACE | C | VISUAL | 100% | 100% | ROUTE SURVEY REPORT | | SITE REGISTER | |
| | 4.INSALATION OF POLES | | | | | | | | | |
| 4.1 | EXCAVATION OF PIT | 4.1.1) MANUAL EXCAVATION / CONTROLLED BLASTING | C | VISUAL | 100% | RANDOM | UTILITY / REC SPECIFICATION or AS PER ACCEPTANCE NORMS | PIT LONGITUDINAL AXIS SHOULD BE IN THE DIRECTION OF THE LINE | SITE REGISTER | "CONTROLLED BLASTING IS PERMITTED IN CASE OF HARD OR ROCKY SOILS (IN CASE OF INHABITED LOCATION DRILLING/ CHIPPING TO BE RESORTED TO)" |

| SL.NO | MAIN ACTIVITY& OPERATION | CHARACTERISTICS / INSTRUMENTS | CLASS OF CHECK | TYPE OF CHECK | QUANTUM OF CHECK - CONTRACTOR/PQCC | QUANTUM OF CHECK - TPIA/REC/NQM | REFERENCE DOCUMENT | ACCEPTANCE NORMS | FORMAT OF RECORD | RE MARKS |
|---|---|---|---|---|---|---|---|---|---|---|
| | | 4.1.2 )SIZE OF PIT | C | DIMENSIONAL | 100% | RANDOM | UTILITY / REC SPECIFICATION or AS PER ACCEPTANCE NORMS | 0.6M X 1.2M (OR) 0.6Dia X 1.5M Depth | SITE REGISTER | IN HARD ROCK LOCATIONS ONE Mtr. DEEP HOLE AND Dia OF 1.2 TIMES THE BOTTOM DIMENSION OF THE POLE. |
| | | 4.1.3) PLANTING DEPTH IN GROUND | C | DIMENSIONAL | 100% | 5% | UTILITY / REC SPECIFICATION or AS PER ACCEPTANCE NORMS | 1.5 m ABOVE PRECAST SLAB | SITE REGISTER | IN CASE OF BLACK COTTON & WET SOILS PLANTING DEPTH INCREASED BY 0.2 Mtr |
| 4.2 | BASE FOUNDATION | BASE CONCRETE | C | MEASUREMENT | 100% | 5% | UTILITY / REC SPECIFICATION or AS PER ACCEPTANCE NORMS | M-15 GRADE SIZE 0.45M X 0.45M X 0.075 m | SITE REGISTER | EQUIVALENT SIZE STONE PLATE CAN ALSO BE USED WHERE EVER FOUND ECONOMICAL |
| 4.3 | POLE ERECTION | 4.3.1) POLE ERECTION | C | VISUAL | 100% | RANDOM | UTILITY / REC SPECIFICATION or AS PER ACCEPTANCE NORMS | “1)POLES SHALL BE LIFTED TO THE PIT WITH THE HELP OF WOODEN SUPPORTS 2)THE POLE SHALL BE KEPT IN VERTICAL POSITION WITH THE HELP 25mm MANILA ROPES.” | | |
| | | 4.3.2) ALIGNMENT & VERTICALITY IN BOTH DIRECTIONS | C | SPIRIT LEVEL | 100% | RANDOM | UTILITY / REC SPECIFICATION or AS PER ACCEPTANCE NORMS | | SITE REGISTER | |

| SL.NO | MAIN ACTIVITY& OPERATION | CHARACTERISTICS / INSTRUMENTS | CLASS OF CHECK | TYPE OF CHECK | QUANTUM OF CHECK - CON-TRACTOR/ PQCC | QUANTUM OF CHECK - TPIA/REC/ NQM | REFERENCE DOCUMENT | ACCEPTANCE NORMS | FORMAT OF RECORD | RE MARKS |
|---|---|---|---|---|---|---|---|---|---|---|
| | | 4.3.3) BACK FILLING | C | VISUAL | 100% | RANDOM | UTILITY / REC SPECI-FICATION or AS PER AC-CEPTANCE NORMS | WITH BRICK BATS AND COMPACTED IN LAYERS | SITE REGISTER | TEMPORARY ANCHORS SHALL BE REMOVED ONLY AFTER THE POLE IS SET IN THE FOUNDA-TION AFTER COMPACT-ING THE SOIL. |
| | | 4.3.4) CONCRETING OF FOUNDATIONS | C | "MEA-SURE EMENT" | 100% | 10% | UTILITY / REC SPECI-FICATION or AS PER AC-CEPTANCE NORMS | | SITE REGISTER | AT ALL TAPPING POINTS, DEAD END POLES, AT DT LOCATIONS, AT ALL POINTS AS PER REC CONSTRUCTION DRAWING AT 1 km OF LAST JAMA FILLED STRUCTURE, BOTH SIDE POLES OF NALLA CROSSINGS, ROAD CROSSING, RAILWAY CROSSINGS, AT DP , 4P STRUCTURE. |
| | | 5.1) COIL TYPE EARTHING | C | VISUAL | 100% | 5% | UTILITY / REC SPECI-FICATION or AS PER AC-CEPTANCE NORMS | REC CON-STRUCTION STANDARD J-1 | SITE REGISTER | |
| 6 | COIL TYPE EARTHING INSTALLA-TION | a) EXCAVATION OF PIT SIZE (DIA-600 X 1500 mm) | C | VISUAL/ DIMEN-SIONAL | 100% | RANDOM | UTILITY / REC SPECI-FICATION or AS PER AC-CEPTANCE NORMS | REF: REC CONSTRUC-TION STAN-DARD -J-1 | SITE REGISTER | |
| | | b)INSTALEARTHING SPIRAL | C | VISUAL | 100% | RANDOM | UTILITY / REC SPECI-FICATION or AS PER AC-CEPTANCE NORMS | | | ENSURE THE SPIRAL WIRE IS 4mm GI WIRE |



REC
Endless energy. Infinite possibilities.

| SL.NO | MAIN ACTIVITY& OPERATION | CHARACTERISTICS / INSTRUMENTS | CLASS OF CHECK | TYPE OF CHECK | QUANTUM OF CHECK - CON-TRACTOR/ PQCC | QUANTUM OF CHECK - TPIA/REC/ NQM | REFERENCE DOCUMENT | ACCEPTANCE NORMS | FORMAT OF RE-CORD | RE MARKS |
|---|---|---|---|---|---|---|---|---|---|---|
| | | c) FILL THE PIT WITH ALTERNATE LAYERS OF 300mm WITH CHARCOAL AND SALT UPTO 1.2 Mtr.OF DEPTH FROM BOTTOM OF THE PIT. | B | VISUAL | 100% | RANDOM | UTILITY / REC SPECIFICA-TION or AS PER ACCEP-TANCE NORMS | | | |
| | | d) CONNECTION BETWEEN THE SPI-RAL WIRE AND POLE EARTH WIRE | C | VISUAL | 100% | RANDOM | UTILITY / REC SPECIFICA-TION or AS PER ACCEP-TANCE NORMS | | | |
| | | 6.1) PIPE/ ROD TYPE EARTHING | C | VISUAL | 100% | 5% | UTILITY / REC SPECIFICA-TION or AS PER ACCEP-TANCE NORMS | REC CON-STRUCTION STANDARD J-2 | SITE REGISTER | AT BOTH SIDES OF RAILWAY, ROAD, DRAIN, TELECOM, RIVER CROSSINGS |
| 7 | PIPE TYPE EARTHING INSTALLA-TION | a) EXCAVATION OF PIT SIZE BY 0.6M Dia X 2.7M DEPTH | C | VISUAL | 100% | RANDOM | UTILITY / REC SPECIFICA-TION or AS PER ACCEP-TANCE NORMS | REF: REC CON-STRUCTION STANDARD- J-2 | SITE REGISTER | |
| | | b) INSTALL 40 Dia GI PIPE WITH 12 Dia HOLES IN THE PIT. | C | VISUAL | 100% | RANDOM | UTILITY / REC SPECIFICA-TION or AS PER ACCEP-TANCE NORMS | | | |
| | | c) FILL THE PIT WITH ALTERNATE LAYERS OF 300mm CHAR COAL AND SALT. | B | VISUAL | 100% | RANDOM | UTILITY / REC SPECIFICA-TION or AS PER ACCEP-TANCE NORMS | | | |

| SL.NO | MAIN ACTIVITY& OPERATION | CHARACTERISTICS / INSTRUMENTS | CLASS OF CHECK | TYPE OF CHECK | QUANTUM OF CHECK - CON-TRACTOR/ PQCC | QUANTUM OF CHECK - TPIA/REC/ NQM | REFERENCE DOCUMENT | ACCEPTANCE NORMS | FORMAT OF RECORD | RE MARKS |
|---|---|---|---|---|---|---|---|---|---|---|
| | | d) CONNECTION BETWEEN THE PIPE AND POLE WITH 8mm SWG WIRE | C | VISUAL | 100% | RANDOM | UTILITY / REC SPECIFICA-TION or AS PER ACCEP-TANCE NORMS | | | |
| 8 | STAY / GUY ERECTION | 8.1) LOCATION FOR THE GUY SETS | C | VISUAL | 100% | 5% | UTILITY / REC SPECIFICA-TION or AS PER ACCEP-TANCE NORMS | | | THE GUY SETS ARE ERECTED AT ANGLE LOCATIONS , DEAD END LOCATIONS , T - Off POINTS , STEEP GRADIENT LOCA-TIONS, DOUBLE POLE STRUCTURES. |
| | | 8.2) EXCAVATION OF PIT SIZE 0.5M X 0.5M X 1.6M | C | DIMEN-SIONAL | 100% | 5% | UTILITY / REC SPECIFICA-TION or AS PER ACCEP-TANCE NORMS | REC CON-STRUCTION STANDARD G-1 | | |
| | | 8.3)SIZING OF AN-CHOR PLATE | C | DIMEN-SIONAL | 100% | 5% | UTILITY / REC SPECIFICA-TION or AS PER ACCEP-TANCE NORMS | REC CON-STRUCTION STANDARD K-1 | | |
| | | 8.4)GROUTING OF ANCHOR PLATE AND ANCHOR ROD WITH EARTH FILLING | C | DIMEN-SIONAL | 100% | 5% | UTILITY / REC SPECIFICA-TION or AS PER ACCEP-TANCE NORMS | | | IF GUY WIRE IS FOUND HAZARD-OUS IT SHOULD BE PROTECTED WITH ASBESTOS PIPE FILL WITH CONCRETE |
| | | 8.5)ANGLE BE-TWEEN STAY WIRE AND POLE | B | “MEA-SURE EMENT” | 100% | 5% | UTILITY / REC SPECIFICA-TION or AS PER ACCEP-TANCE NORMS | REC CON-STRUCTION STANDARD G-1 | | |

| SL.NO | MAIN ACTIVITY& OPERATION | CHARACTERISTICS / INSTRUMENTS | CLASS OF CHECK | TYPE OF CHECK | QUANTUM OF CHECK - CON-TRACTOR/ PQCC | QUANTUM OF CHECK - TPIA/REC/ NQM | REFERENCE DOCUMENT | ACCEPTANCE NORMS | FORMAT OF RECORD | RE MARKS |
|---|---|---|---|---|---|---|---|---|---|---|
| | | 8.6)ERECTION OF GUY INSULATOR | C | VISUAL | 100% | 50% | UTILITY / REC SPECIFICA-TION or AS PER ACCEP-TANCE NORMS | REC CON-STRUCTION STANDARD G-1 | | GUY INSULATORS ARE ERECTED AT HEIGHT OF 3050 mm FROM THE GROUND . |
| | | 8.7) ERECTION TURNBUCKLE | C | VISUAL | 100% | 50% | UTILITY / REC SPECIFICA-TION or AS PER ACCEP-TANCE NORMS | REC CON-STRUCTION STANDARD G-1 | | TURN BUCKLE ARE MOUNTED HALF WAY IN THE WORKING PO-SITION , THUS GIVING THE Max. MOVEMENT FOR TIGHTENING AND LOOSENING |

CLASS OF CHECK:
A -- CRITICAL
B -- MAJOR
C-- MINOR

NAME/ SIGNATURE OF THE SUB-CONTRACTOR/ ERECTION AGENCY

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | FIELD QUALITY PLAN--ERECTION OF 11KV POLE ACCESSORIES | | | | | |
| Contractor's Name: | | | | | Item: ERECTION OF 11KV POLE ACCESSORIES | | | | FQP No: | |
| Sub Contractor/ agency Name & Address: | | | | | Sub-system: G.I COMPONENTS, INSULATORS, HARDWARE FITTINGS, DANGER BOARDS, ANTI-CLIMBING DEVICES, GUARDING | | | | REV.No: | |
| | | | | | | | | | DATE: | |
| | | | | | | | | | PAGE: | |
| MS GALVANIZED COMPONENTS | | | | | | | | | | |
| SL.NO | MAIN ACTIVITY& OPERATION | CHARACTERISTICS/ INSTRUMENTS | CLASS OF CHECK | TYPE OF CHECK | QUANTUM OF CHECK - CONTRACTOR/PQCC | QUANTUM OF CHECK - TPIA/REC/ NQM | REFERENCE DOCUMENT | ACCEPTANCE NORMS | FORMAT OF RECORD | RE MARKS |
| 1 | RECEIPT AND STORAGE | 1) RECEIPT AT STORES | C | VISUAL CHECK | 100% | RANDOM | | CORRELATION OF THE LOT RECEIVED WITH TC | STORES REGISTER | COMPONENTS WHICH ARE INSPECTED AND CLEARED BY PIA SHALL ONLY BE ACCEPTED ON RECEIPT |
| | | 2) VISUAL INSPECTION | C | VISUAL CHECK | 100% | RANDOM | | DAMAGED AND GALVANIZATION DEFECTIVE COMPONENTS ARE TO BE STACKED SEPARATELY | STORES REGISTER | |
| | | 3) PROPER STORAGE | 0 | VISUAL CHECK | 100% | RANDOM | UTILITY / REC SPECIFICATION or AS PER ACCEPTANCE NORMS | ALL G.I. COMPONENTS SHOULD BE STACKED ON WOODEN SLEEPERS AND THE STORAGE AREA SHALL BE FREE FROM WATER LOGGING | STORES REGISTER | |

| SL.NO | MAIN ACTIV-ITY& OPERA-TION | CHARAC-TERISTICS/ INSTRUMENTS | CLASS OF CHECK | TYPE OF CHECK | QUANTUM OF CHECK - CONTRAC-TOR/PQCC | QUANTUM OF CHECK - TPIA/REC/ NQM | REFERENCE DOCUMENT | ACCEPTANCE NORMS | FORMAT OF RECORD | RE MARKS |
|---|---|---|---|---|---|---|---|---|---|---|
| 2 | FIXING OF MS COMPONENTS | 1) V- CROSS ARM WITH CROSS ARM BACK CLAMP | C | VISUAL CHECK | 100% | 10% | UTILITY / REC SPECIFICA-TION or AS PER ACCEPTANCE NORMS | AS PER AP-PROVED DRAW-ING | SITE REGIS-TER | CROSS ARMS ARE TO BE FIXED AT THE MARKINGS PROVIDED ON THE POLES |
| | | 2) HORIZON-TAL ALIGN-MENT OF CROSS ARMS WITH POLE | C | WATER LEVEL | 100% | 10% | APPROVED DRAWING | APPROVED DRAWING | | |
| | | 3) TOP CLEAT WITH BACK CLAMP | C | VISUAL CHECK | 100% | 10% | UTILITY / REC SPECIFICA-TION or AS PER ACCEPTANCE NORMS | AS PER AP-PROVED DRAW-ING | SITE REGIS-TER | TOP CLEATS ARE TO BE FIXED AT THE MARKINGS PROVIDED ON THE TOP OIF THE POLE |
| | | 4) VERTICAL ALIGNMENT OF TOP CLEAT WITH POLE | C | WATER LEVEL | 100% | 10% | APPROVED DRAWING | APPROVED DRAWING | | |
| | | 5) TIGHT-ENING MS COMPONENTS WITH NUTS, BOLTS AND WASHERS | C | ERECTION CHECK | 100% | 10% | APPROVED DRAWING | THE COMPO-NENTS SHOULD BE FIXED RIGID ENOUGH TO WITH STAND ALL THE FORCES | SITE REGIS-TER | |
| | INSULATORS WITH PINS | | | | | | | | | |
| 3 | RECEIPT AND STORAGE | 1) RECEIPT AT STORES | C | VISUAL CHECK | 100% | RANDOM | UTILITY / REC SPECIFICA-TION or AS PER ACCEPTANCE NORMS | CORRELATION OF THE LOT RECEIVED WITH THE CHP DE-SCRIPTIONS | SITE REGIS-TER | COMPONENTS WHICH ARE INSPECTED AND CLEARED BY PIA SHALL ONLY BE ACCEPTED ON RECEIPT |

| SL.NO | MAIN ACTIVITY& OPERATION | CHARACTERISTICS/ INSTRUMENTS | CLASS OF CHECK | TYPE OF CHECK | QUANTUM OF CHECK - CONTRACTOR/PQCC | QUANTUM OF CHECK - TPIA/REC/ NQM | REFERENCE DOCUMENT | ACCEPTANCE NORMS | FORMAT OF RECORD | RE MARKS |
|---|---|---|---|---|---|---|---|---|---|---|
| | | 2) VISUAL INSPECTION | C | VISUAL CHECK | 100% | RANDOM | | THE SURFACE OF THE INSULATORS ARE TO BE THOROUGHLY CHECKED AND CLEANED , THREADING OF THE INSULATOR THIMBLE TO BE CHECKED | STORES REGISTER | DAMAGED INSULAOTRS ARE TO BE STACKED SEPARATELY |
| | | 3) PROPER STORAGE | C | VISUAL CHECK | 100% | RANDOM | STANDARD PRACTICE | | STORES REGISTER | |
| 4 | FIXING OF INSULATORS | 1) CHECK THREADING OVER THE PINS AND INSULATOR THIMBLES AND CHECK THE ALIGNMENT OF PIN WITH INSULATOR | C | VISUAL CHECK | 100% | RANDOM | UTILITY / REC SPECIFICATION or AS PER ACCEPTANCE NORMS | AS PER APPROVED DRAWING | SITE REGISTER | AT GROUND LEVEL THIS PREASSEMBLY CHECK IS DONE FOR PROPER ASSEMBLY |
| | | 2) ASSEMBLING THE GI PIN AND INSULATORS | C | VISUAL | 100% | RANDOM | APPROVED DRAWING | APPROVED DRAWING | | |
| | | 3) FIXING THE PIN INSULATOR TO THE CROSSARMS AND POLE TOP BRACKET | C | VISUAL CHECK | 100% | RANDOM | UTILITY / REC SPECIFICATION or AS PER ACCEPTANCE NORMS | AS PER APPROVED DRAWING | SITE REGISTER | ON ALL THE POLES IN THE STRAIGHT LINE PIN INSULATORS SHALL BE USED. DISC INSULATORS ARE USED AT DEAD END AND ANGLE LOCATIONS |

| SL.NO | MAIN ACTIV-ITY& OPERA-TION | CHARACTERIS-TICS/ INSTRU-MENTS | CLASS OF CHECK | TYPE OF CHECK | QUANTUM OF CHECK - CONTRAC-TOR/PQCC | QUANTUM OF CHECK - TPIA/REC/ NQM | REFERENCE DOCUMENT | ACCEPTANCE NORMS | FORMAT OF RECORD | RE MARKS |
|---|---|---|---|---|---|---|---|---|---|---|
| | | 4) CHECK THE CLEARANCES BETWEEN THE INSULATORS | B | DIMEN-SIONAL | RANDOM | RANDOM | UTILITY / REC SPECIFICA-TION or AS PER ACCEPTANCE NORMS | APPROVED DRAWING | | FOR CHECKING THE CLEARANCES SUITABLE TEM-PLATE/ JIGS ARE TO BE USED |
| | CLASS OF CHECK:<br>A -- CRITICAL<br>B -- MAJOR<br>C-- MINOR | | | | | | | | | |
| | | | | | | | | | | NAME/ SIGNATURE OF THE SUB-CONTRACTOR/ ERECTION AGENCY |

| FIELD QUALITY PLAN FOR ISOLATOR, AB SWITCH/DO FUSE | ITEM :<br>SUB SYSTEM :<br>QAP NO. :<br>REV. NO.: | ERECTION WORK<br>ISO/AB SWITCH/ DOFUSE |
|---|---|---|
| | DATE : | |

| Sr. No. | CHARACTERISTICES / ITEMS | Type of Check | Instruments | Class | QUANTUM OF CHECK - CONTRAC-TOR/PQCC | QUANTUM OF CHECK - TPIA/REC/ NQM | Reference Docu-ments & Acceptance Standard | "Format Of Records" | Remarks |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 | | 7 | 8 | 9 |
| 1 | RECEIPT & STORAGE | | | | | | | | |
| 1.1 | Receiving inspection (Completeness of docu-ments, test certificates, instruction manual etc.) | V | - | B | 100% | RANDOM | Delivery Challan | MRC | |
| 1.2 | Unloading | V | - | B | 100% | RANDOM | Instruction Manual | - | |
| 1.3 | Visual exmination for damage & defects | V | - | B | 100% | RANDOM | Packing list / Instruc-tion Manual | - | |
| 1.4 | Proper storage | V | - | B | 100% | RANDOM | Instruction Manual | - | |
| | | | | | | | | | |
| 2 | PRE INSTALLATION | | | | | | | | |
| 2.1 | Availability of instruction manual and drawing, lifting arrangement | V | - | B | 100% | RANDOM | List of approved drawing / Instruction Manuals | - | |
| 2.2 | Availability of all materials | V | - | B | 100% | RANDOM | Packing list, Approved drawing & Bill Of Material | - | |
| 2.3 | Foundation (If required) | V | - | B | 100% | RANDOM | Civil foundation drawing | - | |
| 2.4 | Verticality of support structure | V | - | B | 100% | 50% | GA/ Structural draw-ing | - | |
| | | | | | | | | | |
| 3 | INSTALLATION | | | | | | | | |
| 3.1 | Rating plate details | V | - | B | 100% | RANDOM | instruction manual | Site record | |



REC
Endless energy. Infinite possibilities.

| Sr. No. | CHARACTERISTICES / ITEMS | Type of Check | Instruments | Class | QUANTUM OF CHECK - CONTRACTOR/PQCC | QUANTUM OF CHECK - TPIA/REC/NQM | Reference Documents & Acceptance Standard | "Format Of Records" | Remarks |
|---|---|---|---|---|---|---|---|---|---|
| 3.2 | Check for proper slinging & lifting | V | - | B | 100% | RANDOM | Instruction Manual | - | |
| 3.3 | Check for the tightness of base bolts & other bolted joints preferably by torque wrench. | V | - | B | 100% | 50% | Instruction Manual | - | |
| 3.4 | Check level & alignment of the base, housing assembly and flanges. | V | - | B | 100% | 50% | Instruction Manual | - | |
| 3.5 | Ensure proper erection of poles, main blade & drive assembly as per approved drgs. | V | - | B | 100% | 50% | Instruction Manual | Site record | |
| 3.6 | Check for the alignment of isolator and verticality of isolator / AB switch / DO Fuse. | V | - | B | 100% | 50% | Instruction Manual | Site record | |
| 3.7 | Check for the clearance between live part to earth. | V | - | B | 100% | 50% | As per IS 10118 | - | |
| 3.8 | Check for no vibration or rotation of contacts of insulators during isolator operation. (Electrical & Mechanical) | V | - | B | 100% | 50% | Instruction Manual | - | |
| 3.9 | Check for the provision of earthing and earth connection. | V | - | B | 100% | 50% | Instruction Manual | - | |
| 3.10 | Check operation of the isolator by rotating one of the insulator stack manually and adjust the length of the crossed tandem assembly to ensure proper engagement of contacts during closing. | V | - | B | 100% | 50% | Instruction Manual | - | |

| Sr. No. | CHARACTERISTICES / ITEMS | Type of Check | Instruments | Class | QUANTUM OF CHECK - CONTRACTOR/PQCC | QUANTUM OF CHECK - TPIA/REC/ NQM | Reference Documents & Acceptance Standard | "Format Of Records" | Remarks |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | |
| 4 | PRE COMMOSSIONING | | | | | | | | |
| 4.1 | Check for visual damage to any parts including porcelain isolator. | V | - | B | 100% | 50% | Instruction Manual | TC | |
| 4.2 | Check manual / operation and inter locks. | V | - | B | 100% | 50% | Instruction Manual | TC | |
| 4.3 | IR Value | Test | Megger | B | 100% | 50% | Instruction Manual | TC | |
| | a. Between each pole to earth. | | | | | | | | |
| 4.4 | Ground connections | V | - | B | 100% | 50% | Instruction Manual | TC | |
| 4.5 | Check continuity | Electrical | Multimeter | B | 100% | 50% | Instruction Manual | Site Record | |
| | | | | | | | | | |
| CONTRACTOR'S SIGNATURE | | | | | | | NAME & SIGN OF APPROVING AUTHORITY | | |

Legends :
CLASS OF CHECK:
A -- CRITICAL
B -- MAJOR
C-- MINOR
TC : Test Certificate
MRC : Material Reciept Certificate
V : Visual

EIC : Engineer In Charge



REC
Endless energy. Infinite possibilities.

| | | | FIELD QUALITY PLAN FOR LA | | | ITEM :<br>SUB SYSTEM :<br>QAP NO. :<br>REV. NO.: | | ERECTION WORK<br>Lighning Arrestor | |
|---|---|---|---|---|---|---|---|---|---|
| Sr. No. | CHARACTERISTICES / ITEMS | Type of Check | Instruments | Class | QUANTUM OF CHECK - CONTRACTOR/PQCC | QUANTUM OF CHECK - TPIA/ REC/ NQM | Reference Documents & Acceptance Standard | "Format Of Records" | Remarks |
| 1 | 2 | 3 | 4 | 5 | 6 | | 7 | 8 | 9 |
| 1 | RECEIPT & STORAGE | | | | | | | | |
| 1.1 | Receiving inspection (Completeness of documents, test certificates, instruction manual etc.) | V | - | B | 100% | RANDOM | Delivery Challan | MRC | |
| 1.2 | Unloading | V | - | B | 100% | RANDOM | Instruction Manual | - | |
| 1.3 | Visual exmination for damage & defects | V | - | B | 100% | RANDOM | Packing list / Instruction Manual | - | |
| 1.4 | Proper storage | V | - | B | 100% | RANDOM | Instruction Manual | - | |
| 2 | PRE INSTALLATION | | | | | | | | |
| 2.1 | Availability of instruction manual and drawing, lifting arrangement | V | - | B | 100% | RANDOM | List of approved drawing / Instruction Manuals | - | |
| 2.2 | Availability of all materials | V | - | B | 100% | RANDOM | Packing list, Approved drawing & Bill Of Material | - | |
| 2.3 | Verticality of support structure | V | - | B | 100% | 50% | GA/ Structural drawing | - | |
| 3 | INSTALLATION | | | | | | | | |
| 3.1 | Rating plate details | V | - | B | 100% | RANDOM | instruction manual | Site record | |
| 3.2 | Check cleanliness of surfaces of the arrester and check Megger value. | Test | Meggar | B | 100% | 10% | Instruction manual | - | |
| 3.3 | Check base of the surge arrestor. | V | - | B | 100% | 50% | Instruction manual | - | |

| Sr. No. | CHARACTERISTICES / ITEMS | Type of Check | Instruments | Class | QUANTUM OF CHECK - CONTRACTOR/PQCC | QUANTUM OF CHECK - TPIA/ REC/ NQM | Reference Documents & Acceptance Standard | "Format Of Records" | Remarks |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 | | 7 | 8 | 9 |
| 3.4 | Check the tightness of equipment base with structure. | V | - | B | 100% | 50% | Instruction manual | - | |
| 3.5 | Ensure that the explosion vent of the LA is away from adjacent critical equipment. | V | - | B | 100% | 50% | Instruction manual | - | |
| 3.6 | Check earthing provision and connection tightness. | V | - | B | 100% | 50% | Instruction manual | - | |
| 3.7 | Check clearance between live part to earth part. | V | - | B | 100% | 50% | Instruction manual | - | |
| 3.8 | Check overall alignment of LA. | V | - | B | 100% | 50% | Instruction manual | - | |
| 3.9 | Mounting height of LA | Measure | - | B | 100% | RANDOM | Instruction manual | Site record | |
| 4 | PRE COMMISSIONING | | | | | | | | |
| 4.1 | IR Value test | Test | Meggar | A | 100% | 10% | Instruction manual | TC | |
| 4.2 | Check for resistance of ground connection. | Test | - | B | 100% | 10% | Instruction manual | TC | |
| 4.3 | Earth continuity test | Test | Earth Megger | B | 100% | 10% | Instruction manual | TC | |
| 4.4 | Final Document review | V | - | B | 100% | RANDOM | instruction manual / final document list | TC | |

CONTRACTOR'S SIGNATURE NAME & SIGN OF APPROVING AUTHORITY

Legends :
CLASS OF CHECK:
A -- CRITICAL
B -- MAJOR
C-- MINOR
TC : Test Certificate
MRC : Material Reciept Certificate
V : Visual
EIC : Engineer In Charge



REC
Endless energy. Infinite possibilities.

FIELD QUALITY PLAN FOR PAINTING

ITEM : ERECTION WORK
SUB SYSTEM : PAINTING
QAP NO. :
REV. NO.:
DATE :

| Sr. No. | CHARACTERIS-TICES / ITEMS | Type of Check | Instruments | Class | QUANTUM OF CHECK - CON-TRACTOR/PQCC | QUANTUM OF CHECK - TPIA/ REC/ NQM | Reference Docu-ments & Accep-tance Standard | "Format Of Records" | Remarks |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | | | 7 | 8 | 9 |
| 1 | RECEIPT & STOR-AGE | | | | | | | | |
| 1.1 | Recveiving inspection | V | | C | 100% | RANDOM | Delivery Challan & Specification | MRC | |
| 1.2 | Proper storage | V | | C | 100% | RANDOM | 5% | Site Records | |
| 2 | PAINTING | | | | | | | | |
| 2.1 | De rusting from struc-tutres & other rusted part of the equipment | V | Wire Brush, emery paper | B | 100% | RANDOM | As per EIC | - | |
| 2.2 | Red oxide zinc chromate paint on steel structures - Two Coats | V | Paint brush | B | 100% | RANDOM | As per EIC / IS 2074 | Site Records | |
| 2.3 | Synthetic enamel paint - Two Coats or more coats | V | Paint brush | B | 100% | RANDOM | As per EIC / IS 2932 | Site Records | |
| 2.4 | Aluminimum Paint - Two Coats or more coats | V | Paint brush | B | 100% | RANDOM | As per EIC / IS 2339 | Site Records | |
| 2.5 | Final document review | - | - | B | 100% | RANDOM | Final document list | Site Records | |

CONTRACTOR'S SIGNATURE

NAME & SIGN OF APPROVING AUTHORITY

Legends :
CLASS OF CHECK:
A -- CRITICAL
B -- MAJOR
C-- MINOR
TC : Test Certificate
MRC : Material Reciept Certificate

V : VISUAL

# FIELD QUALITY PLAN

Item: ERECTION OF BPL CONNECTION

Sub-system:

| SL.NO | MAIN ACTIVITY& OPERATION | CHARACTERIS-TICS / INSTRU-MENTS | CLASS OF CHECK | TYPE OF CHECK | QUANTUM OF CHECK - CONTRAC-TOR/ PQCC | QUANTUM OF CHECK - TPIA / REC / NQM | REFERENCE DOCUMENT | ACCEPTANCE NORMS | FORMAT OF RECORD | RE MARKS |
|---|---|---|---|---|---|---|---|---|---|---|
| SECTION 1 : BOUGHT OUT ITEMS OF BPL CONNECTION | | | | | | | | | | |
| 1 | RECEIPT AND STOR-AGE | 1) RECEIPT AT STORES | C | VISUAL CHECK | 100% | RANDOM | APPROVED BOM AND APPROVED DRAWING | APPROVED MAKE OF THE ITEM | STORES REGISTER | |
| | | 2) VISUAL IN-SPECTION | C | VISUAL CHECK | 100% | RANDOM | | DAMAGED AND DE-FECTIVE COMPO-NENTS ARE TO BE REPLACED WITH GOOD ONE | STORES REGISTER | THE METER BOARD SHALL BE OF TEAK WOOD QUALITY OR HARD WOOD |
| | | 3) PROPER STORAGE | C | VISUAL CHECK | 100% | RANDOM | STANDARD PRACTICE | STANDARD PRAC-TICE | STORES REGISTER | |
| SECTION : 2 FIXING OF BOARDS AND ACCESSORIES | | | | | | | | | | |
| 2 | FIXING OF BOARDS AND AC-CESSORIES | 1) IDENTIFYING AND MARKING THE POSITIONS WHERE THE COMPONENTS ARE TO BE ERECTED | C | VISUAL CHECK | 100% | RANDOM | AS PER SPECIFICA-TION | AS PER APPROVED DRAWING | SITE REGIS-TER | CLEARANCE SHALL BE MAINTAINED AS PER APPROVED DRAWING AND AS PER SPECIFI-CATION |
| | | 2) FIXING THE SERVICE SUP-PORTS AND GUYS | C | VISUAL CHECK | 100% | RANDOM | AS PER SPECIFICA-TION | AS PER APPROVED DRAWING | SITE REGIS-TER | THE SURFACE OF ALL SUP-PORTS SHOULD BE CLEANED . |

| SL.NO | MAIN ACTIVITY& OPERATION | CHARACTERIS-TICS / INSTRU-MENTS | CLASS OF CHECK | TYPE OF CHECK | QUANTUM OF CHECK - CONTRAC-TOR/ PQCC | QUANTUM OF CHECK - TPIA / REC / NQM | REFERENCE DOCUMENT | ACCEPTANCE NORMS | FORMAT OF RECORD | RE MARKS |
|---|---|---|---|---|---|---|---|---|---|---|
| | | "3) FIXING OF THE WOODEN BOARDS ( METER BOARD AND SWITCH BOARD )" | C | DIMEN-SIONAL | 100% | RANDOM | AS PER SPECIFICA-TION | AS PER APPROVED DRAWING | SITE REGIS-TER | |
| | | 4) FIXING OF ALL OTHER ACCES-SORIES | C | VISUAL CHECK | 100% | RANDOM | AS PER SPECIFICA-TION | AS PER APPROVED DRAWING | SITE REGIS-TER | |
| SECTION : 3 STRINGING OF SERVICE CABLE | | | | | | | | | | |
| 3 | STRINGING OF SERVICE CABLE | 1) HANDLING OF THE CABLE | C | VISUAL CHECK | 100% | RANDOM | AS PER SPECIFICA-TION | CABLE SHOULD NOT BE DRAGGED ON THE GROUND | SITE REGIS-TER | CABLE SURFACE SHALL BE FREE FROM FAULTS, FLAWS e.t.c |
| | | 2) SEQUENCE OF CABLE EREC-TION | C | VISUAL CHECK | 100% | RANDOM | AS PER SPECIFICA-TION | SEQUENCE OF RUNNING OUT SHALL BE FROM TOP TO BOTTOM, i.e.. THE TOP CABLE SHALL RUN OUT FIRST, FOLLOWED BY THE SIDE CABLES | SITE REGIS-TER | |
| | | 3) FIX THE G.I WIRE OF SER-VICE CABLE TO CLAMPS | C | VISUAL CHECK | 100% | RANDOM | AS PER SPECIFICA-TION | SPECIFICATION / AS PER APPROVED DRAWING | SITE REGIS-TER | |
| | | 4) CHECK THE TIGHTNESS OF SERVICE CABLE WITH CLAMPS | C | VISUAL CHECK | 100% | RANDOM | AS PER SPECIFICA-TION | AS PER THE STAN-DARD PRACTICE | SITE REGIS-TER | |

| SL.NO | MAIN ACTIVITY& OPERATION | CHARACTERIS-TICS / INSTRU-MENTS | CLASS OF CHECK | TYPE OF CHECK | QUANTUM OF CHECK - CONTRAC-TOR/ PQCC | QUANTUM OF CHECK - TPIA / REC / NQM | REFERENCE DOCUMENT | ACCEPTANCE NORMS | FORMAT OF RECORD | RE MARKS |
|---|---|---|---|---|---|---|---|---|---|---|
| | | 5) CHECK THE GROUND CLEARANCES AFTER EREC-TION OF THE SERVICE CABLE | C | VISUAL CHECK | 100% | RANDOM | AS PER THE REC SPECIFI-CATIONS | AS PER IE RULES | SITE REGIS-TER | THE MINIMUM GROUND CLEAR-ANCES SHOULD BE MAINTAINED |
| SECTION : 4 EARTHING ARRANGEMENT | | | | | | | | | | |
| 4 | EARTHING ARRANGE-MENT | 1) LOCAL EARTHING OF BPL HOUSE HOLD | C | VISUAL CHECK | 100% | RANDOM | STANDARD PRACTICE / IS 3043 | IS 3043 | SITE REGIS-TER | |
| | | 2) EARTHING OF GI SUPPORT WIRE | C | VISUAL CHECK | 100% | RANDOM | STANDARD PRACTICE / IS 3043 | IS 3043 | SITE REGIS-TER | |
| SECTION : 5 CHARGING OF BPL CONNECTION | | | | | | | | | | |
| 4 | CHARGING OF BPL CONNEC-TION | 1) CHECK THE CONTINUITY OF CONNECTION | C | TEST | 100% | RANDOM | STANDARD PRACTICE | STANDARD PRAC-TICE | SITE REGIS-TER | |
| | | 2) CONNECTION OF SERVICE LINE TO THE POLE | C | VISUAL CHECK | 100% | RANDOM | STANDARD PRACTICE | STANDARD PRAC-TICE | SITE REGIS-TER | TAKE LINE CLEAR ON POLE FROM WHICH SERVICE LINE TO BE TAPPED |
| | | 3) CHARGING OF SERVICE CON-NECTION | C | VISUAL CHECK | 100% | RANDOM | STANDARD PRACTICE | STANDARD PRAC-TICE | SITE REGIS-TER | CHECK FOR ANY ABNORMALITIES AT THE BOARD |
| | | | | | | | | | | |

CLASS OF CHECK:
A -- CRITICAL
B -- MAJOR
C-- MINOR

NAME/ SIGNATURE OF THE SUB-CONTRACTOR/ ERECTION AGENCY



REC
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# FIELD QUALITY PLAN FOR VCB

SUB SYSTEM :
QAP NO. :
REV. NO.:

DATE :

| Sr. No. | CHARACTERISTICS / ITEMS | Type of Check | Instruments | Class | QUANTUM OF CHECK - CONTRACTOR/PQCC | QUANTUM OF CHECK - TPIA/REC/ NQM | Reference Documents & Acceptance Standard | "Format Of Records" | Remarks |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 | | 7 | 8 | 9 |
| | | | | | | | | | |
| 1 | RECEIPT & STORAGE | | | | | | | | |
| 1.1 | Receiving inspection (Completeness of documents, test certificates, instruction manual etc.) | V | - | B | 100% | RANDOM | Delivery Challan | MRC | |
| 1.2 | Unloading | V | - | B | 100% | RANDOM | Instruction Manual | - | |
| 1.3 | Visual exmination for damage and defects | V | - | B | 100% | RANDOM | Packing list / Instruction Manual | - | |
| 1.4 | Proper storage | V | - | B | 100% | RANDOM | Instruction Manual | - | |
| | | | | | | | | | |
| 2 | PRE INSTALLATION | | | | | | | | |
| 2.1 | Availability of instruction manual and drawing, lifting arrangement | V | - | B | 100% | RANDOM | List of Approved drawing/ Instruction Manual | - | |
| 2.2 | Availability of all materials | V | - | B | 100% | RANDOM | Packing list ,Approved drawing & Bill of Material | - | |
| 2.3 | VCB foundation | V | - | B | 100% | RANDOM | Civil foundation drawing | - | |
| 2.4 | VCB Support structure ( Level & Verticality ) | V | - | B | 100% | 50% | GA/ Structural drawing | - | |
| | | | | | | | | | |
| 3 | INSTALLATION | | | | | | | | |
| 3.1 | Before erection check adequacy of lifting device. | V | - | B | 100% | RANDOM | instruction manual | - | |

| Sr. No. | CHARACTERISTICS / ITEMS | Type of Check | Instruments | Class | QUANTUM OF CHECK - CONTRAC-TOR/PQCC | QUANTUM OF CHECK - TPIA/REC/ NQM | Reference Docu-ments & Accep-tance Standard | "Format Of Records" | Remarks |
|---|---|---|---|---|---|---|---|---|---|
| 3.2 | Ensure that breaker are erected with proper handling equipment, check slings, dereck/tripod & rope . | V | - | B | 100% | RANDOM | instruction manual | - | |
| 3.3 | Ensure erection has been done as per approved drawing and manual. | V | - | B | 100% | RANDOM | GA / equipment detail drawing | - | |
| 3.4 | Check for Individual pole and CB alignment. | V | - | B | 100% | 50% | instruction manual | - | |
| 3.5 | Check for the tightness of pole base bolt with structure. | V | - | B | 100% | 50% | instruction manual | - | |
| 3.6 | Check for the checknut tight-ness of tie rod. (if applicable) | V | - | B | 100% | 10% | instruction manual | - | |
| 3.7 | Check for cable termination, ferrules and cable tags are provided (with proper lugs and glands) | V | - | B | 100% | 50% | instruction manual | - | |
| 3.8 | Lubricate all the moving parts of the CB. | V | - | B | 100% | RANDOM | instruction manual | - | |
| 3.9 | Earthing of support structure & VCB frame. | V | - | B | 100% | 50% | instruction manual | - | |
| | | | | | | | | | |
| 4 | PRE-COMMISSIONING | | | | | | | | |
| 4.1 | Check correct installation of circuit breaker & operating mechanism as per instruction manual. | V | - | B | 100% | 50% | instruction manual | - | |
| 4.2 | Insulation resistance of each pole | Test | Megger | A | 100% | 10% | instruction manual | TC | |
| 4.3 | Insulation resistance of control circuits, motor etc. | Test | Megger | A | 100% | 10% | instruction manual | TC | |



REC
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| Sr. No. | CHARACTERISTICS / ITEMS | Type of Check | Instruments | Class | QUANTUM OF CHECK - CONTRACTOR/PQCC | QUANTUM OF CHECK - TPIA/REC/ NQM | Reference Documents & Acceptance Standard | "Format Of Records" | Remarks |
|---|---|---|---|---|---|---|---|---|---|
| 4.4 | Resistance of closing & tripping coils. | Test | Multimeter | A | 100% | 10% | instruction manual | TC | |
| 4.5 | Minimum pick up volts of coils | Test | Multimeter | A | 100% | 10% | instruction manual | TC | |
| 4.6 | Contact resistance | Test | Multimeter | A | 100% | 10% | instruction manual | TC | |
| 4.7 | Breaker closing & tripping time | V | - | A | 100% | 10% | instruction manual | TC | |
| 4.8 | Functional checking of all accessories. | Test | Multimeter | B | 100% | 10% | instruction manual | TC | |
| 4.9 | Functional checking of control circuits, tripping through protective relays and auto reclose operation. | Test | Multimeter | B | 100% | 10% | instruction manual | TC | |
| 4.10 | Final document review | V | - | B | 100% | RANDOM | instruction manual/final document list | TC | |
| CONTRACTOR'S SIGNATURE | | | | | | | NAME & SIGN OF APPROVING AUTHORITY | | |

Legends :
CLASS OF CHECK:
A -- CRITICAL
B -- MAJOR
C-- MINOR
TC : Test Certificate
MRC : Material Reciept Certificate
V : Visual
EIC : Engineer In Charge

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | FIELD QUALITY PLAN | | | | | |
| | | | | | Item: DTR STRUCTURE AND COMPONENTS | | | | | |
| | | | | | Sub-system: ERECTION TRANSFORMER STRUCTURE | | | | | |
| SECTION - I : MS GALVANIZED COMPONENTS | | | | | | | | | | |
| S. NO | MAIN ACTIVITY& OPERA-TION | CHARAC-TERISTICS/ INSTRU-MENTS | CLASS OF CHECK | TYPE OF CHECK | QUANTUM OF CHECK - CONTRAC-TOR/PQCC | QUANTUM OF CHECK - TPIA/REC/ NQM | REFER-ENCE DOCUMENT | ACCEPTANCE NORMS | FORMAT OF RECORD | RE MARKS |
| 1 | RECEIPT AND STOR-AGE | 1) RECEIPT AT STORES | C | VISUAL | 100% | RANDOM | DELIVERY CHALLAN | CORRELATION OF THE LOT RECEIVED WITH THE DELIVERY CHAL-LAN / MDCC DESCRIP-TIONS | SITE REGISTER | COMPONENTS WHICH ARE INSPECTED AND CLEARED SHALL ONLY BE ACCEPTED |
| | | 2) VISUAL INSPECTION | C | VISUAL | 100% | RANDOM | | DAMAGED AND GALVA-NISATION DEFECTIVE COMPONENTS ARE TO BE STACKED SEPA-RATELY | STORES REGIS-TER | |
| | | 3) PROPER STORAGE | C | VISUAL | 100% | RANDOM | UTILITY / REC SPECI-FICATION or AS PER AC-CEPTANCE NORMS | ALL G.I. COMPONENTS SHOULD BE STACKED ON WOODEN SLEEP-ERS AND THE STOR-AGE AREA SHALL BE FREE FROM WATER LOGGING | STORES REGIS-TER | |
| 2 | FIXING OF MS COM-PONENTS | 1) CHECK THE ALIGN MENT OF TWO POLES | C | VISUAL | 100% | RANDOM | UTILITY / REC SPECI-FICATION or AS PER AC-CEPTANCE NORMS | AS PER APPROVED DRAWING | SITE REGISTER | BOTH THE POLES SHOULD BE PARALLEL TO EACH OTHER AND SHOULD BE PLANTED AT SAME DEPTH |
| | | 2) FIX THE TOP CHAN-NEL | C | VISUAL | 100% | RANDOM | UTILITY / REC SPECI-FICATION or AS PER AC-CEPTANCE NORMS | AS PER APPROVED DRAWING | SITE REGISTER | CHECK THE ALIGNMENT OF THE TOP CHANNEL WITH THE POLE |



REC
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| S. NO | MAIN ACTIVITY& OPERA-TION | CHARAC-TERISTICS/ INSTRU-MENTS | CLASS OF CHECK | TYPE OF CHECK | QUANTUM OF CHECK - CONTRAC-TOR/PQCC | QUANTUM OF CHECK - TPIA/REC/ NQM | REFER-ENCE DOCUMENT | ACCEPTANCE NORMS | FORMAT OF RECORD | RE MARKS |
|---|---|---|---|---|---|---|---|---|---|---|
| | | 3) FIX THE FISH PLATE | C | VISUAL | 100% | RANDOM | UTILITY / REC SPECI-FICATION or AS PER AC-CEPTANCE NORMS | AS PER APPROVED DRAWING | SITE REGISTER | THESE FISH PLATE SHOULD BE PLACED RIGIDLY AND HOLES ARE TO BE CHECKED |
| | | 3) FIX THE BELTING ANGLES WITH BELT-ING ANGLE BACK CLAMP | C | VISUAL | 100% | RANDOM | UTILITY / REC SPECI-FICATION or AS PER AC-CEPTANCE NORMS | AS PER APPROVED DRAWING | SITE REGISTER | ANGLES SHOULD BE FIXED FROM SPECIFIED FROM GROUND |
| | | 4) HORIZON-TAL ALIGN-MENT OF THE BELT-ING ANGLE WITH POLES | C | DIMEN-SIONAL | 100% | RANDOM | APPROVED DRAWING | APPROVED DRAWING | SITE REGISTER | |
| | | 5) FIX THE BRACING ANGLES WITH BRAC-ING ANGLE CLAMP | C | VISUAL | 100% | RANDOM | UTILITY / REC SPECI-FICATION or AS PER AC-CEPTANCE NORMS | AS PER APPROVED DRAWING | SITE REGISTER | THE BOLTS AND NUTS SHALL BE TIGHT ENOUGH TO HOLD THE BRACING TO THE POLE |
| | | 6) ALIGN-MENT OF THE BRAC-ING ANGLE WITH BELT-ING ANGLES | C | DIMEN-SIONAL | 100% | RANDOM | APPROVED DRAWING | APPROVED DRAWING | SITE REGISTER | THE ANGLE BETWEEN THE TWO BRACING SHOULD BE 900 AND SHOULD BE RIGID ENOUGH TO BEAR THE FORCES |

| S. NO | MAIN ACTIVITY& OPERA-TION | CHARAC-TERISTICS/ INSTRU-MENTS | CLASS OF CHECK | TYPE OF CHECK | QUANTUM OF CHECK - CONTRAC-TOR/PQCC | QUANTUM OF CHECK - TPIA/REC/ NQM | REFER-ENCE DOCUMENT | ACCEPTANCE NORMS | FORMAT OF RECORD | RE MARKS |
|---|---|---|---|---|---|---|---|---|---|---|
| 3 | STAY / GUY ERECTION | 8.1) LOCA-TION FOR THE GUY SETS | C | VISUAL | 100% | 50% | UTILITY / REC SPECI-FICATION or AS PER AC-CEPTANCE NORMS | | SITE REGISTER | AS PER APPROVED DRAWING THE NUMBER OF STAYS ARE TO BE ERECTED |
| | | 8.2) EXCA-VATION OF PIT SIZE 0.5M X 0.5M X 1.6M | C | DIMEN-SIONAL | 100% | RANDOM | UTILITY / REC SPECI-FICATION or AS PER AC-CEPTANCE NORMS | REC CONSTRUCTION STANDARD G-1 | SITE REGISTER | |
| | | 8.3)SIZING OF ANCHOR PLATE | C | DIMEN-SIONAL | 100% | RANDOM | UTILITY / REC SPECI-FICATION or AS PER AC-CEPTANCE NORMS | REC CONSTRUCTION STANDARD K-1 | SITE REGISTER | |
| | | 8.4)GROUT-ING OF ANCHOR PLATE AND ANCHOR ROD WITH EARTH FILL-ING | C | DIMEN-SIONAL | 100% | 50% | UTILITY / REC SPECI-FICATION or AS PER AC-CEPTANCE NORMS | | SITE REGISTER | IF GUY WIRE IS FOUND HAZARDOUS IT SHOULD BE PROTECT-ED WITH ASBESTOS PIPE FILL WITH CON-CRETE |
| | | 8.5)ANGLE BETWEEN STAY WIRE AND POLE | B | "MEA-SURE EMENT" | 100% | 50% | UTILITY / REC SPECI-FICATION or AS PER AC-CEPTANCE NORMS | REC CONSTRUCTION STANDARD G-1 | SITE REGISTER | |
| | | 8.6)EREC-TION OF GUY INSU-LATOR | C | VISUAL | 100% | 50% | UTILITY / REC SPECI-FICATION or AS PER AC-CEPTANCE NORMS | REC CONSTRUCTION STANDARD G-1 | SITE REGISTER | GUY INSULATORS ARE ERECTED AT HEIGHT OF 3050 mm FROM THE GROUND . |



REC
Endless energy. Infinite possibilities.

| S. NO | MAIN ACTIVITY& OPERA-TION | CHARAC-TERISTICS/ INSTRU-MENTS | CLASS OF CHECK | TYPE OF CHECK | QUANTUM OF CHECK - CONTRAC-TOR/PQCC | QUANTUM OF CHECK - TPIA/REC/ NQM | REFER-ENCE DOCUMENT | ACCEPTANCE NORMS | FORMAT OF RECORD | RE MARKS |
|---|---|---|---|---|---|---|---|---|---|---|
| | | 8.7) EREC-TION TURN-BUCKLE | C | VISUAL | 100% | 50% | UTILITY / REC SPECI-FICATION or AS PER AC-CEPTANCE NORMS | REC CONSTRUCTION STANDARD G-1 | SITE REGISTER | TURN BUCKLE ARE MOUNTED HALF WAY IN THE WORKING POSI-TION , THUS GIVING THE Max. MOVEMENT FOR TIGHTENING AND LOOSENING |
| | | 8.8) EN-SURE THE RIGIDNESS OF THE STRUC-TURE | C | VISUAL | 100% | RANDOM | STANDARD PRACTICE | APPROVED DRAWING | SITE REGISTER | |
| SECTION - II : FIXING OF INSULATORS | | | | | | | | | | |
| 4 | RECEIPT AND STOR-AGE | 1) RECEIPT AT STORES | C | VISUAL | 100% | RANDOM | DELIVERY CHALLAN | CORRELATION OF THE LOT RECEIVED WITH THE DELIVERY CHAL-LAN / MDCC DESCRIP-TIONS | SITE REGISTER | COMPONENTS WHICH ARE INSPECTED AND CLEARED BY PIA SHALL ONLY BE ACCEPTED ON RECEIPT |
| | | 2) VISUAL INSPECTION | C | VISUAL | 100% | RANDOM | | THE SURFACE OF THE INSULATOR IS TO BE THROUGHLY CHECKED AND CLEANED,<br><br>THE THREADING OF THE INSULATOR IS TO BE CHECKED | STORES REGIS-TER | DAMAGED INSULATORS ARE TO BE STACKED SEPARATELY |
| | | 3) PROPER STORAGE | C | VISUAL | 100% | RANDOM | STANDARD PRACTICE | | STORES REGIS-TER | |

| S. NO | MAIN ACTIVITY& OPERA-TION | CHARAC-TERISTICS/ INSTRU-MENTS | CLASS OF CHECK | TYPE OF CHECK | QUANTUM OF CHECK - CONTRAC-TOR/PQCC | QUANTUM OF CHECK - TPIA/REC/ NQM | REFER-ENCE DOCUMENT | ACCEPTANCE NORMS | FORMAT OF RECORD | RE MARKS |
|---|---|---|---|---|---|---|---|---|---|---|
| 5 | FIXING OF INSULA-TORS | 1) CHECK THREADING OVER THE PINS AND INSULA-TORS AND CHECK THE ALIGNMENT OF PIN WITH INSU-LATOR | C | VISUAL | 100% | RANDOM | UTILITY / REC SPECI-FICATION or AS PER AC-CEPTANCE NORMS | AS PER APPROVED DRAWING | SITE REGISTER | |
| | | 2) ASSEM-BLING THE GI PIN AND INSULA-TORS | C | VISUAL | 100% | RANDOM | APPROVED DRAWING | APPROVED DRAWING | | |
| | | 3) FIX THE PIN INSULA-TOR OVER THE FISH PLATES | C | VISUAL | 100% | RANDOM | UTILITY / REC SPECI-FICATION or AS PER AC-CEPTANCE NORMS | AS PER APPROVED DRAWING | SITE REGISTER | PIN INSULATORS SHALL BE TIGHTENED RIGIDLY TO WITH STAND THE LOAD. |
| | | 4) CHECK THE CLEAR-ANCES BETWEEN THE INSU-LATORS | B | DIMEN-SIONAL | RANDOM | RANDOM | UTILITY / REC SPECI-FICATION or AS PER AC-CEPTANCE NORMS | APPROVED DRAWING | | FOR CHECKING THE CLEARANCES SUITABLE TEMPLATE/ JIGS ARE TO BE USED |
| | | 5) NOW FIX THE RE-SPECTIVE DISC IN-SULATORS WITH DISC INSULATOR CLAMPS | C | VISUAL | 100% | RANDOM | UTILITY / REC SPECI-FICATION or AS PER AC-CEPTANCE NORMS | AS PER APPROVED DRAWING | SITE REGISTER | DEPENDING ON TYPE OF LOCATION T&C OR B&S ARE TO BE USED AS PER APPROVED DRAWING |

| S. NO | MAIN ACTIVITY& OPERA-TION | CHARACTERIS-TICS/INSTRU-MENTS | CLASS OF CHECK | TYPE OF CHECK | QUANTUM OF CHECK - CONTRAC-TOR/PQCC | QUANTUM OF CHECK - TPIA/REC/ NQM | REFER-ENCE DOCUMENT | ACCEPTANCE NORMS | FORMAT OF RECORD | RE MARKS |
|---|---|---|---|---|---|---|---|---|---|---|
| | | 6) CHECK THE CLEARANCES BETWEEN THE INSULATORS | B | DIMEN-SIONAL | RANDOM | RANDOM | UTILITY / REC SPECI-FICATION or AS PER AC-CEPTANCE NORMS | APPROVED DRAWING | | FOR CHECKING THE CLEARANCES SUIT-ABLE TEMPLATE/ JIGS ARE TO BE USED |
| SECTION - III : FIXING OF 11KV HG FUSE | | | | | | | | | | |
| 6 | RECEIPT AND STOR-AGE | 1) RECEIPT AT STORES | C | VISUAL | 100% | RANDOM | DELIVERY CHALLAN | CORRELATION OF THE LOT RECEIVED WITH THE DELIVERY CHAL-LAN | STORES REGIS-TER | COMPONENTS WHICH ARE IN-SPECTED AND CLEARED SHALL ONLY BE ACCEPTED ON RECEIPT |
| | | 2) VISUAL INSPECTION | C | VISUAL | 100% | RANDOM | | DAMAGED AND DEFEC-TIVE EQUIPMENT SHALL BE STACKED SEPARATELY | STORES REGIS-TER | MAJOR DAMAGED MATERIAL SHALL BE DISCARDED. |
| | | 3) PROPER STORAGE | C | VISUAL | 100% | RANDOM | UTILITY / REC SPECI-FICATION or AS PER AC-CEPTANCE NORMS | THE HG FUSE COM-PONENTS SHALL BE STORED ON WOODEN PLATFORM OF 300mm DEPTH | STORES REGIS-TER | |
| 7 | FIXING OF HG FUSE SET | 1) RATING PLATE DETAILS | C | VISUAL | 100% | 10% | STANDARD PRACTICE | APPROVED DRAWINGS | STORES REGIS-TER | |
| | | 2) CHECK LEVEL & ALIGN-MENT OF THE BASE, HOUS-ING ASSEMBLY & FLANGS | C | VISUAL | 100% | 10% | STANDARD PRACTICE | INSTRUCTION MANUAL | SITE REGISTER | |
| | | 3) CHECK FOR THE CLEARANCE BETWEEN LIVE PART TO EARTH | B | VISUAL | 100% | RANDOM | STANDARD PRACTICE | INSTRUCTION MANUAL / APPROVED DRAWING\ | SITE REGISTER | |

| S. NO | MAIN ACTIVITY& OPERA-TION | CHARAC-TERISTICS/ INSTRU-MENTS | CLASS OF CHECK | TYPE OF CHECK | QUANTUM OF CHECK - CONTRAC-TOR/PQCC | QUANTUM OF CHECK - TPIA/REC/ NQM | REFER-ENCE DOCUMENT | ACCEPTANCE NORMS | FORMAT OF RECORD | RE MARKS |
|---|---|---|---|---|---|---|---|---|---|---|
| SECTION - IV : ERECTION AND COMMISSIONING OF LINE SECTIONALIZER / AB SWITCH | | | | | | | | | | |
| 8 | RECEIPT AND STOR-AGE | 1) RECEIPT AT STORES | C | VISUAL | 100% | RANDOM | DELIVERY CHALLAN | CORRELATION OF THE LOT RECEIVED WITH THE DELIVERY CHAL-LAN | STORES REGIS-TER | COMPONENTS WHICH ARE INSPECTED AND CLEARED SHALL ONLY BE ACCEPTED ON RECEIPT |
| | | 2) VISUAL INSPECTION | C | VISUAL | 100% | RANDOM | | DAMAGED AND DEFEC-TIVE EQUIPMENT SHALL BE STACKED SEPARATELY | STORES REGIS-TER | MAJOR DAMAGED MATERIAL SHALL BE DISCARDED. |
| | | 3) PROPER STORAGE | C | VISUAL | 100% | RANDOM | STANDARD PRACTICE | THE AB SWITCH COM-PONENTS SHALL BE STORED ON WOODEN PLATFORM OF 300mm DEPTH | STORES REGIS-TER | |
| 9 | FIXING OF LINE SECTION-ALIZER/ AB SWITCH | A) INSTAL-LATION | | | | | | | | |
| | | 1) RAT-ING PLATE DETAILS | C | VISUAL | 100% | 10% | STANDARD PRACTICE | APPROVED DRAWING | SITE REGISTER | |
| | | 2) CHECK FOR PROPER SLING AND LIFTING | C | VISUAL | 100% | RANDOM | STANDARD PRACTICE | INSTRUCTION MANUAL | SITE REGISTER | |
| | | 3) CHECK TIGHTNESS OF BASE BOLTS AND OTHER BOLTED JOINTS BY TORQUE WRENCH | C | VISUAL | 100% | RANDOM | STANDARD PRACTICE | INSTRUCTION MANUAL | SITE REGISTER | |

| S. NO | MAIN ACTIVITY& OPERA-TION | CHARAC-TERISTICS/ INSTRU-MENTS | CLASS OF CHECK | TYPE OF CHECK | QUANTUM OF CHECK - CONTRAC-TOR/PQCC | QUANTUM OF CHECK - TPIA/REC/ NQM | REFER-ENCE DOCUMENT | ACCEPTANCE NORMS | FORMAT OF RECORD | RE MARKS |
|---|---|---|---|---|---|---|---|---|---|---|
| | | 4) CHECK LEVEL & ALIGN-MENT OF THE BASE, HOUSING ASSEMBLY & FLANGES | C | VISUAL | 100% | 10% | STANDARD PRACTICE | INSTRUCTION MANUAL | SITE REGISTER | |
| | | 5) ENSURE PROPER ERECTION OF POLES, MAIN BLADE & DRIVE ASSEMBLY AS PER APPROVED DRAWINGS | C | VISUAL | 100% | RANDOM | STANDARD PRACTICE | APPROVED DRAWING | SITE REGISTER | |
| | | 6) CHECK FOR THE ALIGNMENT AND VERTI-CALITY OF SECTIONAL-IZER | C | VISUAL | 100% | 10% | STANDARD PRACTICE | INSTRUCTION MANUAL / APPROVED DRAWING\ | SITE REGISTER | |
| | | 7) CHECK FOR THE CLEARANCE BETWEEN LIVE PART TO EARTH | B | VISUAL | 100% | RANDOM | STANDARD PRACTICE | INSTRUCTION MANUAL / APPROVED DRAWING\ | SITE REGISTER | |

| S. NO | MAIN ACTIVITY& OPERA-TION | CHARACTER-ISTICS/IN-STRUMENTS | CLASS OF CHECK | TYPE OF CHECK | QUANTUM OF CHECK - CONTRAC-TOR/PQCC | QUANTUM OF CHECK - TPIA/REC/ NQM | REFER-ENCE DOCUMENT | ACCEPTANCE NORMS | FORMAT OF RECORD | RE MARKS |
|---|---|---|---|---|---|---|---|---|---|---|
| | | 9) CHECK FOR NO VI-BRATION OR ROTATION OF CONTACTS INSULATORS DURING ISOLATOR OPERATION | C | VISUAL | 100% | 10% | STANDARD PRACTICE | INSTRUCTION MANUAL | SITE REGISTER | |
| | | 10) CHECK FOR THE PROVISION OF EARTHING AND EARTH CONNECTION | C | VISUAL | 100% | 50% | STANDARD PRACTICE | APPROVED DRAWING | SITE REGISTER | |
| | | 11) CHECK OPERATION OF THE ISOLATOR BY ROTAT-ING ONE OF THE INSULA-TOR STACK MANUALLY AND ADJUST THE LENGTH OF THE CROSSED TANDEM ASSEMBLY TO ENSURE PROPER ENGAGE-MENT OF CONTACTS DURING CLOSING. | B | VISUAL | 100% | 50% | STANDARD PRACTICE | INSTRUCTION MANUAL / APPROVED DRAW-ING\ | SITE REGISTER | ENSURE THE ENTIRE STRUCTURE SHOULD BE RIGID AND CHECK THE RIGIDNESS BY OERATING THE AB SWITCHES |

| S. NO | MAIN ACTIVITY& OPERA-TION | CHARAC-TERISTICS/ INSTRU-MENTS | CLASS OF CHECK | TYPE OF CHECK | QUANTUM OF CHECK - CONTRAC-TOR/PQCC | QUANTUM OF CHECK - TPIA/REC/ NQM | REFER-ENCE DOCUMENT | ACCEPTANCE NORMS | FORMAT OF RECORD | RE MARKS |
|---|---|---|---|---|---|---|---|---|---|---|
| 10 | PRE COM-MISSION-ING | 1) CHECK FOR VISUAL DAMAGE TO ANY PARTS INCLUDING PORCELAIN ISOLATOR | C | VISUAL | 100% | RANDOM | STANDARD PRACTICE | INSTRUCTION MANUAL / APPROVED DRAWING\ | SITE REGISTER | |
| | | 2) CHECK MANUAL / OPERTION AND INTER LOCKS | B | VISUAL CHECK | 100% | 10% | STANDARD PRACTICE | INSTRUCTION MANUAL / APPROVED DRAWING\ | SITE REGISTER | |
| | | 3) IR VALUE BETWEEN EARTH TO POLE | B | VISUAL CHECK | 100% | 10% | STANDARD PRACTICE | INSTRUCTION MANUAL / APPROVED DRAWING\ | SITE REGISTER | |
| | | 4) GROUND CONNEC-TIONS | C | VISUAL CHECK | 100% | RANDOM | STANDARD PRACTICE | INSTRUCTION MANUAL / APPROVED DRAWING\ | SITE REGISTER | |
| | | 5) CHECK CONTINUITY | B | VISUAL CHECK | 100% | 10% | STANDARD PRACTICE | INSTRUCTION MANUAL / APPROVED DRAWING\ | SITE REGISTER | |
| SECTION - V : ERECTION & COMMISSIONING OF DTRS | | | | | | | | | | |
| 11 | RECEIPT AND STOR-AGE | 1) RECEIPT AT STORES | C | VISUAL | 100% | RANDOM | DELIVERY CHALLAN | CORRELATION OF THE LOT RECEIVED WITH THE DELIVERY CHAL-LAN / MDCC DESCRIP-TIONS | STORES REGIS-TER | TRANSFORMERS AND ACCESSORIES IN-CLUDING LAs WHICH ARE INSPECTED AND CLEARED SHALL ONLY BE ACCEPTED ON RECEIPT |
| | | 2) VISUAL INSPECTION | C | VISUAL | 100% | RANDOM | APPROVED DRAWING | DAMAGED COMPO-NENTS SHALL BE STAGED SEPARATELY | STORES REGIS-TER | MAJOR DAMAGED MATERIAL SHALL BE DISCARDED. |

| S. NO | MAIN ACTIVITY& OPERA-TION | CHARACTERIS-TICS/INSTRU-MENTS | CLASS OF CHECK | TYPE OF CHECK | QUANTUM OF CHECK - CONTRAC-TOR/PQCC | QUANTUM OF CHECK - TPIA/REC/ NQM | REFER-ENCE DOCUMENT | ACCEPTANCE NORMS | FORMAT OF RE-CORD | RE MARKS |
|---|---|---|---|---|---|---|---|---|---|---|
| | | 3) PROPER STOR-AGE | C | VISUAL | 100% | RANDOM | UTILITY / REC SPECI-FICATION or AS PER AC-CEPTANCE NORMS | THE TRANSFORMERS AND THE ACCES-SORIES SHALL BE STACKED ON DRY LEVELLED AND RAISED PLATFORM. ALL PIPE WORK CONSERVA-TORS, RADIATORS SHOULD BE STORED WITH THEIR BLANKING PLATES IN POSITION HEATERS IN THE MARSHELLING BOX SHOULD BE KEPT ENERZIZED TO AVOID CONDENSATION | STORES REGISTER | |
| 12 | ERECTION OF TRANS-FORMERS | 1) ENSURE THE REGIDNESS OF THE STRUCTURE OVER WHICH TRANFORMER IS TO BE ERECTED | C | VISUAL | 100% | 50% | STANDARD PRACTICE | AS PER APPROVED DRAWING | SITE REGISTER | |
| | | 2) LIFTING OF THE TRANFORM-ERS | C | VISUAL | 100% | RANDOM | AS PER MANUFAC-TURER IN-STRUCTION MANUAL | "VERTICALITY OF THE TRANFORMERS SHALL BE MAINTAINED HV / LV ORIENTATION OF THE TRANFORMER SHALL BE CHECKED" | SITE REGISTER | |
| | | 3) ENSURE PRO-POER SITTING OF THE TRANS-FORMER OVER THE STRUCTURE | C | VISUAL | 100% | 10% | STANDARD PRACTICE | THERE SHOULD NOT BE ANY MOVEMENT OF THE TRANFORMER AND TRANSFORMER SHALL BE FIXED RIG-IDLY TO THE STRUC-TURE | SITE REGISTER | THE BOLTS AND NUTS SHALL BE TIGHT ENOUGH TO HOLD THE TRANSFORMER WITHOUT ANY SHAKE |



REC
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| S. NO | MAIN ACTIVITY& OPERA-TION | CHARACTERIS-TICS/INSTRU-MENTS | CLASS OF CHECK | TYPE OF CHECK | QUANTUM OF CHECK - CONTRAC-TOR/PQCC | QUANTUM OF CHECK - TPIA/REC/ NQM | REFER-ENCE DOCUMENT | ACCEPTANCE NORMS | FORMAT OF RECORD | RE MARKS |
|---|---|---|---|---|---|---|---|---|---|---|
| | | 4) HV / LV POSI-TION | C | VISUAL | 100% | RANDOM | AS PER MANUFAC-TURER IN-STRUCTION MANUAL | AS PER APPROVED DRAWING | SITE REGISTER | AIR CLEARANCE SHOULD BE AS PER APPROVED DRAW-ING |
| | | 5) OTHER ACCES-SORIES LIKE LAs, BUSHINGS, CON-NECTORS ETC. ARE ERECTED | C | VISUAL | 100% | 50% | AS PER MANUFAC-TURER IN-STRUCTION MANUAL | AS PER APPROVED DRAWING | SITE REGISTER | AIR CLEARANCES SHOULD BE AS PER APPROVED DRAW-ING |
| 13 | PRE COMMIS-SIONING CHECKS | 1) INSULATION RESISTANCE | A | TEST | 100% | 10% | UTILITY / REC SPECI-FICATION or AS PER AC-CEPTANCE NORMS | | SITE REGISTER | A 5 KV MEGGER PREFERABLY MO-TOR OPERATED SHOULD BE USED FOR MEASURING HIGHER VALUES. BUSHINGS ARE THROUGHLY CLEANED BE-FORE TAKING IR VALUES. IR VALUES BETWEEN WINDINGS AND BETWEEN WIND-INGS TO EARTH ARE CHECKED. WHILE CHECKING THESE VALUES, NO EXTERNAL LINES or LIGHTNING AR-RESTERS SHOULD BE IN CIRCUIT. |
| | | 2) OIL DIEELEC-TRIC STRENTH TEST | A | TEST | 100% | 10% | AS PER IN-STRUCTION MANUAL | IS : 335 SAMPLES FROM TOP AND BOT-TOM OF TRANFORMER ARE TESTED, IF REQUIRED | SITE REGISTER | |

| S. NO | MAIN ACTIVITY& OPERA-TION | CHARAC-TERISTICS/ INSTRU-MENTS | CLASS OF CHECK | TYPE OF CHECK | QUANTUM OF CHECK - CONTRAC-TOR/PQCC | QUANTUM OF CHECK - TPIA/REC/ NQM | REFERENCE DOCUMENT | ACCEPTANCE NORMS | FORMAT OF RECORD | RE MARKS |
|---|---|---|---|---|---|---|---|---|---|---|
| | | 3) GENERAL CHECKS | | | | | | | | |
| | | a) ALL OIL VALVES ARE IN CORRECT POSITION, CLOSED OR OPENED AS REQUIRED | C | VISUAL | 100% | RANDOM | AS PER IN-STRUCTION MANUAL | | SITE REGISTER | |
| | | b) ALL AIR POCK-ETS ARE CLEARED | C | TEST | 100% | RANDOM | AS PER IN-STRUCTION MANUAL | | SITE REGISTER | |
| | | c) THER-MOMETER POCKETS ARE FILLED WITH OIL | C | TEST | 100% | RANDOM | AS PER IN-STRUCTION MANUAL | | SITE REGISTER | |
| | | d) OIL IS AT CORRECT LEVEL IN THE TRAN-FORMERS | B | TEST | 100% | RANDOM | AS PER IN-STRUCTION MANUAL | | SITE REGISTER | |
| | | e) EARTH-ING CON-NECTIONS ARE DONE | C | TEST | 100% | 50% | AS PER IN-STRUCTION MANUAL | | SITE REGISTER | |
| | | f) ARCING HORN GAPS ON BUSH-INGS ARE PROPERLY ADJUSTED | C | TEST | 100% | 10% | AS PER IN-STRUCTION MANUAL | | SITE REGISTER | |

| S. NO | MAIN ACTIVITY& OPERA-TION | CHARAC-TERISTICS/ INSTRU-MENTS | CLASS OF CHECK | TYPE OF CHECK | QUANTUM OF CHECK - CONTRAC-TOR/PQCC | QUANTUM OF CHECK - TPIA/REC/ NQM | REFERENCE DOCUMENT | ACCEPTANCE NORMS | FORMAT OF RECORD | RE MARKS |
|---|---|---|---|---|---|---|---|---|---|---|
| 14 | ENERZISA-TION | CHARGING THE TRANS-FORMER | A | VISUAL | 100% | 10% | AS PER IN-STRUCTION MANUAL | NO ABNORMILITY SUCH AS VIBRATION OF THE PARTS, HUM NOISE SHOULD BE ABSORBED | SITE REGISTER | ABNORMILITIES IF NOTICED SHOULD BE CORRECTED AFTER FEW HOURS OF ENER-ZISATION AT NO LOAD. |
| SECTION - VI : EARTHING OF DTR STATION | | | | | | | | | | |
| 15 | IDENTIFI-CATION OF THE EARTH PITS AND EARTHING EQUIP-MENT | 1) IDEN-TIFY THE LOCATION WHERE THE EARTHING IS TO BE DONE | A | VISUAL | 100% | 10% | AS PER APPROVED DRAWING | REFERE REC CON-STRUCTION STAN-DARDS | SITE REGISTER | |
| | | 2) IDENTIFY THE TRANS-FORMER NEUTRAL TERMINAL, LA TERMI-NAL AND OTHER ACCESSO-RIES | A | VISUAL | 100% | 10% | AS PER APPROVED DRAWING | REFERE REC CON-STRUCTION STAN-DARDS | SITE REGISTER | |
| 16 | PIPE TYPE EARTHING INSTALLA-TION OF DP STRUC-TURE | 1) EXCAVA-TION OF PIT SIZE | C | VISUAL | 100% | RANDOM | AS PER APPROVED DRAWING | REFERE REC CON-STRUCTION STAN-DARDS J2 | SITE REGISTER | |
| | | 2) INSTALL 40 DIA GI PIPE WITH 12 DIA HOLES IN THE PIT | C | VISUAL | 100% | 10% | AS PER APPROVED DRAWING | REFERE REC CON-STRUCTION STAN-DARDS J2 | SITE REGISTER | |

| S. NO | MAIN ACTIVITY& OPERA-TION | CHARAC-TERISTICS/ INSTRU-MENTS | CLASS OF CHECK | TYPE OF CHECK | QUANTUM OF CHECK - CONTRAC-TOR/PQCC | QUANTUM OF CHECK - TPIA/REC/ NQM | REFERENCE DOCUMENT | ACCEPTANCE NORMS | FORMAT OF RECORD | RE MARKS |
|---|---|---|---|---|---|---|---|---|---|---|
| | | 3) FILL THE PIT WITH ALTERNATE LAYERS OF 300 mm CHAR COAL AND SALT | A | VISUAL | 100% | 10% | AS PER APPROVED DRAWING | REFERE REC CON-STRUCTION STAN-DARDS J2 | SITE REGISTER | IN CASE OF THE ORDINARY SOILS WHERE PIPE COULD HAMOURED IN, TREAT-MENT OF THE PIT WITH CHARCOAL AND SALT IS NOT NECESSARY |
| | | 4) CON-NECTIONS BETWEEN THE PIPE AND POLE WITH 8mm SWG WIRE | C | VISUAL | 100% | 10% | AS PER APPROVED DRAWING | REFERE REC CON-STRUCTION STAN-DARDS J2 | SITE REGISTER | |
| | | 5) CONNECT THE EQUIP-MENT TO BE EARTHED AND THE PIPE EARTHE TERMINALS WITH GI WIRE | C | VISUAL | 100% | 10% | AS PER APPROVED DRAWING | THERE SHOULD NOT BE ANY LOOSE CON-NECTIONS | SITE REGISTER | |
| 17 | TESTING OF EARTH RESISTIV-ITY | TESTING OF EARTHING | A | TEST | 100% | 10% | STANDARD PRACTICE | INSTRUCTION MANUAL | SITE REGISTER | |
| SECTION - VII : ERECTION OF DANGER BOARDS AND ANTICLIMBING DEVICES | | | | | | | | | | |
| 18 | | 1) FIXING OF DANGER BOARDS | C | VISUAL | 100% | 50% | INSTRUC-TION MANUAL | APPROVED DRAWINGS AND REC SPECIFICA-TION NO 57 | SITE REGISTER | THE LANGUAGE OF LETTERINGS SHALL CONFIRM TO RULE NO 35 OF IE RULES 1956 AND SHALL BE IN HIN-DHI OR ENGLISH AND IN LOCAL LANGUAGE WITH SIGN OF SKULL AND BONES |

| S. NO | MAIN ACTIVITY& OPERA-TION | CHARAC-TERISTICS/ INSTRU-MENTS | CLASS OF CHECK | TYPE OF CHECK | QUANTUM OF CHECK - CONTRAC-TOR/PQCC | QUANTUM OF CHECK - TPIA/REC/ NQM | REFERENCE DOCUMENT | ACCEPTANCE NORMS | FORMAT OF RECORD | RE MARKS |
|---|---|---|---|---|---|---|---|---|---|---|
| | | 2) EREC-TION OF ANTI CLIMBING DEVICES - BARBED WIRE | C | VISUAL | 100% | 50% | INSTRUC-TION MANUAL | APPROVED DRAWINGS | SITE REGISTER | |
| SECTION - VIII : ERECTION AND COMMISSIONING OF LT DISTRIBUTION BOXES | | | | | | | | | | |
| 19 | INSTALLA-TION | 1) RECEIPT AT STORES | C | VISUAL | 100% | 5% | DELIVERY CHALLAN | CORRELATION OF THE LOT RECEIVED WITH THE DELIVERY CHAL-LAN | STORES REGIS-TER | COMPONENTS WHICH ARE INSPECTED AND CLEARED SHALL ONLY BE ACCEPTED ON RECEIPT |
| | | 2) VISUAL INSPEC-TION | C | VISUAL | 100% | 5% | APPROVED DRAWING | DAMAGED COMPO-NENTS SHALL BE STACKED SEPARATELY | STORES REGIS-TER | MAJOR DAMAGED MATERIAL SHALL BE DISCARDED. |
| | | 3) PROPER STORAGE | C | VISUAL | 100% | 5% | UTILITY / REC SPECI-FICATION or AS PER AC-CEPTANCE NORMS | THE TRANSFORMERS AND THE ACCES-SORIES SHALL BE STACKED ON DRY LEVELLED AND RAISED PLATFORM. ALL PIPE WORK CONSERVA-TORS, RADIATORS SHOULD BE STORED WITH THEIR BLANKING PLATES IN POSITION HEATERS IN THE MARSHELLING BOX SHOULD BE KEPT ENERZIZED TO AVOID CONDENSATION | STORES REGIS-TER | |
| | | 4) EREC-TION OF LT DISTRI-BUTION BOXES | C | VISUAL | 100% | 10% | STANDARD PRACTICE | AS PER APPRROVED DRAWINGS | SITE REGISTER | |

| S. NO | MAIN ACTIVITY& OPERA-TION | CHARAC-TERISTICS/ INSTRU-MENTS | CLASS OF CHECK | TYPE OF CHECK | QUANTUM OF CHECK - CONTRAC-TOR/PQCC | QUANTUM OF CHECK - TPIA/REC/ NQM | REFERENCE DOCUMENT | ACCEPTANCE NORMS | FORMAT OF RECORD | RE MARKS |
|---|---|---|---|---|---|---|---|---|---|---|
| | | 2) EREC-TION OF ANTI CLIMBING DEVICES - BARBED WIRE | C | VISUAL | 100% | 50% | INSTRUC-TION MANUAL | APPROVED DRAWINGS | SITE REGISTER | |
| SECTION - VIII : ERECTION AND COMMISSIONING OF LT DISTRIBUTION BOXES | | | | | | | | | | |
| 19 | INSTALLA-TION | 1) RECEIPT AT STORES | C | VISUAL | 100% | 5% | DELIVERY CHALLAN | CORRELATION OF THE LOT RECEIVED WITH THE DELIVERY CHAL-LAN | STORES REGIS-TER | COMPONENTS WHICH ARE INSPECTED AND CLEARED SHALL ONLY BE ACCEPTED ON RECEIPT |
| | | 2) VISUAL INSPECTION | C | VISUAL | 100% | 5% | APPROVED DRAWING | DAMAGED COMPO-NENTS SHALL BE STACKED SEPARATELY | STORES REGIS-TER | MAJOR DAMAGED MATERIAL SHALL BE DISCARDED. |
| | | 3) PROPER STORAGE | C | VISUAL | 100% | 5% | UTILITY / REC SPECI-FICATION or AS PER AC-CEPTANCE NORMS | THE TRANSFORMERS AND THE ACCES-SORIES SHALL BE STACKED ON DRY LEVELLED AND RAISED PLATFORM. ALL PIPE WORK CONSERVA-TORS, RADIATORS SHOULD BE STORED WITH THEIR BLANKING PLATES IN POSITION HEATERS IN THE MARSHELLING BOX SHOULD BE KEPT ENERZIZED TO AVOID CONDENSATION | STORES REGIS-TER | |
| | | 4) EREC-TION OF LT DISTRIBU-TION BOXES | C | VISUAL | 100% | 10% | STANDARD PRACTICE | AS PER APPRROVED DRAWINGS | SITE REGISTER | |



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| S. NO | MAIN ACTIVITY& OPERA-TION | CHARAC-TERISTICS/ INSTRU-MENTS | CLASS OF CHECK | TYPE OF CHECK | QUANTUM OF CHECK - CONTRAC-TOR/PQCC | QUANTUM OF CHECK - TPIA/REC/ NQM | REFERENCE DOCUMENT | ACCEPTANCE NORMS | FORMAT OF RECORD | RE MARKS |
|---|---|---|---|---|---|---|---|---|---|---|
| | | 5) EARTH-ING OF LTDB | B | VISUAL | 100% | 10% | STANDARD PRACTICE | AS PER APPRROVED DRAWINGS | SITE REGISTER | COVER OF THE BOX IS ALSO TO BE EARTHED BY WAY OF FLEXIBLE COPPER LINK OF SUIT-ABLE DIMENSION |
| | | | | | | | | | | |
| | CLASS OF CHECK:<br>A -- CRITICAL<br>B -- MAJOR<br>C-- MINOR | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |
| NAME/ SIGNATURE OF THE SUB-CONTRACTOR/ ERECTION AGENCY | | | | | | | | | | |

| | FIELD QUALITY PLAN FOR CT & PT | ITEM :<br>SUB SYSTEM :<br>QAP NO. :<br>REV. NO.: | ERECTION WORK<br>CT/ PT |
|---|---|---|---|
| | | DATE : | |

| Sr. No. | CHARACTERISTICES / ITEMS | Type of Check | Instruments | Class | QUANTUM OF CHECK - CONTRACTOR/PQCC | QUANTUM OF CHECK - TPIA/REC/ NQM | Reference Documents & Acceptance Standard | "Format Of Records" | Remarks |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 | 6 | 7 | 8 | 9 |
| 1 | RECEIPT & STORAGE | | | | | | | | |
| 1.1 | Receiving inspection (Completeness of documents, test certificates, instruction manual etc.) | V | - | B | 100% | RANDOM | Delivery Challan & Specification | MRC / Check List | |
| 1.2 | Unloading | V | - | B | 100% | RANDOM | Instruction Manual | - | |
| 1.3 | Visual exmination for damage & defects | V | - | B | 100% | RANDOM | Packing list / Instruction Manual | - | |
| 1.4 | Proper storage | V | - | B | 100% | RANDOM | Instruction Manual | - | |
| | | | | | | | | | |
| 2 | PRE INSTALLATION | | | | | | | | |
| 2.1 | Availability of instruction manual and drawing, lifting arrangement | V | - | B | 100% | RANDOM | List of approved drawing / Instruction Manuals | - | |
| 2.2 | Availability of all materials | V | - | B | 100% | RANDOM | Packing list, Approved drawing & Bill Of Material | - | |
| 2.3 | CT foundation | V | - | B | 100% | RANDOM | Civil foundation drawing | - | |
| 2.4 | Vertically of support structure | V | - | B | 100% | RANDOM | GA/ Structural drawing | - | |
| | | | | | | | | | |
| 3 | INSTALLATION | | | | | | | | |
| 3.1 | Rating plate details | V | - | B | 100% | RANDOM | instruction manual | Site record | |



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| Sr. No. | CHARACTERISTICES / ITEMS | Type of Check | Instruments | Class | QUANTUM OF CHECK - CONTRACTOR/PQCC | QUANTUM OF CHECK - TPIA/REC/ NQM | Reference Documents & Acceptance Standard | "Format Of Records" | Remarks |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 | 6 | 7 | 8 | 9 |
| 3.2 | Check that the C.T. have been installed in proper polarity (P1 & P2 position) | V | - | B | 100% | RANDOM | As per EIC/SLD | - | |
| 3.3 | Check for the tightness of equipment base bolts with | V | - | B | 100% | RANDOM | instruction manual | - | |
| 3.4 | Check overall alignment of C.T. | V | - | B | 100% | RANDOM | instruction manual | - | |
| 3.5 | Check for the primary ratio connected as per requirement. | V | - | B | 100% | RANDOM | Rating plate | - | |
| 3.6 | Earthing of support structure & CT frame. | V | - | B | 100% | RANDOM | instruction manual | - | |
| 3.7 | Check provision of earthing and tightness of earthing connection. | V | - | B | 100% | RANDOM | instruction manual | - | |
| 3.8 | Check for the tightness of clamps/ connectors. | V | - | B | 100% | RANDOM | instruction manual | - | |
| 3.9 | Check for secondary termination tightness and crimping of leads. | V | - | B | 100% | RANDOM | instruction manual | - | |
| 3.10 | Check the cable tags and ferrules are provided | V | - | B | 100% | RANDOM | Cable schedule | - | |
| 3.11 | Ensure that unused secondary core are correctly shorted. | V | - | B | 100% | RANDOM | instruction manual | - | |
| 3.12 | R,Y,B identification | V | - | B | 100% | RANDOM | - | - | |
| 3.13 | Check for oil leackages | V | - | B | 100% | RANDOM | instruction manual / No leackages | Site record | |

| Sr. No. | CHARACTERISTICES / ITEMS | Type of Check | Instruments | Class | QUANTUM OF CHECK - CONTRAC-TOR/PQCC | QUANTUM OF CHECK - TPIA/REC/ NQM | Reference Docu-ments & Accep-tance Standard | "Format Of Records" | Remarks |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 | 6 | 7 | 8 | 9 |
| 3.14 | Check verticality of equipment on support structure | V | - | B | 100% | RANDOM | instruction manual | Site record | |
| | | | | | | | | | |
| 4 | PRE COMMISSIONING | | | | | | | | |
| 4.1 | Measure IR value using meggar | | Megger | A | 100% | 10% | instruction manual | TC | |
| | a. Primary to secondary cores and earth with 2.5 kV. | Test | | | | | | | |
| | b. Between secondary cores. | Test | | | | | | | |
| | c. Between secondary to earth. | Test | | | | | | | |
| 4.2 | Check polarity. | Test | Multimeter/ Dry cell | A | 100% | 10% | instruction manual / SLD | TC | |
| 4.3 | Check for CT ratio by primary Injection method. | Test | Primary injection kit | A | 100% | 10% | instruction manual | TC | |
| 4.4 | Magnetising curve | Test | - | B | 100% | RANDOM | instruction manual | TC | |
| 4.5 | Final document review | - | - | B | 100% | RANDOM | instruction manual/fi-nal document list | TC | |
| CONTRACTOR'S SIGNATURE | | | | | | | NAME & SIGN OF APPROVING AUTHORITY | | |

Legends :
CLASS OF CHECK:
A -- CRITICAL
B -- MAJOR
C-- MINOR
TC : Test Certificate
MRC : Material Reciept Certificate
V : Visual
EIC : Engineer In Charge



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| | FIELD QUALITY PLAN FOR Control & Relay Panel | ITEM :<br>SUB SYSTEM :<br>QAP NO. :<br>REV. NO.: | ERECTION WORK<br>Control & Relay Panel |
|---|---|---|---|

DATE :

| Sr. No. | CHARACTERISTICES / ITEMS | Type of Check | Instruments | Class | QUANTUM OF CHECK - CONTRAC-TOR/PQCC | QUANTUM OF CHECK - TPIA/ REC/NQM | Reference Documents & Acceptance Standard | "Format Of Records" | Remarks |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 | 6 | 7 | 8 | 9 |
| 1 | RECEIPT & STORAGE | | | | | | | | |
| 1.1 | Receiving inspection (Completeness of documents, test certificates, instruction manual etc.) | V | - | B | 100% | RANDOM | Delivery Challan & Specification | MRC / Check List | |
| 1.2 | Unloading | V | - | B | 100% | RANDOM | Instruction Manual | Site record | |
| 1.3 | Visual exmination for damage & defects | V | - | B | 100% | RANDOM | Packing list / Instruction Manual | Site record | |
| 1.4 | Proper storage | V | - | B | 100% | RANDOM | Instruction Manual | - | |
| 2 | PRE INSTALLATION | | | | | | | | |
| 2.1 | Availability of instruction manual and drawing, lifting arrangement | V | - | B | 100% | RANDOM | List of approved drawing / Instruction Manuals | Site record | |
| 2.2 | Availability of all materials | V | - | B | 100% | RANDOM | Packing list, Approved drawing & Bill Of Material | Site record | |
| 2.3 | Panel inatallation space | V | - | B | 100% | RANDOM | Control room detail | - | |
| 3 | INSTALLATION | | | | | | | | |
| 3.1 | Rating plate details | V | - | B | 100% | RANDOM | instruction manual | Site record | |

| Sr. No. | CHARACTERISTICES / ITEMS | Type of Check | Instruments | Class | QUANTUM OF CHECK - CONTRAC-TOR/PQCC | QUANTUM OF CHECK - TPIA/ REC/NQM | Reference Documents & Acceptance Standard | "Format Of Records" | Remarks |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 | 6 | 7 | 8 | 9 |
| 3.2 | Verticality & levelling of panels on support stuctures. | Measure | - | B | 100% | RANDOM | instruction manual | Site record | |
| 3.3 | Check earth bus con-nection | V | - | B | 100% | RANDOM | instruction manual | Site record | |
| 3.4 | Check the floor leveling where the panels are to be installed. | V | - | B | 100% | RANDOM | As per site conditionss | - | |
| 3.5 | Check the physical con-diton of the panels after opening the packing and verify the material as per BOM. | V | - | B | 100% | RANDOM | Specification | Site record | |
| 3.6 | Ensure the panels are lifted using proper slings/ tackles. | V | - | B | 100% | RANDOM | Erection manual | - | |
| 3.7 | Check the panels are levelled, aligned and erected properly. | V | - | B | 100% | RANDOM | As per site conditionss | - | |
| 3.8 | Removal of top and side blanking plates. | V | - | B | 100% | RANDOM | Approved panel drawing | - | |
| 3.9 | Inter panel wiring is comleted as per draw-ing. | V | - | B | 100% | RANDOM | Approved panel drawing | - | |
| 3.10 | Check the tightness of inter panel nuts and bolts, Main bus, earth bus connection etc. | V | - | B | 100% | RANDOM | Approved panel drawing | - | |
| 3.11 | Checked for broken glass, switch handle, lamp cover etc. | V | - | B | 100% | RANDOM | Approved panel drawing | - | |
| 3.12 | Glanding of external cables | V | - | B | 100% | RANDOM | Approved panel drawing | - | |

| Sr. No. | CHARACTERISTICES / ITEMS | Type of Check | Instruments | Class | QUANTUM OF CHECK - CONTRAC-TOR/PQCC | QUANTUM OF CHECK - TPIA/ REC/NQM | Reference Documents & Acceptance Standard | "Format Of Records" | Remarks |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 | 6 | 7 | 8 | 9 |
| 3.13 | Blanking of unused cable entry locks | V | - | B | 100% | RANDOM | Approved panel drawing | - | |
| 3.14 | Proper sealing & lock-ing arrangement of panel door | V | - | B | 100% | RANDOM | Approved panel drawing | - | |
| 4 | PRE COMMISSIONING | | | | | | | | |
| 4.1 | Circuit diagram check | V | - | B | 100% | RANDOM | Approved panel drawing | TC | |
| 4.2 | Auxiliary power supply test | Test | Multimeter | B | 100% | RANDOM | Approved panel drawing | TC | |
| 4.3 | Functional & operation test of fittings on the panels. | V | - | B | 100% | RANDOM | Approved panel drawing | TC | |
| 4.4 | Relay settings as per recommendation | V | - | B | 100% | RANDOM | Approved panel drawing | TC | |
| 4.5 | Scheme check | V | - | B | 100% | RANDOM | Approved panel drawing | TC | |
| 4.6 | IR Value check | Electrical | Megger | A | 100% | RANDOM | Instruction manual | site record | |
| 4.7 | Secondary injection test for relays | Electrical | Injection kit | A | 100% | RANDOM | Instruction manual | site record | |
| 4.8 | Check minimum pick up & drop out voltage of all coils & auxiliary contacts | Electrical | Voltmeter | A | 100% | RANDOM | Instruction manual | site record | |
| 4.9 | Final document review | V | - | B | 100% | RANDOM | Approved panel drawing / Final document list | TC | |
| CONTRACTOR'S SIGNATURE | | | | | | | NAME & SIGN OF APPROVING AUTHORITY | | |

Legends :
"CLASS OF CHECK:
A -- CRITICAL
B -- MAJOR
C-- MINOR MRC : Material Reciept Certificate TC : Test Certificate V : Visual
EIC : Engineer In Charge

ITEM : ERECTION WORK
SUB SYSTEM : DC SYSTEM
QAP NO. :
REV. NO.:

DATE :

| Sr. No. | CHARACTERISTICES / ITEMS | Type of Check | Instruments | Class | Quantum/ Frequency | Reference Documents & Acceptance Standard | "Format Of Records" | Remarks |
|---|---|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| | | | | | | | | |
| 1 | RECEIPT & STORAGE | | | | | | | |
| 1.1 | Receiving inspection (Completeness of documents, test certificates, instruction manual etc.) | V | - | B | 100% | Delivery Challan & NESCL Specification | MRC / Check List / DC / 06 | |
| 1.2 | Unloading | V | - | B | 100% | Instruction Manual | - | |
| 1.3 | Visual exmination for damage & defects | V | - | B | 100% | Packing list / Instruction Manual | - | |
| 1.4 | Proper storage | V | - | B | 100% | Instruction Manual | - | |
| | | | | | | | | |
| 2 | PRE INSTALLATION | | | | | | | |
| 2.1 | Availability of instruction manual and drawing, lifting arrangement | V | - | B | 100% | List of approved drawing / Instruction Manuals | - | |
| 2.2 | Availability of all materials | V | - | B | 100% | Packing list, Approved drawing & Bill Of Material | - | |
| 2.3 | Completion of civil / ventilation requirement of battery room. | V | - | B | 100% | Control room detail | - | |
| | | | | | | | | |
| 3 | INSTALLATION - BATTERY | | | | | | | |
| 3.1 | Rating plate details | V | - | B | 100% | instruction manual | Site record | |



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| Sr. No. | CHARACTERISTICES / ITEMS | Type of Check | Instruments | Class | Quantum/ Frequency | Reference Documents & Acceptance Standard | "Format Of Records" | Remarks |
|---|---|---|---|---|---|---|---|---|
| 3.2 | Check availability of safety devices, water and first aid box. | V | - | B | 100% | BOM / NESCL Specifcation | - | |
| 3.3 | Check installation of batteries and rack as per approved layout. | V | - | B | 100% | Instruction Manual | - | |
| 3.4 | Check the specific gravity of the electrolyte prior to pouring in the cells. | | | | | | | |
| 3.5 | Check for availability of electrolyte level up to required level and there is no leakage. | V | - | B | 100% | Instruction Manual | - | |
| 3.6 | Check alignment and level of each cell | V | - | B | 100% | Instruction Manual | - | |
| 3.7 | Check for tightness inter cell connection and application of grease. | V | - | B | 100% | Instruction Manual | - | |
| 3.8 | Check for provision of earthing and tightness of earthing connection. Ensure cell are not earth any where. | V | - | B | 100% | Instruction Manual | - | |
| 3.9 | Check all cell no. are properly fixed and are visible. | V | - | B | 100% | Instruction Manual | - | |
| 3.10 | The cabling from Battery Charger to first, last and tap cells is completed. | V | - | B | 100% | Instruction Manual | - | |
| 3.11 | Check all the cells are connected in correct polarity. | V | - | B | 100% | Instruction Manual | - | |
| 3.12 | Painting of battery stand | V | - | B | 100% | Instruction Manual | - | |
| | | | | | | | | |
| 4 | INSTALLATION - BATTERY CHARGER | | | | | | | |

| Sr. No. | CHARACTERISTICES / ITEMS | Type of Check | Instruments | Class | Quantum/ Frequency | Reference Documents & Acceptance Standard | "Format Of Records" | Remarks |
|---|---|---|---|---|---|---|---|---|
| 4.1 | Rating plate details | V | - | B | 100% | instruction manual | Site record | |
| 4.2 | The quantity, ratings, type and make of the devices are as per the BOM as given in approved drawings. | V | - | B | 100% | Instruction Manual | - | |
| 4.3 | No physical damages are there in any devices of the panels and replacement of damaged parts. | V | - | B | 100% | Instruction Manual | - | |
| 4.4 | The inter panel Earth bus connections and connection to the earthing grid are tightened properly. | V | - | B | 100% | Instruction Manual | - | |
| 4.5 | Fuses provided are of rating as shown in the approved drawings. | V | - | B | 100% | Instruction Manual | - | |
| 4.6 | Check that the labeling of devices is as per the approved drawings. | V | - | B | 100% | Instruction Manual | - | |
| 4.7 | Check the wiring is completed as per the approved drawings. | V | - | B | 100% | Instruction Manual | - | |
| 4.8 | External cabling and termination with glands is completed as per the Cable schedule. | V | - | B | 100% | Instruction Manual | - | |
| 4.9 | Cable tags, ferrules for cores are provided as per cable schedule. | V | - | B | 100% | Instruction Manual | - | |
| 4.10 | Dressing and clamping of cables is done properly. | V | - | B | 100% | Instruction Manual | - | |

| Sr. No. | CHARACTERISTICES / ITEMS | Type of Check | Instruments | Class | Quantum/ Frequency | Reference Documents & Acceptance Standard | "Format Of Records" | Remarks |
|---|---|---|---|---|---|---|---|---|
| 4.11 | Check the phases sequence of the Mains supply to the battery charger. | V | - | B | 100% | Instruction Manual | - | |
| 4.12 | Check functioning of all relays/meters/selector switches etc. | V | - | B | 100% | Instruction Manual | - | |
| 4.13 | All alarms & annunciations, indications are functioning properly. | V | - | B | 100% | Instruction Manual | - | |
| 4.14 | Check the Float & Boost charger operation, set the o/p voltage (if reqd). | V | - | B | 100% | Instruction Manual | - | |
| 4.15 | Check the current limiting feature of charger & set the current limit (if reqd). | V | - | B | 100% | Instruction Manual | - | |
| 4.16 | IR Value check | Measure | - | A | 100% | Instruction Manual | | |
| | | | | | | | | |
| 5 | PRE-COMMISSIONING | | | | | | | |
| 5.1 | Check that all the assembly activities are completed. | V | - | B | 100% | Instruction Manual | TC | |
| 5.2 | The cabling from Battery Charger to first, last and tap cells is completed. | V | - | B | 100% | Instruction Manual | TC | |
| 5.3 | Check the polarity of the DC connection from Battery charger to Battery. | Test | Multimeter | B | 100% | Instruction Manual | Site Record | |
| 5.4 | Check that the charging & discharging cycle is completed as per guidelines of manufacturer to prove battery AH capacity at 10 hr discharge rate. | V | - | A | 100% | Instruction Manual/IS 1651 | TC | |

| Sr. No. | CHARACTERISTICES / ITEMS | Type of Check | Instruments | Class | Quantum/ Frequency | Reference Documents & Acceptance Standard | "Format Of Records" | Remarks |
|---|---|---|---|---|---|---|---|---|
| 5.5 | Recharge | Electrical | - | B | 100% | Instruction Manual | Site record | |
| 5.6 | Final document review | V | - | B | 100% | Approved panel drawing / Final document list | TC | |
| | | | | | | | | |

CONTRACTOR'S SIGNATURE NAME & SIGN OF APPROVING AUTHORITY

Legends :

"CLASS OF CHECK:

A -- CRITICAL -- TO BE WITNESSED BY NESCL SITE AND SURVEILLANCE BY NESCL, CC.

B -- MAJOR -- TO BE WITNESSED BY CONTRACTOR AND NESCL SITE

C-- MINOR -- TO BE WITNESSED BY CONTRACTOR AND SURVEILLANCE BY NESCL SITE"

TC : Test Certificate

MRC : Material Reciept Certificate

V : Visual

EIC : Engineer In Charge



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# ANNEXURE - III

# MQP

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | **MANUFACTURE'S NAME & ADDRESS:** | | **MANUFACTURING QUALITY PLAN** | | | | | | | | | |
| | | | | ITEM: 11 KV HT XLPE AERIAL BUNCHED CABLE (3X35+70) | | QP NO: | | PROJECT/UTILITY: | | | | | |
| | | | | | | REV.NO: | | PACKAGE: | | | | | |
| | | | | SUB-SYSTEM: | | DATE: | | CONTRACT NO: | | | | | |
| | | | | | | No.of pages:5 | | MAIN-CONTRACTOR: | | | | | |
| Sl. No | Compo-nent & operation | Characteristics | Class | Type of Check | Quantum of Check | Reference Document | Acceptance Norms | Format of Re-cords | | Agency | | | Remarks |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | D | 10 | | | 11 |
| **SECTION: 1 RAW MATERIALS** | | | | | | | | | | M | C | N | |
| 1 | Alumini-um Rod | a) Diameter | Major | Measure-ment | One sample from each lot | "Manu-facturer Specifica-tion & IS 5484" | IS 8130 , IS 613 & NESCL Spec. | QC report | | P | V | V | Review of manufactur-ers test certificates at the time of final inspection |
| | | b) Tensile Strength | Major | Test | do | do | do | do | | P | V | V | do |
| | | c) Elongation | Major | Test | do | do | do | do | | P | V | V | do |
| | | d) Resistivity / Conductivity | Major | Electrical Test | do | do | do | do | | P | V | V | do |
| 2 | Alloy Rod | a) Diameter | Major | Measure-ment | One sample from each lot | "Manu-facturer Specifica-tion & IS 9997" | IS 398 & NESCL Spec. | QC report | | P | V | V | Review of manufactur-ers test certificates at the time of final inspection |
| | | b) Tensile Strength | Major | Test | do | do | do | do | | P | V | V | do |
| | | c) Elongation | Major | Test | do | do | do | do | | P | V | V | do |
| | | d) Resistivity / Conductivity | Major | Electrical Test | do | do | do | do | | P | V | V | do |
| 3 | XLPE Com-pound | a) Hot set | Critical | Test | One sample from each lot | "Manu-facturer Specifi-cation & As per IS 7098 (part-II)" | IS 7098 (part-II) and NESCL Spec. | QC report | | P | V | V | Review of manufactur-ers test certificates at the time of final inspection |

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | D | 10 | | | 11 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | b) Tensile Strength | Major | Test | do | do | do | do | | P | V | V | do |
| | | c) Elongation | Major | Test | do | do | do | do | | P | V | V | do |
| | | “d) Volume Resistivity (Insulation Resistance)” | Major | Electrical Test | do | do | do | do | | P | V | V | do |
| | | e) Thermal Ageing Shelf Life-One Year Contamination & Voids | Critical | Test | do | do | do | do | | P | V | V | do |
| 4 | Messenger Wire | a) Diameter | Major | Measurement | One sample from each lot | “Manufacturer Specification& IS 398” | As per IS 398 & NESCL Spec. | QC report | | P | V | V | “Review of Manufacturer’s Test Certificate at the time of final inspection” |
| | | b) Tensile Strength | Major | Test | do | do | do | do | | P | V | V | do |
| | | c) Elongation | Major | Test | do | do | do | do | | P | V | V | do |
| **SECTION: 2 IN PROCESS INSPECTION** | | | | | | | | | | M | C | N | |
| 5 | “Wire Drawing ( Aluminium/ Alloy)” | a) Dimension | Major | Measurement | 10% | IS 8130, IS 398 & P.S | IS 8130, IS 398 & NESCL Spec. | QC report | | P | V | V | Review of manufacturers test certificates at the time of final inspection |
| | | b) Tensile Strength | Major | Test | do | do | do | do | | P | V | V | do |
| | | c) Wrapping test | Major | Test | do | do | do | do | | P | V | V | do |
| | | d) Surface Finish | Major | Visual | do | do | do | do | | P | V | V | do |
| 6 | “Stranding Phase/ Messenger Wire” | a) Dimension | Major | Measurement | 100% | IS 8130 & IS 398 & P.S | IS 8130 ,IS 398 & NESCL Spec. | QC report | | P | V | V | Review of manufacturers test certificates at the time of final inspection |
| | | b) No./ Diameter of Wire | Major | Visual | do | do | do | do | | P | V | V | do |
| | | c) Sequence | Major | Visual | do | do | do | do | | P | V | V | do |
| | | d) D.C Conductor Resistance | Major | Electrical Test | do | do | do | do | | P | V | V | do |
| | | e) Surface Finish | Major | Visual | do | do | do | do | | P | V | V | do |
| | | f) Lay length, compact & ovality | Major | Visual | do | do | do | do | | P | V | V | do |

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | D | 10 | | | 11 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | g) Direction of lay | Major | Visual | do | do | do | do | | P | V | V | do |
| | | h) Tensile Strength | Major | Test | One sample from each lot | "Manu-facturer Specifica-tion & IS 398" | IS 398 & NESCL Spec. | do | | P | V | V | do |
| | | i) Elongation | Major | Test | do | do | do | do | | P | V | V | do |
| | | j) UTS | Major | Test | do | do | do | do | | P | V | V | do |
| 7 | Insulation | a) Type of compo-nent | Major | Visual | 100% | IS 7098 (part-II) & P.S | IS 7098 (part-II) , P.S and Approved Data Sheet | QC report | | P | V | V | Review of manufactur-ers test certificates at the time of final inspection |
| | | b) Diameter of conductor / core Thickness | Major | Measure-ment | do | do | do | do | | P | V | V | do |
| | | c) Thickness | Major | Measure-ment | 100% | do | do | do | | P | V | V | do |
| | | d) Colour | Major | Visual | do | do | do | do | | P | V | V | do |
| | | e) Identification Ridge | Major | Visual | do | do | do | do | | P | V | V | do |
| | | f) Surface Finish | Major | Visual | do | do | do | do | | P | V | V | do |
| | | g) Embossing | Major | Visual | do | do | do | do | | P | V | V | do |
| | | h) Curing | Major | Visual | do | do | do / By Hot water | do | | P | V | V | do |
| | | i) Hot set test | Major | Test | 1 spool | do | do | do | | P | V | V | do |
| | | j) Tensile Strength | Major | Test | do | do | do | do | | P | V | V | do |
| | | k) Elongation | Major | Test | do | do | do | do | | P | V | V | do |
| | | l) Volume Resistivity | Major | Electrical Test | do | do | do | do | | P | V | V | do |
| | | m) Spark Test | Major | Electrical Test | do | do | do | do | | P | V | V | do |

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | D | 10 | | | 11 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 8 | Laying Up | a) Core Sequence | Major | Visual | 100% | IS 7098 (part-II) & P.S | IS 7098 (part-II) & A.D.S | QC report | | P | V | V | Review of manufacturers test certificates at the time of final inspection |
| | | b) Laid Up diameter | Minor | Measurement | do | do | do | do | | P | V | V | do |
| | | c) Length | Major | Measurement | do | do | do | do | | P | V | V | do |
| 9 | Copper Tape | a) Dimension of Tape | Major | Measurement | 100% | IS 7098 (part-II) & P.S | IS 7098 (part-II) & A.D.S | QC report | | P | V | V | Review of manufacturers test certificates at the time of final inspection |
| | | b) Surface finish | Minor | Visual | do | do | do | do | | P | V | V | do |
| | | c) Overlap in copper tape | Major | Visual | do | do | do | do | | P | V | V | do |
| | | d) Continuity | Major | Electrical Test | do | do | do | do | | P | V | V | do |
| 10 | Outer Sheath | a) Type of component | Major | Visual | 100% | IS 7098 (part-II) & P.S | IS 7098 (part-II) & A.D.S | QC report | | P | V | V | Review of manufacturers test certificates at the time of final inspection |
| | | b) Colour of Sheath | Major | Visual | do | do | do | do | | P | V | V | do |
| | | c) Embossing | Minor | Visual | do | do | do | do | | P | V | V | do |
| | | d) Surface finish | Minor | Visual | do | do | do | do | | P | V | V | do |
| | | | | | | | | | | | | | |
| **SECTION: 3 Final Testing** | | | | | | | | | | M | C | N | |
| 11 | Routine test | a) Conductor resistance | Major | Electrical Test | 100% | IS 7098 (part-II) & P.S | IS 7098 (part-II) & A.D.S | QC report | √ | P | V | V | Routine test certificate will be furnished for verificationduring final inspection |
| | | b) High Voltage | Major | Electrical Test | do | do | do | do | √ | P | V | V | do |
| | | c) Partial Discharge Test | Major | Electrical Test | do | do | do | do | √ | P | V | V | do |

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | D | 10 | | | 11 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 12 | All Type Tests as per NESCL Technical Specification | Type Tests | Major | Electrical Test | Sample | IS 7098 (part-II) & P.S | IS 7098 (part-II) & A.D.S | Type Test Report | √ | V | V | V | Type Test Clearance from NESCL Engineering |
| 13 | Acceptance test on Cable | a) Conductor resistance | Major | Electrical Test | As per sampling plan of IS 7098(Pt-II) | As per IS 7098(Pt-II) | As per IS 7098(Pt-II), A.D.S & NESCL Specification | Acceptance test Certificate | | P | W | W | |
| | | b) Test for thickness & Dimension of insulation including eccentricity & ovality | Major | Test | do | do | do | do | | P | W | W | |
| | | c) Thickness of sheath | Major | Test | do | do | do | do | | P | W | W | |
| | | d) Hot set test for insulation | Major | Test | do | do | do | do | | P | W | W | |
| | | e) Partial discharge test | Major | Electrical Test | do | do | do | do | | P | W | W | |
| | | f) Tensile strength & elongation at break for insulation & sheath | Major | Test | do | do | do | do | | P | W | W | |
| | | g) High voltage test | Major | Electrical Test | do | do | do | do | | P | W | W | |
| | | h) Insulation Resistance ( V. R) | Major | Electrical Test | do | do | do | do | | P | W | W | |
| | | k) Wrapping Test | Major | Test | do | do | do | do | | P | W | W | |
| | | l) Tensile Strength for Aluminum | Major | Test | do | do | do | do | | P | W | W | |

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | D | 10 | | | 11 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 14 | Accep-tance test on mes-senger wire | a) Breaking Load Test | Major | Test | As per sampling plan of IS 398(Pt-II) | As per IS 398(Pt-II) | As per IS 398(Pt-II) | do | | P | W | W | |
| | | b) Elonagtion | Major | Test | As per sampling plan of IS 398(Pt-II) | As per IS 398(Pt-II) | As per IS 398(Pt-II) | do | | P | W | W | |
| | | c) Resistance Test | Major | Test | As per sampling plan of IS 398(Pt-II) | As per IS 398(Pt-II) | As per IS 398(Pt-II) | do | | P | W | W | |
| 15 | Packing & Marking | | Major | Visual | Random | NESCL specifica-tion | NESCL specifica-tion | do | | P | V | V | |

*-All type tests to be carried out as per NESCL specification & Contract Agreement .
√ - Record identified'√' ""tick mark"" shall be essentially included by supplier in QA Documentations.

| | | |
|---|---|---|
| Note: Manufacturing, inspection & testing as per IS 7098 (pt-II) | P.S= Plant Standard | M= Manufacturer |
| P= Performed By | A.D.S= Approved Data Sheet | N= Customer (NESCL) |
| V= Verified By | M/I=Minor | C = Contactor |
| W= Witness of test | SIGNATURE OF THE CONTRACTOR | |
| M/A= Major | SIGNATURE OF THE MANUFACTURER | |

| MANUFACTURER'S NAME & ADDRESS: | MANUFACTURING QUALITY PLAN | | |
|---|---|---|---|
| | ITEM: 11 KV XLPE INSULATED CABLE(3X95sq.mm) | QP NO: | PROJECT/UTILITY: |
| | | REV.NO: | PACKAGE: |
| | SUB-SYSTEM: | DATE: | CONTRACT NO: |
| | | No.of pages:4 | MAIN-CONTRACTOR: |

| Sl. No | Compo-nent & operation | Characteristics | Class | Type of Check | Quantum of Check | Reference Document | Accep-tance Norms | Format of Records | | Agency | | | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | D | 10 | | | 11 |
| **SECTION: 1 RAW MATERIALS** | | | | | | | | | | M | C | N | |
| 1 | Aluminium Rod | a) Diameter | Major | Measure-ment | One sample from each lot | "Manufac-turer Specifi-cation & IS 5484" | As per IS 8130 & As per NESCL Spec | QC report | | P | V | V | Review of Manufac-turer's Test Certificate at the time of final inspection |
| | | b) Tensile Strength | Major | Test | do | do | do | do | | P | V | V | do |
| | | c) Elongation | Major | Test | do | do | do | do | | P | V | V | do |
| | | d) Resistivity / Conductivity | Major | Electrical Test | do | do | do | do | | P | V | V | do |
| 2 | XLPE | a) Hot set | Major | Test | One sample from each lot | Manufacturer Specification & As per IS 7098 | As per IS 7098 and NESCL Spec | QC report | | P | V | V | Review of Manufac-turer's Test Certificate at the time of final inspection |
| | | b) Tensile Strength | Major | Test | do | do | do | do | | P | V | V | do |
| | | c) Elongation | Major | Test | do | do | do | do | | P | V | V | do |
| | | "d) Volume Re-sistivity ( Insulation Re-sistance)" | Major | Electrical Test | do | do | do | do | | P | V | V | do |
| | | e) Thermal Ageing Shelf Life-One Year Contamination & Voids | Critical | Test | do | do | do | do | | P | V | V | do |

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | D | 10 | | | 11 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3 | Copper Tape | a) Dimension | Major | Measure-ment | One sample from each lot | “Manufac-turer Specifi-cation & As per P.S “ | As per IS 8130 & As per NESCL Spec | QC report | | P | V | V | “ Review of Manufac-turer’s Test Certificate at the time of final inspec-tion” |
| | | b) Resistivity / Conductivity | Major | Electrical Test | do | do | do | do | | P | V | V | do |
| | | c) Elongation | Major | Test | do | do | do | do | | P | V | V | do |
| | | d) Yield Strength | Major | Test | do | do | do | do | | P | V | V | do |
| 4 | PVC Com-pound | a) Tensile Strength | Major | Test | One sample from each lot | “Manufac-turer Specifi-cation & As per IS 5831” | As per IS 5831 & As per NESCL Spec | QC report | | P | V | V | “ Review of Manufac-turer’s Test Certificate at the time of final inspec-tion” |
| | | b) Elongation | Major | Test | do | do | do | do | | P | V | V | do |
| | | c) Thermal Sta-bility | Critical | Test | do | do | do | do | | P | V | V | do |
| | | d) Thermal Ag-ing | Critical | Test | do | do | do | do | | P | V | V | do |
| | | e) Loss in mass | Major | Test | do | do | do | do | | P | V | V | do |
| 5 | Armour | a) Dimension | Major | Measure-ment | 10% | “Manufac-turer Specifi-cation & IS 3975” | As per IS 3975 & As perNES-CL Spec | QC report | | P | V | V | “ Review of Manufac-turer’s Test Certificate at the time of final inspec-tion” |
| | | b) Tensile Strength | Major | Test | do | do | do | do | | P | V | V | do |
| | | c) Elongation | Major | Test | do | do | do | do | | P | V | V | do |
| | | d) Resistivity | Major | Electrical Test | do | do | do | do | | P | V | V | do |
| | | e) Torsion / Winding | Major | Test | do | do | do | do | | P | V | V | do |
| | | f) Weight of Zinc coating | Critical | Chemical | do | do | do | do | | P | V | V | do |
| | | g) Dip Test | Critical | Chemical | do | do | do | do | | P | V | V | do |

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | D | 10 | | | 11 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **SECTION: 2 IN PROCESS INSPECTION** | | | | | | | | | | M | C | N | |
| 6 | Wire Drawing ( Aluminium) | a) Dimension | Major | Measurement | 10% | IS 8130, IS 398 & P.S | As per IS 8130, IS 398 & NESCL Spec | QC report | | P | V | V | Review of the records at the time of final inspection |
| | | b) Tensile Strength | Major | Test | do | do | do | do | | P | V | V | do |
| | | c) Wrapping test | Major | Test | do | do | do | do | | P | V | V | do |
| | | d) Surface Finish | Major | Visual | do | do | do | do | | P | V | V | do |
| 7 | Stranding | a) Dimension | Major | Measurement | 100% | IS 8130 & IS 398 & P.S | As per IS 8130 & IS 398 & NESCL Spec | QC report | | P | V | V | do |
| | | b) No./ Diameter of Wire | Major | Visual | do | do | do | do | | P | V | V | do |
| | | c) Sequence | Major | Visual | do | do | do | do | | P | V | V | do |
| | | d) Conductor Resistance | Major | Electrical Test | do | do | do | do | | P | V | V | do |
| | | e) Surface Finish | Major | Visual | do | do | do | do | | P | V | V | do |
| | | f) Lay length, compact & ovality & Direction | Major | Visual | do | do | do | do | | P | V | V | do |
| 8 | Insulation | a) Type of component | Major | Visual | _ | IS 7098 & P.S | As per IS 7098, P.S and Approved Data Sheet | QC report | | P | V | V | do |
| | | b) Thickness | Major | Measurement | 100% | do | do | do | | P | V | V | do |
| | | c) Colour | Major | Visual | do | do | do | do | | P | V | V | do |
| | | d) Surface Finish | Major | Visual | do | do | do | do | | P | V | V | do |

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | D | 10 | | | 11 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | e) Curing | Major | Visual | do | do | do | do | | P | V | V | do |
| | | f) Hot set test | Major | Test | 1 spool | do | do | do | | P | V | V | do |
| | | g) Tensile Strength | Major | Test | do | do | do | do | | P | V | V | do |
| | | h) Elongation | Major | Test | do | do | do | do | | P | V | V | do |
| | | i) Volume Resis-tivity | Major | Electrical Test | do | do | do | do | | P | V | V | do |
| 9 | Copper Taping | a) Dimension of Tape | Major | Measure-ment | 100% | IS 7098 & P.S | IS 7098 & A.D.S | QC report | | P | V | V | do |
| | | b) Surface finish | Major | Visual | do | do | do | do | | P | V | V | do |
| | | c) Over lapping | Major | Visual | do | do | do | do | | P | V | V | do |
| | | d) Continuity | Major | Electrical Test | do | do | do | do | | P | V | V | do |
| 10 | Laying Up | a) Core Se-quence | Major | Visual | 100% | IS 7098 & P.S | " IS 7098 & A.D.S By hot water" | QC report | | P | V | V | do |
| | | b) Laid Up diam-eter | Major | Measure-ment | do | do | IS 7098 & A.D.S | do | | P | V | V | do |
| | | c) Length | Major | Measure-ment | do | do | IS 7098 & A.D.S | do | | P | V | V | do |
| 11 | Inner Sheath | a) Type of com-ponent | Major | Visual | 100% | IS 7098 & P.S | IS 7098 & A.D.S | QC report | | P | V | V | do |
| | | b) Colour of Sheath | Major | Visual | do | do | do | do | | P | V | V | do |
| | | c) Surface finish | Major | Visual | do | do | do | do | | P | V | V | do |
| | | d) Diam-eter Over inner Sheath | Major | Measure-ment | do | do | do | do | | P | V | V | do |
| 12 | Armour | a) No. of strip | Major | Visual | 100% | IS 7098(Pt-II) & P.S | IS 7098(Pt-II) & A.D.S | QC report | | P | V | V | do |
| | | b) Lay length & Direction | Major | Measure-ment | do | do | do | do | | P | V | V | do |
| | | c) Coverage | Major | Measure-ment | do | do | do | do | | P | V | V | do |

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | D | 10 | | | 11 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | d) Diameter Over Armour | Major | Measure-ment | do | do | do | do | | P | V | V | do |
| 13 | Outer Sheath | a) Type of com-pound | Major | _ | 100% | IS 7098(Pt-II) & P.S | IS 7098(Pt-II) & A.D.S | QC report | | P | V | V | do |
| | | b) Sheath thick-ness | Major | Measure-ment | do | do | do | do | | P | V | V | do |
| | | c) Colour of Sheath | Major | Visual | do | do | do | do | | P | V | V | do |
| | | d) Diameter over sheath | Major | Measure-ment | do | do | do | do | | P | V | V | do |
| | | e) Surface Fin-ish | Major | Visual | do | do | do | do | | P | V | V | do |
| | | f) Embossing | Major | Visual | do | do | do | do | | P | V | V | do |
| | | g) Sequential marking | Major | Visual | do | do | do | do | | P | V | V | do |
| SECTION: 3 Final Testing | | | | | | | | | | M | C | N | |
| 14 | Routine test | a) Conductor resistance | Major | Electrical Test | 100% | As per IS 7098(Pt-II) | IS 7098(Pt-II) & A.D.S | QC report | √ | P | V | V | Routine test certificate will be furnished for verification during final inspection |
| | | b) High Voltage | Major | Electrical Test | do | do | do | do | √ | P | V | V | do |
| | | c) Partial Dis-charge Test | Major | Electrical Test | do | do | do | do | √ | P | V | V | do |
| 15 | All Type tests as per NESCL Technical Specifica-tions | Type Tests | Critical | Electrical Test | Sample | As per IS 7098(Pt-II) | IS 7098(Pt-II) & A.D.S | QC report | √ | V | V | V | Type Test Clearance from NESCL Engi-neering Department |
| 16 | Accep-tance test | a) Conductor resitance | Critical | Electrical Test | As per sampling plan of IS 7098(Pt-II) | As per IS 7098(Pt-II) | As per IS 7098(Pt-II), A.D.S & NESCL Specifica-tion | Accep-tance test Certificate | | P | W | W | |

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | D | 10 | | | 11 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | b) Tensile test | Critical | Test | do | do | do | do | | P | W | W | |
| | | c) Wrapping Test | Critical | Test | do | do | do | do | | P | W | W | |
| | | d) Test for thickness of insulation and sheath | Critical | Test | do | do | do | do | | P | W | W | |
| | | e) Hot set test for insulation | Critical | Test | do | do | do | do | | P | W | W | |
| | | f) Partial discharge test | Critical | Electrical Test | do | do | do | do | | P | W | W | |
| | | g) Tensile strength & elongation at break for insulation & outer sheath | Critical | Test | do | do | do | do | | P | W | W | |
| | | h) High voltage test | Critical | Electrical Test | do | do | do | do | | P | W | W | |
| | | i) Insulation resistance ( V. R) | Critical | Electrical Test | do | do | do | do | | P | W | W | |
| 14 | Packing & Marking | Pre-Despatch packing | Major | Visual | Random | NESCL specification | NESCL specification | do | | P | V | V | |

*-All type tests to be carried out as per NESCL specification.
√ - Record identified'√' ""tick mark"" shall be essentially included by supplier in QA Documentations.

| | | |
|---|---|---|
| Note: Manufacturing, inspection & testing as per IS 7098 (pt-II) | PS = Plant Standard | M= Manufacturer |
| P= Performed By | ADS = Approved Data Sheet | N= Customer (NESCL) |
| V= Verified By | | C = Contactor |
| W= Witness of test | SIGNATURE OF THE CONTRACTOR | |
| | | SIGNATURE OF THE MANUFACTURER |

| MANUFACTURE'S NAME & ADDRESS: | MANUFACTURING QUALITY PLAN | | |
|---|---|---|---|
| | ITEM: LT PVC Un-Armoured Cable | QP NO: | PROJECT/UTILITY: |
| | | REV.NO: | PACKAGE: Guna |
| | SUB-SYSTEM: | DATE: | CONTRACT NO: IVRCL…, Myur |
| | | No of pages:3 | MAIN-CONTRACTOR: |

| Sl. No | Compo-nent & operation | Characteristics | Class | Type of Check | Quantum of Check | Reference Document | Accep-tance Norms | Format of Records | | Agency | | | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | D* | ** 10 | | | 11 |
| **SECTION: 1 RAW MATERIALS** | | | | | | | | | | M | C | N | |
| 1 | Aluminium Rod | a) Dimension | M/A | Physical | One sample from each lot | IS 5484 & P.S | IS 5484 & NESCL Spec. | QC report | | P | V | V | Review of Supplier's Test Certificate at the time of final inspection |
| | | b) Tensile Strength | M/A | Physical | do | do | do | QC report | | P | V | V | do |
| | | c) Elongation | M/A | Physical | do | do | do | QC report | | P | V | V | do |
| | | d) Resistivity / Con-ductivity | M/A | Electrical | do | do | do | QC report | | P | V | V | do |
| 2 | "PVC for insulation (Type-A)" | a) Thermal Stabilty | M/A | Physical | One sample from each lot | IS 1554 (Pt-1) &P.S | IS 1554 (Pt-1) NESCL Spec. | QC report | | P | V | V | Review of Supplier's Test Certificate at the time of final inspection |
| | | b) Tensile Strength | M/A | Physical | do | do | do | QC report | | P | V | V | do |
| | | c) Elongation | M/A | Physical | do | do | do | QC report | | P | V | V | do |
| | | "d) Volume Resis-tivity (Insulation Resis-rance)" | M/A | Electrical | do | do | do | QC report | | P | V | V | do |
| 3 | "PVC for Sheath (Type-ST1)" | a) Specific Gravity | M/A | Physical | One sample from each lot | IS 5831 & P.S | IS 5831 & NESCL Spec. | QC report | | P | V | V | "Review of Supplier's Test Certificate at the time of final inspec-tion" |
| | | b) Thermal Stabilty | M/A | Physical | do | do | do | QC report | | P | V | V | do |
| | | c) Tensile Strength | M/A | Physical | do | do | do | QC report | | P | V | V | do |
| | | d) Elongation | M/A | Physical | do | do | do | QC report | | P | V | V | do |

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | D* | ** | 10 | | 11 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 4 | Wooden Drum | Dimension | M/I | Measure-ment | As per IS 10418 | IS 10418 & P.S | IS 10418 & NESCL Spec. | QC report | | P | V | V | do |
| **SECTION: 2 IN PROCESS INSPECTION** | | | | | | | | | | M | C | N | |
| 5 | Wire Drawing | a) Dimension | M/A | Measure-ment | 10% | IS 8130 | IS 8130 & A.D.S | QC report | | P | V | V | "Review of Supplier's Test Certificate at the time of final inspec-tion" |
| | | b) Tensile Strength | M/A | Physical | do | do | do | do | | P | V | V | do |
| | | c) Wrapping test | M/A | Physical | do | do | do | do | | P | V | V | do |
| 6 | Insulation (Extru-sion) | a) Thickness | M/A | Measure-ment | 100% | IS 1554 (Pt-I) & P.S | IS 1554 (Pt-I) NESCL Spec.& A.D.S | QC report | | P | V | V | do |
| | | b) Surface Finish | M/A | Visual | do | do | do | do | | P | V | V | do |
| | | c) Spark Test | M/A | Electrical | do | do | do | do | | P | V | V | do |
| | | d) Colour | M/A | Visual | do | do | do | do | | P | V | V | do |
| | | e) Tensile Strength | M/A | Physical | do | do | do | do | | P | V | V | do |
| | | f) Elongation | M/A | Physical | do | do | do | do | | P | V | V | do |
| 7 | Outer Sheath | d) Surface Finish | M/A | Visual | 100% | IS 1554 (Pt-I) & P.S | IS 1554 (Pt-I) NESCL Spec.& A.D.S | QC report | | P | V | V | "Review of Supplier's Test Certificate at the time of final inspec-tion" |
| | | b) Sheath Thick-ness | M/A | Measure-ment | do | do | do | do | | P | V | V | do |
| | | c) Diameter Over outer sheath | M/A | Measure-ment | do | do | do | do | | P | V | V | do |
| | | d) Tensile Strength | M/A | Physical | do | do | do | do | | P | V | V | do |
| | | f) Elongation | M/A | Physical | do | do | do | do | | P | V | V | do |
| | | f) Embossing | M/A | Visual | do | do | do | do | | P | V | V | do |



REC
Endless energy. Infinite possibilities.

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | D* | ** 10 | | | 11 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **SECTION: 3 Final Testing** | | | | | | | | | | M | C | N | |
| 8 | Routine test | a) Conductor resistance | Critical | Electrical | 100% | As per IS1554(Pt-I)/1988 | "As per IS1554 (Pt-I) /1988" | QC report | √ | P | V | V | Routine test certificate will be furnished for verification during final inspection |
| | | b) High Voltage | Critical | Electrical | do | do | do | do | √ | P | V | V | do |
| 9 | Type Test | Type Tests | Critical | Electrical | Sample | As per IS1554(Pt-I)/1988 | "As per IS1554 (Pt-I) /1988" | Type Test Report | | V | V | V | Type Test Clearance from NESCL Engineering Department |
| 10 | Acceptance test | a) Conductor resistance | Critical | Electrical | As per sampling plan of IS 1554(Pt-I)/1988 | As per IS1554(Pt-I)/1988 | As per IS, A.D.S & NESCL Specification | QC report | | P | W | W | |
| | | b) Test for thickness of insulation & sheath | Critical | Physical | do | do | do | do | | P | W | W | |
| | | c) Tensile strength & elongation test for Insulation & Sheath | Critical | Physical | do | do | do | do | | P | W | W | |
| | | d) High voltage test | Critical | Electrical | do | do | do | do | | P | W | W | |
| | | e) Annealing ( for Copper) | Critical | Electrical | do | do | do | do | | P | W | W | |
| | | f) Wrapping for Aluminium | Critical | Electrical | do | do | do | do | | P | W | W | |
| | | g) Tensile for Aluminium | Critical | Electrical | do | do | do | do | | P | W | W | |
| | | h) Insulation Resistance ( V. R) | Critical | Electrical | do | do | do | do | | P | W | W | |
| 11 | Packing & Marking | | Major | Visual | Random | NESCL specification | NESCL specification | do | | P | V | V | |
| | | | | | | P.S= Plant Standard | | | | | | M= Manufacturer | |
| P= Performed By | | | | | | A.D.S= Approved Data Sheet | | | | | | N= Customer (NESCL) | |
| V= Verified By | | | | | | M/I=Minor | | | | | | C = Contactor | |
| W= Witness of test | | SIGNATURE OF THE CONTRACTOR | | | | | | | | | | | |
| M/A= Major | | | | | | SIGNATURE OF THE MANUFACTURER | | | | | | | |

| MANUFACTURER'S NAME & ADDRESS | | | | MANUFACTURING QUALITY PLAN<br>ITEM: THREE PHASE CT OPERATED STATIC ENERGY METER | | QP NO.:<br>REV.NO.:<br>DATE: | | PROJECT/ UTILITY :<br>PACKAGE :<br>CONTRACT NO. :<br>MAIN-SUPPLIER : | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sl. No | Compo-nents | Characteristics | Class | Type Of Check | Quantum Of Check | Reference Document | Acceptance Norms | Format Of Record | Agency | | | Remarks |
| | | | | | | | | | M | C | N | |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | ** 10. | | | 11. |
| 1 | PCB | Visual Check for the following:<br>• Legend Marking<br>• Masking<br>Dimension<br>Electrical Testing<br>Bare Board Testing | Major | Visual/ Elect-rical | Single Sampling Level II of IS 2500 (PartI) (AQL=0.65)<br>2 from each lot<br>2 from each lot<br>100% | AS per Specification Sheet for the component<br>----do----<br>----do----<br>BBT OK | AS per Specification Sheet for the component | IQC Documents | P<br>P<br>P<br>V | V<br>V<br>V<br>V | V<br>V<br>V<br>V | Review of records of the at the time of Final Inspection |
| 2 | Shunts | Visual Check for Damages and twisting & Tinning of wires<br>Resistance Value<br>Dimensions | Major | Visual/ Elect-rical | Single Sampling Level II of IS 2500 (PartI) (AQL=0.65)<br>----do----<br>10% of Sample Qty. | As Per Specification Sheet for the component<br>----do----<br>----do---- | I.Q.C. Deptt. of<br>----do----<br>----do---- | IQC Documents | P | V | V | Review of records of the at the time of Final Inspection |
| 3 | CTs | Visual check for Damages, Twisting, Tinning of wire, Epoxy coating & Shielding<br>Electrical Tests:<br>• Inductance<br>• Resistance<br>• Output Voltage<br>Dimensions | Major | Visual/ Elect-rical | Single Sampling Level II of IS 2500 (PartI) (AQL=0.65)<br>----do----<br>10% of Sample Qty | AS per Specification Sheet for the component<br>----do----<br>----do---- | I.Q.C. Deptt. of<br>----do----<br>----do---- | IQC Documents | P | V | V | Review of records of the at the time of Final Inspection |
| 4 | LED | Visual Check for<br>• Damage<br>• Colour<br>Electrical Test:<br>• Forward Voltage Drop<br>• Reverse Voltage Drop<br>Dimensions | Major | Visual/ Elect-rical | Single Sampling Level II of IS 2500 (PartI) (AQL=0.65)<br>----do----<br>10% of Sample Qty | As per Specification Sheet for the component<br>----do----<br>----do---- | I.Q.C. Deptt. of<br>----do----<br>----do---- | IQC Documents | P | V | V | Review of records of the at the time of Final Inspection |

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | ** 10. | | | 11. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 4 | LED | Visual Check for<br>• Damage<br>• Colour<br>Electrical Test:<br>• Forward Voltage Drop<br>• Reverse Voltage Drop<br>Dimensions | Major | Visual/ Elect-rical | Single Sampling Level II of IS 2500 (PartI) (AQL=0.65)<br>----do----<br>10% of Sample Qty | As per Specification Sheet for the component<br>----do----<br>----do---- | I.Q.C. Deptt. of<br>----do----<br>----do---- | IQC Documents | P | V | V | Review of records of the at the time of Final Inspection |
| 5 | Resis-tance | Visual<br>• Damage<br>• Coding<br>• Package<br>Resistance value<br>Tolerance<br>Dimension | Major | Visual/ Elect-rical | Single Sampling Level II of IS 2500 (PartI) (AQL=0.65)<br>----do----<br>10% of Sample Qty | As per Specification Sheet for the component<br>----do----<br>----do---- | I.Q.C. Deptt. of<br>----do----<br>----do---- | IQC Documents | P | V | V | Review of records of the at the time of Final Inspection |
| 6 | Capac-itor | Visual<br>• Damage<br>• Package<br>Capacitance value<br>Tolerance<br>Dimension | Major | Visual/ Elect-rical | Single Sampling Level II of IS 2500 (PartI) (AQL=0.65)<br>----do----<br>10% of Sample Qty | As per Specification Sheet for the component<br>----do----<br>----do---- | I.Q.C. Deptt. of<br>----do----<br>----do---- | IQC Documents | P | V | V | Review of records of the at the time of Final Inspection |
| 7 | Diode | Visual Check for<br>• Damage<br>• Package<br>• Marking<br>Electrical Test:<br>• Forward Voltage Drop<br>• Reverse Voltage Drop<br>Dimensions | Major | Visual/ Elect-rical | Single Sampling Level II of IS 2500 (PartI) (AQL=0.65)<br>---do----<br>10% of Sample Qty | As per Specification Sheet for the component<br>----do----<br>----do---- | I.Q.C. Deptt. of<br>----do----<br>----do---- | IQC Documents | P | V | V | Review of records of the at the time of Final Inspection |

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | ** 10. | | | 11. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 8 | Zener Diode | Visual Check for<br>• Damage<br>• Package<br>• Marking<br>Electrical Test:<br>• Forward Voltage Drop<br>• Reverse Voltage Drop<br>• Zener Voltage<br>Dimensions | Major | | Single Sampling Level II of IS 2500 (PartI) (AQL=0.65)<br>---do----<br>10% of Sample Qty | As per Specification Sheet for the component<br>----do----<br>----do---- | As per Specification Sheet for the component | IQC Documents | P | V | V | Review of records of the at the time of Final Inspection |
| 9 | ICs | Visual Check for<br>• Damage<br>• Package<br>• Marking<br>Electrical Test:<br>• Functional<br>Dimensions | Major | Visual/ Elect-rical | Single Sampling Level II of IS 2500 (PartI) (AQL=0.65)<br>---do----<br>10% of Sample Qty | As per Specification Sheet for the component<br>----do----<br>----do---- | As per Specification Sheet for the component | IQC Documents | P | V | V | Review of records of the at the time of Final Inspection |
| 10 | MOV | Visual Check for<br>• Damage<br>• Marking<br>Electrical Test:<br>• Functional<br>Dimensions | Major | Visual/ Elect-rical | Single Sampling Level II of IS 2500 (PartI) (AQL=0.65)<br>---do----<br>10% of Sample Qty | As per Specification Sheet for the component<br>----do----<br>----do---- | As per Specification Sheet for the component | IQC Documents | P | V | V | Review of records of the at the time of Final Inspection |
| 11 | Crystal | Visual Check for<br>• Damage<br>• Package<br>Electrical Test:<br>• Functional<br>Dimensions | Major | Visual/ Elect-rical | Single Sampling Level II of IS 2500 (PartI) (AQL=0.65)<br>---do----<br>10% of Sample Qty | As per Specification Sheet for the component<br>----do----<br>----do---- | As per Specification Sheet for the component | IQC Documents | P | V | V | Review of records of the at the time of Final Inspection |
| 12 | Stepper Motor Counter | Visual Check for<br>• Damage<br>• No. of Digits<br>• Mounting Holes<br>Electrical Test:<br>• HV Test<br>• Resistance<br>• Functional<br>Boiling Water Test<br>Dimensions | Major | Visual/ Elect-rical | Single Sampling Level II of IS 2500 (Part-I) (AQL=0.65)<br>---do----<br>2 from each Lot<br>10% of Sample Qty | As per Specification Sheet for the component<br>----do----<br>----do----<br>----do---- | As per Specification Sheet for the component | IQC Documents | P | V | V | Review of records of the at the time of Final Inspection |

| Sl. No | Operations | Characteristics | Class | Type of Check | Quantum Of check | Reference Document | Acceptance Norms | Format of Record | Agency | | | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. | PCB Inspection | Soldering<br>Solder bridging or dry solder<br>Components Mounting<br>Polarity of components<br>Functional Testing | Major | Visual | 100% check and again 5 nos. randomly selected daily by Q.C. | Functionally OK | As per Specification Sheet for the component | QC Documents | P | V | V | Review of records of the at the time of Final Inspection |
| 2. | Counter & PCB Assembly | Counter alignment | Major | Visual | 100% check and 5 nos. randomly selected daily by Q.C. | Reference Sample & Alignment should be proper | As per Specification Sheet for the component | QC Documents | P | V | V | Review of records of the at the time of Final Inspection |
| 3. | Assembled Base connection | Tightness of Connections<br>Terminal Block<br>Gasket | Major | Visual | 100% check and 5 nos. randomly selected daily by Q.C. | Reference Sample & Work Instructions | As per Specification Sheet for the component | QC Documents | P | V | V | Review of records of the at the time of Final Inspection |
| 4. | Name Plate | Name Plate Marking<br>Serial Number punching and control | Major | Visual | 100% check and 5 nos. randomly selected daily by Q.C. | As per NTPC Specification | As per Specification Sheet for the component | QC Documents | P | V | V | |
| 5 | Cover Fixing | Name Plate position<br>Cover fitment with base | Major | Visual | 100% check and 5 nos. randomly selected daily by Q.C. | Reference Sample & Work Instructions | As per Specification Sheet for the component | QC Documents | P | V | V | Review of records of the at the time of Final Inspection |
| 6. | Meter Calibration | Meter is calibrated by solder shorting in phase as well as neutral element | Major | Elect-rical | 100% check | Specified Standard | As per Specification Sheet for the component | QC Documents | P | V | V | Review of records of the at the time of Final Inspection |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 7 | Temper Test | As per the requirements of specification | Major | Elect-rical | 10 Nos. samples selected daily by Q.C. | As per NTPC Specification | As per Specification Sheet for the component | QC Documents | P | V | V | Review of records of the at the time of Final Inspection |
| 8 | Packing | Sealing Functional Testing of Meter | Major | Visual | 100% check and 5 nos. randomly selected daily by Q.C. | Should be proper as per customer requirement | As per Specification Sheet for the component | QC Documents | P | V | V | Review of records of the at the time of Final Inspection |

| Sl. No | Operations | Characteristics | Class | Type of Check | Quantum Of check | Reference Document | Acceptance Norms | Format of Record | Agency | | | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | M | C | N | |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | ** 10. | | | 11. |
| 1 | Routine Test | A.C. High Voltage Test | Critical | Electrical | 100% on each Meter | IS : 14697 | IS : 14697 | QC Documents | P | V | V | Review of Records of at the time of Final Inspection |
| | | Insulation Test | Critical | Electrical | 100% on each Meter | IS : 14697 | IS : 14697 | QC Documents | P | V | V | - do - |
| | | Test on limits of Errors | Critical | Electrical | 100% on each Meter | IS : 14697 | IS : 14697 | QC Documents | P | V | V | - do - |
| | | Test of Starting condition | Critical | Electrical | 100% on each Meter | IS : 14697 | IS : 14697 | QC Documents | P | V | V | - do - |
| | | Test of no load condition | Critical | Electrical | 100% on each Meter | IS : 14697 | IS : 14697 | QC Documents | P | V | V | - do - |
| | | Meter Constant | Critical | Electrical | 100% on each Meter | IS : 14697 | IS : 14697 | QC Documents | P | V | V | - do - |
| 2. | Acceptance Test | A. C. High Voltage Test | Critical | Electrical | As per IS : 14697 | IS : 14697 | IS : 14697 | Inspection Report | P | w | w | |
| | | Insulation Test | Critical | Electrical | As per IS : 14697 | IS : 14697 | IS : 14697 | Inspection Report | P | w | w | |
| | | Test on limits of Errors | Critical | Electrical | As per IS : 14697 | IS : 14697 | IS : 14697 | Inspection Report | P | w | w | |
| | | Test of Starting condition | Critical | Electrical | As per IS : 14697 | IS : 14697 | IS : 14697 | Inspection Report | P | w | w | |
| | | Test of no load condition | Critical | Electrical | As per IS : 14697 | IS : 14697 | IS : 14697 | Inspection Report | P | w | w | |
| | | Meter Constant | Critical | Electrical | As per IS : 14697 | IS : 14697 | IS : 14697 | Inspection Report | P | w | w | |
| | | Test of repeatability of meter | Critical | Electrical | As per IS : 14697 | IS : 14697 | IS : 14697 | Inspection Report | P | w | w | |
| | | Test of Power Consumption | Critical | Electrical | As per IS : 14697 | IS : 14697 | IS : 14697 | Inspection Report | P | w | w | |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Test on limits of Errors | Critical | Electrical | As per IS : 14697 | IS : 14697 | IS : 14697 | Inspection Report | P | w | w | To be done after Vibration Test |
| | | Anti-Tamper Tests | Critical | Electrical | As per NESCL Tech. Specs. | IS : 14697 | IS : 14697 | Inspection Report | P | w | w | |
| 3. | Type Tests | All Type Tests as per IS : 14697 | Critical | Electrical / Mech | As per IS : 14697 | IS : 14697 | IS : 14697 | Inspection Report | V | w | w | Type Test clearance from NESCL Engineering department |

Legend:

M : Manufacturer
C : Contractor
N : NTPC Electric Supply Company Ltd.
IQC : Incoming Quality Control
P : Perform
V : Verify
W : Witness



REC
Endless energy. Infinite possibilities.

| MANUFACTURER'S NAME & ADDRESS | MANUFACTURING QUALITY PLAN<br>ITEM: SINGLE PHASE WHOLE CURRENT ENERGY METER | QP NO.:<br>REV.NO.:<br>DATE: | PROJECT/ UTILITY :<br>PACKAGE :<br>CONTRACT NO. :<br>MAIN-SUPPLIER : |
|---|---|---|---|

| Sl. No | Comp-onents | Characteristics | Class | Type Of Check | Quantum Of Check | Reference Document | Acceptance Norms | Format Of Record | Agency | | | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | M | C | N | |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | ** 10. | | | 11. |
| 1 | **PCB** | Visual Check for the following:<br>• Legend Marking<br>• Masking<br>Dimension<br>Electrical Testing<br>Bare Board Testing | Major | Visual / Electrical | Single Sampling Level II of IS 2500 (PartI) (AQL=0.65)<br>2 from each lot<br>2 from each lot<br>100% | AS per Specification Sheet for the component<br>----do----<br>----do----<br>BBT OK | AS per Specification Sheet for the component | IQC Documents | P<br>P<br>P<br>V | V<br>V<br>V<br>V | V<br>V<br>V<br>V | Review of records of the at the time of Final Inspection |
| 2 | **Shunts** | Visual Check for Damages and twisting & Tinning of wires<br>Resistance Value<br>Dimensions | Major | Visual / Electrical | Single Sampling Level II of IS 2500 (PartI) (AQL=0.65)<br>----do----<br>10% of Sample Qty. | As Per Specification Sheet for the component<br>----do----<br>----do---- | I.Q.C. Deptt. of<br>----do----<br>----do---- | IQC Documents | P | V | V | Review of records of the at the time of Final Inspection |
| 3 | **CTs** | Visual check for Damages, Twisting, Tinning of wire, Epoxy coating & Shielding<br>Electrical Tests:<br>• Inductance<br>• Resistance<br>• Output Voltage<br>Dimensions | Major | Visual / Electrical | Single Sampling Level II of IS 2500 (PartI) (AQL=0.65)<br>----do----<br>10% of Sample Qty | AS per Specification Sheet for the component<br>----do----<br>----do---- | I.Q.C. Deptt. of<br>----do----<br>----do---- | IQC Documents | P | V | V | Review of records of the at the time of Final Inspection |
| 4 | **LED** | Visual Check for<br>• Damage<br>• Colour<br>Electrical Test:<br>• Forward Voltage Drop<br>• Reverse Voltage Drop<br>Dimensions | Major | Visual / Electrical | Single Sampling Level II of IS 2500 (PartI) (AQL=0.65)<br>----do----<br>10% of Sample Qty | As per Specification Sheet for the component<br>----do----<br>----do---- | I.Q.C. Deptt. of<br>----do----<br>----do---- | IQC Documents | P | V | V | Review of records of the at the time of Final Inspection |

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | ** 10. | | | 11. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 5 | **Resis-tance** | Visual<br>• Damage<br>• Coding<br>• Package<br>Resistance value<br>Tolerance<br>Dimension | Major | Visual / Electrical | Single Sampling Level II of IS 2500 (PartI) (AQL=0.65)<br>----do----<br>10% of Sample Qty | As per Specification Sheet for the component<br>----do----<br>----do---- | I.Q.C. Deptt. of<br>----do----<br>---do---- | IQC Documents | P | V | V | Review of records of the at the time of Final Inspection |
| 6 | **Capa-citor** | Visual<br>• Damage<br>• Package<br>Capacitance value<br>Tolerance<br>Dimension | Major | Visual / Electrical | Single Sampling Level II of IS 2500 (PartI) (AQL=0.65)<br>----do----<br>10% of Sample Qty | As per Specification Sheet for the component<br>----do----<br>----do---- | I.Q.C. Deptt. of<br>----do----<br>----do---- | IQC Documents | P | V | V | Review of records of the at the time of Final Inspection |
| 7 | **Diode** | Visual Check for<br>• Damage<br>• Package<br>• Marking<br>Electrical Test:<br>• Forward Voltage Drop<br>• Reverse Voltage Drop<br>Dimensions | Major | Visual / Electrical | Single Sampling Level II of IS 2500 (PartI) (AQL=0.65)<br>---do----<br>10% of Sample Qty | As per Specification Sheet for the component<br>----do----<br>----do---- | I.Q.C. Deptt. of<br>----do----<br>----do---- | IQC Documents | P | V | V | Review of records of the at the time of Final Inspection |
| 8 | **Zener Diode** | Visual Check for<br>• Damage<br>• Package<br>• Marking<br>Electrical Test:<br>• Forward Voltage Drop<br>• Reverse Voltage Drop<br>• Zener Voltage<br>Dimensions | Major | | Single Sampling Level II of IS 2500 (PartI) (AQL=0.65)<br>---do----<br>10% of Sample Qty | As per Specification Sheet for the component<br>----do----<br>----do---- | As per Specification Sheet for the component | IQC Documents | P | V | V | Review of records of the at the time of Final Inspection |
| 9 | **ICs** | Visual Check for<br>• Damage<br>• Package<br>• Marking<br>Electrical Test:<br>• Functional<br>Dimensions | Major | Visual / Electrical | Single Sampling Level II of IS 2500 (PartI) (AQL=0.65)<br>---do----<br>10% of Sample Qty | As per Specification Sheet for the component<br>----do----<br>----do---- | As per Specification Sheet for the component | IQC Documents | P | V | V | Review of records of the at the time of Final Inspection |

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | ** 10. | | | 11. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 10 | **MOV** | Visual Check for<br>• Damage<br>• Marking<br>Electrical Test:<br>• Functional Dimensions | Major | Visual / Electrical | Single Sampling Level II of IS 2500 (PartI) (AQL=0.65)<br>---do----<br>10% of Sample Qty | As per Specification Sheet for the component<br>----do----<br>----do---- | As per Specification Sheet for the component | IQC Documents | P | V | V | Review of records of the at the time of Final Inspection |
| 11 | **Crystal** | Visual Check for<br>• Damage<br>• Package<br>Electrical Test:<br>• Functional Dimensions | Major | Visual / Electrical | Single Sampling Level II of IS 2500 (PartI) (AQL=0.65)<br>---do----<br>10% of Sample Qty | As per Specification Sheet for the component<br>----do----<br>----do---- | As per Specification Sheet for the component | IQC Documents | P | V | V | Review of records of the at the time of Final Inspection |
| 12 | **Stepper Motor Counter** | Visual Check for<br>• Damage<br>• No. of Digits<br>• Mounting Holes<br>Electrical Test:<br>• HV Test<br>• Resistance<br>• Functional<br>Boiling Water Test<br>Dimensions | Major | Visual / Electrical | Single Sampling Level II of IS 2500 (Part-I) (AQL=0.65)<br>---do----<br>2 from each Lot<br>**10% of Sample Qty** | As per Specification Sheet for the component<br>----do----<br>----do----<br>----do---- | As per Specification Sheet for the component | IQC Documents | P | V | V | Review of records of the at the time of Final Inspection |

| Sl. No | Opera-tions | Characteristics | Class | Type Of Check | Quantum Of Check | Reference Document | Acceptance Norms | Format Of Record | Agency | | | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. | **PCB Inspe-ction** | Soldering<br>Solder bridging or dry solder<br>Components Mounting<br>Polarity of components<br>Functional Testing | Major | Visual | 100% check and again 5 nos. randomly selected daily by Q.C. | Functionally OK | As per Specification Sheet for the component | QC Documents | P | V | V | Review of records of the at the time of Final Inspection |
| 2. | **Counter & PCB Ass embly-** | Counter alignment | Major | Visual | 100% check and 5 nos. randomly selected daily by Q.C. | Reference Sample & Alignment should be proper | As per Specification Sheet for the component | QC Documents | P | V | V | Review of records of the at the time of Final Inspection |
| 3. | **Asse-mbled Base conne-ction** | Tightness of Connections<br>Terminal Block<br>Gasket | Major | Visual | 100% check and 5 nos. randomly selected daily by Q.C. | Reference Sample & Work Instructions | As per Specification Sheet for the component | QC Documents | P | V | V | Review of records of the at the time of Final Inspection |
| 4. | **Name Plate** | Name Plate Marking<br>Serial Number punching and control | Major | Visual | 100% check and 5 nos. randomly selected daily by Q.C. | As per NTPC Specification | As per Specification Sheet for the component | QC Documents | P | V | V | |
| 5 | **Cover Fixing** | Name Plate position<br>Cover fitment with base | Major | Visual | 100% check and 5 nos. randomly selected daily by Q.C. | Reference Sample & Work Instructions | As per Specification Sheet for the component | QC Documents | P | V | V | Review of records of the at the time of Final Inspection |
| 6. | **Meter Calib-ration** | Meter is calibrated by solder shorting in phase as well as neutral element | Major | Electrical | 100% check | Specified Standard | As per Specification Sheet for the component | QC Documents | P | V | V | Review of records of the at the time of Final Inspection |
| 7 | **Temper Test** | As per the requirements of specification | Major | Electrical | 10 Nos. samples selected daily by Q.C. | As per NTPC Specification | As per Specification Sheet for the component | QC Documents | P | V | V | Review of records of the at the time of Final Inspection |
| 8 | **Packing** | Sealing<br>Functional Testing of Meter | Major | Visual | 100% check and 5 nos. randomly selected daily by Q.C. | Should be proper as per customer requirement | As per Specification Sheet for the component | QC Documents | P | V | V | Review of records of the at the time of Final Inspection |

| Sl. No | Oper-ations | Characteristics | Class | Type Of Check | Quantum Of Check | Reference Document | Acceptance Norms | Format Of Record | Agency | | | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | M | C | N | |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | ** 10. | | | 11. |
| 1. | **Routine Test** | A.C. High Voltage Test | Critical | Electrical | 100% on each Meter | IS : 13779 | IS : 13779 | QC Documents | P | V | V | Review of Records of at the time of Final Inspection |
| | | Insulation Test | Critical | Electrical | 100% on each Meter | IS : 13779 | IS : 13779 | QC Documents | P | V | V | - do - |
| | | Test on limits of Errors | Critical | Electrical | 100% on each Meter | IS : 13779 | IS : 13779 | QC Documents | P | V | V | - do - |
| | | Test of Starting condition | Critical | Electrical | 100% on each Meter | IS : 13779 | IS : 13779 | QC Documents | P | V | V | - do - |
| | | Test of no load condition | Critical | Electrical | 100% on each Meter | IS : 13779 | IS : 13779 | QC Documents | P | V | V | - do - |
| | | Meter Constant | Critical | Electrical | 100% on each Meter | IS : 13779 | IS : 13779 | QC Documents | P | V | V | - do - |
| 2. | **Accept-ance Test** | A. C. High Voltage Test | Critical | Electrical | As per NESCL Tech. Specs./ IS: 13779 | IS : 13779 | IS : 13779 | Inspection Report | P | w | w | The offered quantity of meters shall be divided into sub-lots of 1000 meters each and sampling plan for each sub-lot of 1000 meters shall be as per IS: 13779 |
| | | Insulation Test | Critical | Electrical | As per NESCL Tech. Specs./ IS: 13779 | IS : 13779 | IS : 13779 | Inspection Report | P | w | w | |
| | | Test on limits of Errors | Critical | Electrical | As per NESCL Tech. Specs./ IS: 13779 | IS : 13779 | IS : 13779 | Inspection Report | P | w | w | |
| | | Test of Starting condition | Critical | Electrical | As per NESCL Tech. Specs./ IS: 13779 | IS : 13779 | IS : 13779 | Inspection Report | P | w | w | |
| | | Test of no load condition | Critical | Electrical | As per NESCL Tech. Specs./ IS: 13779 | IS : 13779 | IS : 13779 | Inspection Report | P | w | w | |
| | | Meter Constant | Critical | Electrical | As per NESCL Tech. Specs./ IS: 13779 | IS : 13779 | IS : 13779 | Inspection Report | P | w | w | |

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | ** 10. | | | 11. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Test of repeatability of meter | Critical | Electrical | As per NESCL Tech. Specs./ IS: 13779 | As per IS 13779:99 | IS 13779:99 | Inspection Report | P | w | w | The offered quantity of meters shall be divided into sub-lots of 1000 meters each and sampling plan for each sub-lot of 1000 meters shall be as per IS: 13779 |
| | | Test of Power Consumption | Critical | Electrical | As per NESCL Tech. Specs./ IS: 13779 | As per IS 13779:99 | IS 13779:99 | Inspection Report | P | w | w | |
| | | **Shock Test (Acceptance)** | **Critical** | **Mech** | **As per NESCL Tech. Specs./ IS: 13779** | **As per IS 13010** | **IS 13010** | **Inspection Report** | **P** | **w** | **w** | |
| | | **Vibration Test (Acceptance)** | **Critical** | **Mech** | **As per NESCL Tech. Specs./ IS: 13779** | **NESCL Tech. Specs.** | **NESCL Tech. Specs.** | **Inspection Report** | **P** | **w** | **w** | |
| | | Test on limits of Errors | Critical | Electrical | As per NESCL Tech. Specs./ IS: 13779 | IS : 13779 | IS : 13779 | Inspection Report | P | w | w | To be done after Vibration Test |
| | | Anti-Tamper Tests | Critical | Electrical | As per NESCL Tech. Specs. | IS : 13779 | IS : 13779 | Inspection Report | P | w | w | |
| 3. | Type Tests | All Type Tests as per IS 13779 | Critical | Electrical / Mech | As per IS 13779:99 | As per IS 13779:99 | IS 13779:99 | Inspection Report | V | w | w | Type Test clearance from NESCL Engineering department |

Legend:

M : Manufacturer
C : Contractor
N : NTPC Electric Supply Company Ltd.
IQC : Incoming Quality Control
P : Perform
V : Verify
W : Witness



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| Manufacturer's Name And Address : | | | MANUFACTURING QUALITY PLAN | | | | | Project/ UTILITY:<br>PACKAGE:<br>Contract No.:<br>main-supplier: | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Item :11 kV A B switch | | | QP No.:<br>Rev. No.:<br>Date: | | | | | | |
| Sl. No | Component & Operations | Characte-ristics | Class | Type of Check | Quantum Of check | Reference Document | Acceptance Norms | Format of RecordS | Agency | | | Remarks |
| | | | | | | | | | M | C | N | |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | | | 11 |
| **SECTION : 1 RAW MATERIALS** | | | | | | | | | | | | |
| 1. | Copper Flats | Visual Examination | Major | PH | IS-191 Part-IV, IS-1897 | IS-191 Part-IV, IS-1897 | IS-191 Part-IV, IS-1897 | QC Record | P | V | V | Review Of Records At The Time Of Final Inspection |
| | | Dimension | Major | PH | IS-191 Part-II IS-1897 | IS-191 Part-II IS-1897 | IS-191 Part-II IS-1897 | QC Record | P | V | V | ----DO--- |
| | | Tensile Strength | Major | ME | IS-1608 | IS-1608 | IS-1608 | Supplier TC | V | V | V | Review of Manufacturer TC/Reputed lab TC at the time of final inspection |
| | | Chemical Composition | Major | CH | IS-191 Part-IV IS-1897 | IS-191 Part-IV IS-1897 | IS-191 Part-IV IS-1897 | Supplier TC | V | V | V | ---DO--- |
| | | Bend Test | Major | ME | IS-191 Part-IV IS-1897 | IS-191 Part-IV IS-1897 | IS-191 Part-IV IS-1897 | Supplier Tc | V | V | V | ---DO--- |
| | | Resistivity / Conductivity | Major | E | IS-191 Part-IV IS-1897 | IS-191 Part-IV IS-1897 | IS-191 Part-IV IS-1897 | Supplier Tc | V | V | V | ---DO--- |

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | | | 11 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2. | Aluminium Flats | Visual Examination | Major | PH | IS-5082 | IS-5082 | IS-5082 | QC Record | P | V | V | Review Of Records At The Time Of Final Inspection |
| | | Dimension | Major | PH | IS-3965 | IS-3965 | IS-3965 | QC Record | P | V | V | ---DO--- |
| | | Tensile Strength | Major | ME | IS-1608 | IS-1608 | IS-1608 | Supplier TC | V | V | V | Review of Manufacturer TC/Reputed lab TC at the time of final inspection |
| | | Bend Test | Major | ME | IS-5082 | IS-5082 | IS-5082 | Supplier TC | V | V | V | ---DO--- |
| | | Resistivity / Conductivity | Major | E | IS-5082 | IS-5082 | IS-5082 | Supplier TC | V | V | V | ---DO--- |
| | | Chemical Composition | Major | CH | IS-5082 | IS-5082 | IS-5082 | Supplier TC | V | V | V | ---DO--- |
| 3. | MILD STEEL SECTIONS | Visual Examination | Major | PH | IS-2062 | IS-2062 | IS-2062 | QC Record | P | V | V | Review Of Records At The Time Of Final Inspection |
| | | Dimension | Major | PH | IS-808, IS-1730, IS-1732, IS-3954 | IS-808, IS-1730, IS-1732, IS-3954 | IS-808, IS-1730, IS-1732, IS-3954 | QC Record | P | V | V | ---DO--- |
| | | Tensile Strength | Major | ME | IS-1608 | IS-1608 | IS-1608 | Supplier TC | V | V | V | Review of Manufacturer TC/Reputed lab TC at the time of final inspection |
| | | Chemical Composition | Major | CH | IS-2062 | IS-2062 | IS-2062 | Supplier TC | V | V | V | ---DO--- |
| | | Bend Test | Major | ME | IS-2062 | IS-2062 | IS-2062 | QC Record | P | V | V | Review Of Records At The Time Of Final Inspection |

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | | | 11 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 4. | CONTACT SPRIGS | Visual Examination | Major | PH | 100% | PLANT STANDARD | PLANT STANDARD | QC Record | P | V | V | ---DO--- |
| | | Dimension | Major | PH | 10 Nos. per lot | PLANT STANDARD | PLANT STANDARD | QC Record | P | V | V | ---DO--- |
| | | Functional check | Major | PH | --DO-- | PLANT STANDARD | PLANT STANDARD | QC Record | P | V | V | ---DO--- |
| | | Fitment/ Springs | Major | PH | --DO-- | PLANT STANDARD | PLANT STANDARD | QC Record | P | V | V | ---DO--- |
| 5. | FASTN-ERS | Visual Examination | Major | PH | IS-1367-III | IS-1367-III | IS-1367-III | QC Record | P | V | V | Review Of Records At The Time Of Final Inspection |
| | | Dimension | Major | PH | IS-1363 | IS-1363 | IS-1363 | QC Record | P | V | V | ---DO--- |
| | | Wedge Test | Major | ME | IS-1367-III | IS-1367-III | IS-1367-III | Supplier TC | V | V | V | Review of Manufacturer TC/Reputed lab TC at the time of final inspection |
| | | Hardness | Major | ME | IS-1367-III | IS-1367-III | IS-1367-III | Supplier TC | V | V | V | ---DO--- |
| | | Galvanizing | Major | CH | IS-1367-XIII | IS-1367-XIII | IS-1367-XIII | SUPPLIER TC | V | V | V | ---DO--- |
| 6. | GI PINS | Visual | Major | PH | IS-2486-II | IS-2486- II | IS-2486- II | QC Record | P | V | V | Review Of Records At The Time Of Final Inspection |
| | | Dimension | Major | PH | IS-2486-II | IS-2486- II | IS-2486- II | QC Record | P | V | V | ---DO--- |
| | | Galvaniza-tion Checks | Major | CH | IS-4759 | IS-4759 | IS-4759 | Supplier TC | V | V | V | Review of Manufacturer TC /Reputed lab TC at the time of final inspection |

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | | | 11 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 7. | INSULA-TOR | Visual | Major | PH | 100% | IS-2544 IS-5350 IS-731 | IS-2544 IS-5350 Is-731 | QC Record | P | V | V | NGK Birla/ WSI/ Jayshree Makes only. Review Of Records At The Time Of Final Inspection |
| | | Dimension | Major | PH | IS-2544 IS-5350 IS-731 | Approved Drgs. | Approved Drgs. | QC Record | P | V | V | ---DO--- |
| | | High Voltage Test | Major | E | IS-2544 IS-731 | IS-2544 IS-731 | IS-2544 IS-731 | Supplier TC | V | V | V | Review of Manufacturer TC/Reputed lab TC at the time of final inspection |
| | | Temperature Cycle | Major | E | IS-2544 IS-731 | IS-2544 IS-731 | IS-2544 IS-731 | Supplier TC | V | V | V | -----DO---- |
| | | Mechanical Strength/ Failing load Test | Major | ME | IS-2544 IS-731 | IS-2544 IS-731 | IS-2544 IS-731 | Supplier TC | V | V | V | -----DO---- |
| | | Puncture Test | Major | E | IS-2544 IS-731 | IS-2544 IS-731 | IS-2544 IS-731 | Supplier TC | V | V | V | -----DO---- |
| | | Porosity Test | Major | PH | IS-2544 IS-731 | IS-2544 IS-731 | IS-2544 IS-731 | Supplier TC | V | V | V | -----DO---- |
| | | Galvanizing test | Major | CH | IS-2544 IS-4759 IS-731 | IS-2544 IS-4759 IS-731 | IS-2544 IS-4759 IS-731 | Supplier TC | V | V | V | -----DO---- |



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| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | | | 11 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 8. | AL. ALLOY | Chemical Composition | Major | CH | IS-617 | SI-617 | IS-617 | Supplier TC | V | V | V | ---DO--- |
| 9.. | ZINC | Chemical Composition | Major | CH | IS-209 IS-13229 | IS-209 IS-13229 | IS-209, IS-4759 | Supplier TC | V | V | V | ---DO--- |
| 10. | GI TUBES | Visual | Major | PH | IS-1239 | IS-1239 | IS-1239 | QC Record | P | V | V | Review Of Records At The Time Of Final Inspection |
| | | Dimension | Major | PH | IS-1239 | Approved Drgs | IS-1239 | QC Record | P | V | V | -----DO---- |
| | | Chemical Analysis | Major | CH | IS-1239 | IS-1239 | IS-1239 | Supplier TC | V | V | V | Review of Manufacturer TC/Reputed lab TC at the time of final inspection |
| | | Tensile Strength | Major | ME | IS-1239 | IS-1239 | IS-1239 | Supplier TC | V | V | V | -----DO---- |
| | | Elongation | Major | ME | IS-1239 | IS-1239 | IS-1239 | Supplier TC | V | V | V | -----DO---- |
| | | Bend Test | Major | ME | IS-1239 | IS-1239 | IS-1239 | | P | V | V | Review Of Records At The Time Of Final Inspection |
| | | Galvanizing | Major | CH | IS-1239 | IS-1239 | IS-1239 | Supplier TC | V | V | V | Review of Manufacturer TC /Reputed lab TC at the time of final inspection |

| Sl. No | Component & Operations | Characteristics | Class | Type of Check | Quantum Of check | Reference Document | Acceptance Norms | Format of RecordS | Agency | | | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | M | C | N | |
| 1. | 2. | 3. | 4. | 5. | 6. | 7. | 8. | 9. | 10. | | | 11. |
| **SECTIION: 2 INPROCESS INSPECTION** | | | | | | | | | | | | |
| 1. | WELDED/ FABRICATED M.S. COMPONENT | Visual Examination | Major | PH | 100% | -FQP | -FQP | QC Record | P | V | V | Review Of Records At The Time Of Final Inspection |
| | | Dimension | Major | PH | Min. five sample per lot | -FQP | -FQP | QC Record | P | V | V | ----DO--- |
| | | Fitment/ Assembly | Major | PH | One sample per lot | -FQP | -FQP | QC Record | P | V | V | ----DO--- |
| 2. | FABRICATION OF COPPER CONTACTS | Visual Examination | Major | PH | 100% | -FQP | -FQP | QC Record | P | V | V | ----DO--- |
| | | Dimension | Major | PH | Min. five sample per lot | -FQP | -FQP | QC Record | P | V | V | ---DO--- |
| | | Fitment / Assembly | Major | PH | One sample per lot | -FQP | -FQP | QC Record | P | V | V | ----DO--- |
| 3. | HOT DIP GALVANIZING | Visual Examination | Major | PH | 100% | IS-4759 | IS-4759 | QC Record | P | V | V | ----DO--- |
| | | Appearance | Major | PH | One sample of each compon-ent per lot | IS-2629 | IS-2629 | QC Record | P | V | V | ----DO--- |
| | | Uniformity | Major | CH | -----DO--- | IS-2633 | IS-2633 | QC Record | P | V | V | ----DO--- |
| | | Mass of zinc | Major | CH | -----DO---- | IS-6745 | IS-6745 | QC Record | P | V | V | ----DO--- |



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| Sl. No | Component & Operations | Characteristics | Class | Type of Check | Quantum Of check | Reference Document | Acceptance Norms | Format of RecordS | Agency | | | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | M | C | N | |
| 1. | 2. | 3. | 4. | 5. | 6. | 7. | 8. | 9. | 10. | | | 11. |
| 4. | Terminals Connector | Visual Examination | Major | PH | 100% | IS-5561 | IS-5561 | QC Record | P | V | V | Review Of Records At The Time Of Final Inspection |
| | | Dimension | Major | PH | One sample per lot | Approve d drags. | Approved Drgs. | QC Record | P | V | V | -----DO---- |
| | | Tensile | Major | ME | Type test | IS-5561 | IS-5561 | Type Test Report | W | V | V | Review of type test from CPRI/NABL approved lab on similar connector. |
| | | Resistance | Major | E | Type test | IS-5561 | IS-5561 | Type Test Report | W | V | V | -----DO---- |
| | | Temperature Rise | Major | E | Type test | IS-5561 | IS-5561 | Type Test Report | W | V | V | -----DO---- |
| | | Short Time Current test | Major | E | Type test | IS-5561 | IS-5561 | Type Test Report | W | V | V | -----DO---- |
| 5. | Electroplating | Visual Examination | Major | PH | 100% | IS-3203 IS-6012 | IS-3203 IS-6012 | SV | W | V | V | Review Of Inspection Records At The Time of Final Inspection |
| | | Thickness of plating | Major | PH | One sample of each comp onents per lot | IS-3203 IS-6012 | IS-3203 IS-6012 | SV | W | V | V | ---DO--- |

| 1. | 2. | 3. | 4. | 5. | 6. | 7. | 8. | 9. | 10. | | | 11. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 6. | Assemblies/ Subassem- blies | Visual Examination | Major | PH | 100% | -FQP | -FQP | QC RECORD | P | V | V | Review Of Records At The Time Of Final Inspection |
| | | Dimension | Major | PH | 10% | Approved/ Floor Drgs. | Approved/ Floor Drgs. | QC RECORD | P | V | V | ---DO--- |
| | | Verification of components | Major | PH | 10% | Approved/ Floor Drgs. | Approved/ Floor Drgs. | QC RECORD | P | V | V | ---DO--- |
| | | Functional check | Major | PH | Min. one sample per lot | -FQP | -FQP | QC RECORD | P | V | V | ---DO--- |
| 7. | PACKING | Visual | Major | PH | 100% | Packing list Approved Drgs. | Packing list Approved Drgs. | QC RECORD | P | V | V | Verification of packing List at the time of final inspection & review |

| Sl. No | Component & Operations | Characteristics | Class | Type of Check | Quantum Of check | Reference Document | Acceptance Norms | Format of RecordS | Agency | | | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | M | C | N | |
| 1. | 2. | 3. | 4. | 5. | 6. | 7. | 8. | 9. | 10. | | | 11. |
| **SECTIION: 3 PRODUCT TESTING** | | | | | | | | | | | | |
| 1. | TYPE TEST – GO AB SWITCH | All type tests as per relevant IS & Technical Specifications | Major | TTR | Proto-type | IS-9920, NESCL Technical specific-ation | IS-9920, NESCL Technical specific-ation | TYPE TEST REPORT | W | W | W | Type Test Clearance from NESCL Engineering Department |
| 2. | ROUTINE TEST- GO AB SWITCH | 1) Power Frequency Voltage Dry Test 2) Measurement of Resistance of main circuit 3)Operating Test | Major | Routine Checks | 100% | IS-9920, NESCL Technical specifi-cation Approved Drgs | IS-9920, NESCL Technical specifi-cation Approved Drgs | QC RECORD | P | V | V | Review Of Routine test reports during final Inspection |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3. | Accept-ance Tests-Goab Switch | Visual Examination | Major | Physical | 100% | IS-9920 /9921, Part-I-IV | IS-9920/9921, Part-I-IV | Test Report | P | W | W | |
| | | Dimension | Major | Physical | Sample as per IS: 2500 | Approved Drgs. | Approved Drgs. | Test Report | P | W | W | |
| | | Verification of component | Major | Physical | | | | | P | W | W | |
| | | Operational check | Major | Physical | | IS-9920, Part-I-IV | IS-9920, Part-I-IV | | P | W | W | |
| | | Measurement of Resistance on main circuits | Major | Electrical | | | | | P | W | W | |
| | | Power Frequency withstand voltage test | Major | Electrical | | | | | P | W | W | |

| SECTIION: 5 REMARKS | |
|---|---|
| 1. | The MQP should be read in conjunction with NESCL specification and shall deem to include additional tests if any required as per contract. |
| 2. | In case of any contradiction between the manufacturer's manufacturer FQP & NESCL FQP, this MQP and NESCL specification following precedence shall be followed:<br>a) NESCL specification<br>b) This Manufacturing Quality Plan<br>c) Manufacturer's FQP. |
| 3. | 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. |
| 4. | In case of any tests being carried out at third party lab, such lab/facility should be NABL accredited / accepted by NESCL. |
| 5. | The raw material/bought out items should be procured from reputed sources. |
| 6. | The manufacturer shall maintain the proper co-relatio<br>NESCL. |
| 7. | Any material rejected during power grid inspection shall be disposed off with the approval of NESCL. For destructive disposal NESCL may depute its representative for witnessing. In case the material is to be returned to sub-vendor, all such items shall be indelibly marked (to prevent mixing) at the works of the manufacturer and offered to NESCL Inspector for verification of marking. |
| 8. | Insulators shall be procured from M/S Birla NGK (JSI)/ India pottery only. |



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| Manufacturer/ Sub-supplier | Main-supplier | LEGEND<br>M: MANUFACTURER/SUB-SUPPLIER<br>C: SUPPLIER/ NOMINATED INSPECTION AGENCY (SUBJECT TO PRIOR APPROVAL OF NESCL), N: NESCL P: PERFORM<br>W: WITNESS AND<br>V: VERIFICATION. AS APPROPRIATE, ,PH:PHYSICAL, E:ELECTRICAL ME:MECHANICAL,CH:CHEMICAL<br>CHP: NESCL SHALL IDENTIFIED IN COLUM "N" | एनटीपीसी NTPC इलेक्ट्रिक सप्लाई Electric Supply<br>FOR NESCL USE | Doc. No.: Rev…… Cat….. | | |
| SIGNATURE | | | | Reviewed By | Approved By | Approval Seal |

| MANUFACTURE'S NAME & ADDRESS: | | | | MANUFACTURING QUALITY PLAN | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | ITEM : 33 kV AND 11 KV VACCUM CIRCUIT BREAKERS (VCB) | | | QP NO. VEL/ NESCL/CG/01 | PROJECT/UTILITY: | | | | |
| | | | | | | | REV. NO: | PACKAGE : | | | | |
| | | | | | | | DATE: | CONTRACT NO: | | | | |
| | | | | | | | | MAIN-CONTRACTOR: M/s. | | | | |
| Sl. No | Component & Operation | Characte-ristics | Class | Type Of Check | Quantum of Check | Reference Document | Acceptance norms | Format of Records | | Agency | | Remarks |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | D | 10 | | 11 |
| **SECTION: 1 RAW MATERIAL** | | | | | | | | | | M | N | C | |
| 1 | Hot Rolled Sheets (3.15mm)/ Cold Rolled Sheets (1.25mm TO 3mm) | 1. Finish | Major | Visual | 5PCS/LOT | ISO W/I WIQR03 CGL SPEC HR-S2MS006 CR-S2MS005 PLATES S2M007 IS 1079, 1S 513 | Nescl Spec And Nescl Approved Drawing | Supplier Manufac-turer's / CGL Record On Electr-onic System | | P | V | V | Review Of Manufacturer, S Test Records/ Supplier Tc At The Inspection |
| | | 2. Dimension | Major | Measur-ement | 5PCS/LOT | DO | DO | DO | | P | V | V | DO |
| | | 3. Bend Test | Major | Mechanical | 1 PCS/LOT | DO | DO | DO | | P | V | V | DO |
| | | 4.Chemical | Major | Chemical | 1 PCS/LOT OF 10 Tons | DO | DO | DO | | P | V | V | DO |
| 2 | Alloy Steel Barsi/ Flats/ Angles & Sections En 8, En 9, En 19a SAE 8620 | 1. Finish | Major | Visual | 10% PER LOT | ISO W/I AND CGL SPEC S2MS 008 | Nescl Spec And Nescl Approved Drawing | DO | | P | V | V | DO |
| | | 2. Dimension | Major | Measur-ement | 5 NOS/ LOT | DO | DO | DO | | P | V | V | DO |
| | | 3. Chemical | Major | Chemical | 2 NO/LOT | DO | DO | DO | | P | V | V | DO |
| | | 4. Tensile | Major | Mechanical | 1NO/LOT | DO | DO | DO | | P | V | V | DO |



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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3 | Copper/ Copper Alloys, Flats Round Sections | 1. Finish | Major | Visual | 10% PER LOT | ISO W/I WIQR03 CGL SPEC S2MSOO1 AND 1S6134, 1S 191 & IS 2826 | NESCL SPEC AND NESCL APPROVED DRAWING | DO | | P | V | V | DO |
| | | 2. Dimension | Major | Measur-ement | 5 NOS/ LOT | DO | DO | DO | | P | V | V | DO |
| | | 3. Conduct-ivity | Major | Electrical | 2 NOS/ LOT | DO | DO | DO | | P | V | V | DO |
| | | 4. Bend Test | Major | Mechanical | 2 NOS/ LOT | DO | DO | DO | | P | V | V | DO |
| | | 5. Chemical | Major | Chemical | 1 NO/LOT | DO | DO | DO | | P | V | V | DO |
| | | 6. Tensile Test & Elongation | Major | Mechanical | 1 NO/LOT (LOT SIZE 1500 KG) | DO | DO | DO | | P | V | V | DO |
| 4 | Aluminium And Aluminium Alloys Flats And Section | 1. Finish | Major | Visual | 10% PER LOT | ISO W/I WIQR03 CGL SPEC S2MS002 AND 1S5082 AND 1S 3965 | NESCL SPEC AND NESCL APPROVED DRAWING | DO | | P | V | V | DO |
| | | 2. Dimension | Major | Measur-ement | 5 NOS/ LOT | DO | | DO | | P | V | V | DO |
| | | 3. Conduct-ivity | Major | Electrical | 2 NOS/ LOT | DO | | DO | | P | V | V | DO |
| | | 4. Bend Test | Major | Mechanical | 2 NOS/ LOT | DO | | DO | | P | V | V | DO |
| | | 5. Chemical | Major | Chemical | 1 NO/LOT | DO | | DO | | P | V | V | DO |
| | | 6. Tensile Test | Major | Mechanical | 1 NO/LOT (LOT SIZE 1000 KG) | DO | | DO | | P | V | V | DO |
| 5 | Castings/ Forgings | 1. Defects & Finsih | Major | Visual | 10% LOT | CGL Drawing And Control Plan | CGL Drawing And Control Plan | DO | | P | V | V | DO |
| | | 2. Dimension | Major | Measur-ement | Samples Per Chart – 3 Of QCC09 | DO | | DO | | P | V | V | DO |
| | | 3. Chemical | Major | Chemical | 1 NO/LOT | DO | | DO | | P | V | V | DO |

| SECTION: 1 BOUGHT OUT COMPONENTS | | | | | | | | | | M | C | N | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 6 | Identified Major Compo-nents (Lost As Per Qcc 01 And Qcc03) | 1. Dimen-sions | Major | Measur-ement | 100% And Chart 1 As Per QCC09 | CGL Drawing And Control Plan | CGL Drawing And Control Plan | Supplier Manufa-cturer's /Cgl Record On Electr-onic System | | P | V | V | Review Of Manufa-cturer's Test Records/ Supplier Tc At The Time Of Final Inspection |
| | | 2. Chemical (Where Applicable) | Major | | As Mentioned In Resp. Drawing | CGL Drawing And Control Plan | NESCL SPEC and NESCL Approved Drawing | Do | | P | V | V | DO |
| 7 | Pressed Comp-onents | 1. Dimen-sions | Major | Measur-ement | SAMPLES AS PER CHART-3 OF QCC09 | CGL DRAWING | CGL Drawing (Identified Charecte-ristics) | Inspe-ction Record On Electr-onic System | | P | V | V | DO |
| | | 2. Surface Finish | Major | Visual | D0 | DO | DO | DO | | P | V | V | DO |
| 8 | Fabricated Comp-onents | 1. Dimen-sions | Major | Measur-ement | D0 | DO | DO | DO | | P | V | V | DO |
| | | 2. Finish | Major | Visual | D0 | DO | DO | DO | | P | V | V | DO |

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| 9 | Springs | 1. Dimen-sions | Major | Measur-ement | D0 | CGL DRAWING AND CONTROL PLAN | CGL DRAWING AND NESCL SPEC | Supplier Manufac-turer's /Cgl Record On Electr-onic System | | P | V | V | DO |
| | | 2. Surface Finish | Major | Visual | D0 | DO | DO | DO | | P | V | V | DO |
| | | 3. Load Values | Major | Test | D0 | DO | DO | DO | | P | V | V | DO |
| 10 | Hardware | 1. Surface Finish | Major | Visual | D0 | NESCL SPEC | NESCL SPEC AND NESCL APPROVED DRAWING | Inspe-ction Record On Electr-onic System | | P | V | V | DO |
| | | 2. Dimension | Major | Measur-ement | D0 | DO | DO | DO | | P | V | V | DO |
| | | 3. Harness (If Applicable) | Major | Test | D0 | IS 1363, IS 1364, IS 1367, IS 2389, IS 2016 | IS 1363, IS 1364, IS 1367, 1S 2389, 1S 2016 | DO | | P | V | V | DO |
| 11 | Expoy Insulators Bushings And Pole Units | 1. Surface Finish | Major | Visual | D0 | CGL DRAWING AND SPEC | NESCL SPEC and NESCL Approved Drawing | DO | | P | V | V | DO |
| | | 2. Dimension | Major | Measur-ement | D0 | DO | DO | DO | | P | V | V | DO |
| | | 3. Cantilever Load (Is Specified) | Major | Mechanical | D0 | DO | DO | DO | | P | V | V | DO |
| | | 4. Hv Test (If Specified) | Major | Electrical | D0 | DO | DO | DO | | P | V | V | DO |

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| 12 | Gaskets | 1. Dimen-sions | Major | Measur-ement | D0 | | | DO | | P | V | V | DO |
| | | 2. Hardness Test | Major | Test | D0 | DO | DO | DO | | P | V | V | DO |
| 13 | Vaccum Interrupters Make Cgl/ Bel | 1. Routine Test | Major | Electrical | 100% | B Sheet And Manufa-cturing Instruction Sheet Of CGL | NESCL SPEC and NESCL Approved Drawing | Supplier Manufa-cter's /Cgl Record On Inprocess Test Card Fiv-02 | | P | V | V | DO |
| | | 2. Type/ Rating | Major | Visual | Sample | DO | DO | DO | | P | V | V | DO |
| | | 3. Functional Test | Major | Operational | 100% | DO | DO | DO | | P | V | V | DO |
| 14 | Electrical Accessories Relays, Meters, Switches, Contrators And Other Fitments | 1. Type/ Rating | Major | Visual | SAMPLE | DO | NESCL SPEC and NESCL Approved Drawing | Supplier Manufa-cturer,S /Cgl Record On Inprocess Test Card Fiv-01 | | P | V | V | DO |
| | | 2. Functional Test | Major | Operational | 100% | DO | DO | DO | | P | V | V | DO |



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| 15 | Ct/Pts | 1. Routine Test | Major | Electrical | 100% | DO | NESCL SPEC and NESCL Approved Drawing | Supplier TC | | P | V | V | DO |
| | | 2. Frame Size | Major | Visual | 100% | DO | DO | DO | | P | V | V | DO |
| | | 3. Terminal Marking | Major | Visual | 100% | DO | DO | DO | | P | V | V | DO |
| 16 | Pvc Wires | 1. Dimen-sions | Major | Measur-ement | Sample As Per Chart-3 of QCC-O9 | NESCL SPEC | NESCL Approved Drawing | DO | | P | V | V | |
| | | 2. Resist-ance | Major | Electrical | DO | DO | DO | DO | | P | V | V | DO |
| | | 3. Insulation | Major | Electrical | DO | DO | DO | DO | | | | | |
| 17. | MOTORS | 1. Type/ Rating | Major | Visual | 100% | B Sheet/MI | Supplier TC/B Sheet/ M.I | Supplier TC | | P | V | V | DO |
| | | 2. Functional Test | Major | Measur-ement | 100% | DO | DO | DO | | | | | |
| **SECTION: 3.1 INPROCESS INSPECTION & TESTING (FEEDER SHOP)** | | | | | | | | | | M | C | N | |
| 18 | CNC Punching Shearing, Bending Drilling Welding Machining | 1. Dimen-sions | Major | Measur-ement | FIRST PIECE RANDOM PIECE LAST PIECE | NESCL Approved Drawing / CGL Drawing | NESCL Approved Drawing/ CGL Drawing | Inspe-ction Record On Daily Job Card | | P | V | V | Review Of Manufa-cturer's Test Records/ Supplier Tc At The Time Of Final Inspection |
| 19 | Finished Comp-onents (Feeder Shop) | 1. Dimen-sions | Major | Measur-ement | AS PER CHART-3 OF QCC-09 | NESCL Approved Drawing / CGL Drawing | NESCL Approved Drawing/ CGL Drawing | DO | | P | V | V | DO |
| | | 2. Complet-eness Of Oepration | Major | Visual | D0 | DO | DO | DO | | P | V | V | DO |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 20 | Pretreat-ment Process Zinc Phosph-ating (9 Tank) | 1. Bath Concen-tration | Major | Analysis | Daily Once | CGL W.I PTO-03 | Plant Standard | Register | | P | V | V | DO |
| | | 2. Temper-ature | Major | Temp. Control | DI | DO | DO | DO | | P | V | V | DO |
| | | 3. Coating Weight | Major | Physical | Once In 6 Month | CGL W.I PTO-015 | DO | Supplier TC | | P | V | V | DO |
| | | 4. Surface Finish | Major | Visual | Daily Once | DO | DO | DO | | P | V | V | DO |
| 21 | Powder Coating | 1. Shade | Major | Visual | DAILY | CGL Material Spec And W.I Pto-16 And Pto-17 Approved Drawing | Shade To Match With Std Panel Dft Min 40 Microns/ Approved | Register | | P | V | V | DO |
| | | 2. Dry Film Thickness | Major | Measur-ement | DAILY SAMPLE AS PER CHART-03 | Do | Do | Do | | P | V | V | DO |
| 22. | Breaker | 1. Assembly Checks | Major | Visual/ Mechanical | 100% | ISO Work Instruction (W/I) W/I-WIQV-01 | As Per Work Instructions | Breaker Test Card FIV-02 | | P | V | V | Review Of Manufac-turer's Test Records/ Supplier Tc At The Time Of Final Inspection |
| | | 2. Coil/ Mechanism Setting | Major | Mecha-nical/ Electrical | 100% | ISO Work Instruction (W/I) W/I-WIQV-02 | DO | DO | | P | V | V | DO |
| | | 3. Operation Testing | Major | Electrical | 100% | ISO Work Instruction (W/I) W/I – WIQV-06 | DO | do | | p | V | V | DO |



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| 23. | Breaker | 1. Assembly Checks | Major | Visual/ Mechanical | 100% | ISO Work Instruction (W/I) W/I – WIQV-01 | As Per Work Instuctions | Breaker Test Card FIV-02 | | P | V | V | DO |
| | | 2. Coil/ Mechanism Setting | Major | Mechanical/ Electrical | 100% | ISO Work Instruction (W/I) W/I –WIQV-02 | DO | DO | | P | V | V | DO |
| | | 3. Operation Testing | Major | Electrical | 100% | ISO Work Instruction (W/I) W/I-WIQV-06 | DO | DO | | P | V | V | DO |
| **SECTION : 3.2 INPROCESS INSPECTION & TESTING (ASSEMBLY SHOP)** | | | | | | | | | | | | | |
| 24 | Inprocess Inspection (Panel) | 1. Assembly | Major | Visual | 100% | W;I-WIQV-03 | As Per Work Instruction And Bom/Mi | PANEL TEST CARD FIV-01 | | P | V | V | DO |
| | | 2. Bom/M.I Checks | Major | Visual | 100% | BOM/MI | DO | | | P | V | V | DO |
| **SECTION: 4 FINAL INSPECTION AND TESTING** | | | | | | | | | | M | C | N | |
| 25 | Routine Testing Of Vcb | 1. Power Frequency Voltage (Dry) Test On The Main Circuit | Major | Electrical | 100% | As Per Is 13118-91 And NESCL Specification | As Per Is 13118-91 And NESCL Specification | Test Report | | P | V | V | Review Of Manufa-cturer's Test Records/Tc At The Time Fo Final Inspection |
| | | 2. Voltage Test On Control & Auxiliary Circuits | Major | Electrical | 100% | | | DO | | P | V | V | |
| | | 3. Measure Ment Of Resistance Of Main Circuit | Major | Electrical | 100% | | | DO | | P | V | V | |
| | | 4. Mecha-Nical Operating Test | Major | Electrical | 100% | | | DO | | P | V | V | |

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| 26 | Routine Tests For Voltage Transformer | 1.Verification Of Terminal Markings & Polarity | Major | Electrical | 100% | As per IS 3156 (PART-1) 92 and NESCL Specification | As per IS 3156 (PART-1) 92 and NESCL Specification | Test Report | | P | V | V | Review Of Manufa-cturer's Test Records/Tc At The Time Fo Final Inspection |
| | | 2. Power Frequency (Dry) Withstand Tests On Primary Windings | Major | Electrical | 100% | | | DO | | P | V | V | |
| | | 3. Power Frequency (Dry) Withstand Tests On Secondary Windings | Major | Electrical | 100% | | | DO | | P | V | V | |
| | | 4.Determi-nation Of Errors For Accuracy Class | Major | Electrical | 100% | | | DO | | P | V | V | |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 27 | Routine Tests For Current Transformer | 1.Verification Of Terminal Markings & Polarity | Major | Electrical | 100% | AS PER IS 2705 (PART-1) 92 and NESCL Specification | AS PER IS 2705 (PART-1) 92 and NESCL Specification | TEST REPORT | | P | V | V | Review Of Manufac-turer's Test Records/Tc At The Time Fo Final Inspection |
| | | 2. Power Frequency (Dry) Withstand Tests On Primary Windings | Major | Electrical | 100% | | | DO | | P | V | V | |
| | | 3. Power Frequency (Dry) Withstand Tests On Secondary Windings | Major | Electrical | 100% | | | DO | | P | V | V | |
| | | 4. Over Voltage Inter Turn Test | Major | Electrical | 100% | | | | | P | V | V | |
| | | 5. Determi-nation Of Errors For Accuracy Class | Major | Electrical | 100% | | | DO | | P | V | V | |
| 28 | Type Test For Vcb | All Type Test As Per Is: 13118 & Nescl Tech. Spec. | Major | Electrical | Prototype | AS PER IS: 13118 & NESCL TECH. SPEC. | AS PER IS: 13118 & NESCL TECH. SPEC. | Type Test Report | | V | V | V | Type Test Clearance From Nescl Engineering Dept. |
| 29 | Type Test For Pt | All Type Test As Per Is: 3156 & Nescl Tech. Spec. | Major | Electrical | Prototype | AS PER IS: 3156 & NESCL TECH. SPEC. | AS PER IS: 3156 & NESCL TECH. SPEC. | Type Test Report | | V | V | V | Type Test Clearance From Nescl Engineering Dept. |
| 30 | Type Test For Ct | All Type Test As Per Is: 2705 & Nescl Tech. Spec. | Major | Electrical | Prototype | AS PER IS: 2705 & NESCL TECH. SPEC. | AS PER IS: 2705 & NESCL TECH. SPEC. | Type Test Report | | V | V | V | Type Test Clearance From Nescl Engineering Dept. |

| MANUFACTURE'S NAME & ADDRESS: | | | | MANUFACTURING QUALITY PLAN | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | ITEM: 33 kV CURRENT TRANSFORMER | | QP NO: | | PROJECT/UTILITY: | | | | | |
| | | | | | | REV.NO: | | PACKAGE: | | | | | |
| | | | | SUB-SYSTEM: | | DATE: | | CONTRACT NO: | | | | | |
| | | | | | | | | MAIN-CONTRACTOR: | | | | | |
| Sl. No | Component & Operation | Characteristics | Class | Type Of Check | Quantum of Check | Reference Document | Acceptance Norms | Format of Records | | Agency | | | Remarks |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | D | * 10 | | | 11 |
| **SECTION: 1 RAW MATERIALS** | | | | | | | | | | M | C | N | |
| 1 | Supper Enamal Copper Wire | 1. Visual | Major | Visual | 5% | Plant Standard Qai/01 Sec-2 | IS 13778 Pt-1 | VCS/ QA/02R | | P | V | V | Verification Of Record / Supplier Tc At The Time Of Final Inspection By Nescl Inspector |
| | | 2.Diameter | Major | Measurement | 1 SAMPLE PER LOT | Do | IS 13778 Pt-1 &2 | DO | | P | V | V | DO |
| | | 3.Resistance | Major | Electrical | 1 MTR EACH SIZE | Supplier TC | Random Sample Testing As Per Is 13778 Pt -5 | SUPPLIER TC / VCS LAB REPORT | | P | V | V | DO |
| | | 4.B.D.V | Major | Electrical | 1 SAMPLE PER LOT | Supplier TC | IS 13778 Pt-5 | DO | | P | V | V | DO |
| | | 5.Elongation | Major | Mechanical | DO | Supplier TC | IS 13778 Pt-3 | DO | | P | V | V | DO |
| | | 6.Continuity Of Enamel Cover | Major | Electrical | DO | Supplier TC | IS 13778 Pt-5 | DO | | P | V | V | DO |
| 2 | D.C.C (Double Cotton Cover ) Copper | 1.Visual | Major | Visual | 5% RANDOM | QAI / 01 SEC-1 | Covering To Be Uniform With Sufficient Insulation | VCS/ QA/02R | | P | V | V | DO |



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| | | 2. Cross Section | Major | Measurement | 1 SAMPLE PER LOT | QAI / 01 SEC-2 | Number Of Strands Multiplied By Cross Section Of Each Strand | Supplier TC / VCS Lab Report | | P | V | V | DO |
| | | 3. Resistance | Major | Electrical | DO | SUPPLIER TC | IS 4800 | DO | | P | V | V | DO |
| | | 4.Purity Of Copper | Major | Chemical | DO | DO | 99% MIN / NESCL SPEC | DO | | P | V | V | DO |
| 3 | Crgo Coils | 1. Dimension | Major | Measurement | 5% | QAI/01 SEC-3 | AS PER NESCL SPEC | VCS/ QA/02R | | P | V | V | DO |
| | | 2. Visual | Major | Visual | 100% | DO | UNIFORMITY | DO | | P | V | V | DO |
| 4 | Torroidal Core | 1.Dimension | Major | Measurement | 10% PER LOT | QAI/01 SEC-3 | NESCL SPEC | DO | | P | V | V | DO |
| | | 2. Visual | Major | Visual | 100% PER LOT | DO | UNIFORMITY | DO | | P | V | V | DO |
| | | 3. Ampere Turn Test | Major | Electrical | 10% PER LOT | DO | 0.35 AT/cm | DO | | P | V | V | DO |
| 5 | Insulating Kraft Paper | 1. Visual | Major | Visual | 5% PER LOT | QAI/01 SEC-4 | UN-BLEACHED KRAFT PULP | VCS/ QA/02R | | P | V | V | VERIFICATION OF RECORD / SUPPLIER TC AT THE TIME OF FINAL INSPECTION BY NESCL INSPECTOR |
| | | 2. Thickness | Major | Measurement | 1 SAMPLE PER LOT | DO | NESCL SPEC | DO | | P | V | V | DO |
| | | 3. Electric Strength | Major | Electrical | DO | DO | 7 KV/mm | SUPPLIER TC / VCS LAB REPORT | | P | V | V | DO |
| | | 4. Density | Major | Mechanical | DO | VCS/ MS/04 | 660-800 Kg/ m3 | DO | | P | V | V | DO |
| | | 5. Tensile Strength | Major | Mechanical | DO | DO | MD 95 & CMD 40 Nm/ gm | DO | | P | V | V | DO |

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| 6 | Insulating Creepe Paper | 1.Visual | Major | Visual | 5% PER LOT | QAI/01 SEC-4 | FREE FROM DAMAGE | VCS/ QA/02R | | P | V | V | DO |
| | | 2. Dimensions | Major | Measure-ment | 1 SAM-PLE PER LOT | DO | AS PER NESCL APP DWG | SUPPLI-ER TC / VCS LAB REPORT | | P | V | V | DO |
| | | 3. Electric Strength | Major | Electrical | DO | VCS/ MS/06 | 1 KV/mm | DO | | P | V | V | DO |
| | | 4.Elongation | Major | Mechani-cal | DO | DO | “MD 90% TO 110% CMD 3% TO 5%” | DO | | P | V | V | DO |
| 7 | Poly Ethylene Terepha-late Film | 1.Visual | Major | Visual | 1 SAM-PLE PER LOT | QAI/01 SEC-4 | FREE FROM DAMAGE | VCS/ QA/02R | | P | V | V | DO |
| | | 2.Dimensions | Major | Measure-ment | DO | VCS/ MS/08 | 50 +/- 3 MI-CRONS | DO | | P | V | V | DO |
| | | 3.Electric Strength | Major | Electrical | DO | DO | 5 KV FOR 50 MICRONS | SUPPLI-ER TC / VCS LAB REPORT | | P | V | V | DO |
| | | 4.Tensile Strength | Major | Mechani-cal | DO | DO | “MD 1732 KG/sq.cm CMD 1710 KG/sq.cm” | DO | | P | V | V | DO |
| 8 | Semicon-ducting Paper | 1.Visual | Major | Visual | 1 SAM-PLE PER LOT | VCS/ MS/07 | BLACK FREE FROM DAMAGE | SUPPLI-ER TC / VCS LAB REPORT | | P | V | V | DO |
| | | 2.Dimensions | Major | Measure-ment | DO | DO | 0.45 mm TO 0.55 mm | VCS/ QA/02R | | P | V | V | DO |
| | | 3.Density | Major | Mechani-cal | DO | DO | 0.65 gm/cc TO 0.85gm/ cc | SUPPLI-ER TC / VCS LAB REPORT | | P | V | V | DO |
| | | 4.Conductivity | Major | Electrical | DO | DO | 160 MICRO SIEMENS/ cm | DO | | P | V | V | DO |

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| 9 | Aluminium Foil | 1. Visual | Major | Visual | 1 SAM-PLE PER LOT | Vcs/Ms/09 | No Sign Of Oxidation | SUPPLI-ER TC / VCS LAB REPORT | | P | V | V | DO |
| | | 2. Thickness | Major | Measure-ment | DO | Do | 30 MICRONS +/- 3 | VCS/ QA/02R | | P | V | V | DO |
| | | 3.Purity | Major | Chemical | DO | Do | 99% MIN | SUPPLI-ER TC / VCS LAB REPORT | | P | V | V | DO |
| 10 | Press Board / Letheroid Sheet | 1.Visual | Major | Visual | 1 SAM-PLE PER LOT | Qai/01 Sec-4 | IS 1576 / Free From Damage | VCS/ QA/02R | | P | V | V | DO |
| | | 2.Dimensions | Major | Measure-ment | DO | Do | IS 1576 Nominal Thickness | DO | | P | V | V | DO |
| 11 | Trans-former Oil | 1. Appearance | Major | Visual | 1 SAM-PLE PER LOT | Supplier Tc / Is 335 | IS 335 / Oil Shell Be Clear Trans-parent And Free From Suspenede Particals | SUPPLI-ER TC / VCS LAB REPORT | | P | V | V | Verification Of Record / Supplier Tc At The Time Of Final Inspection By Nescl Inspector |
| | | 2.Density | Major | Physical | DO | Supplier Tc / Is 335 | 0.89gms/CC | DO | | P | V | V | DO |
| | | 3.Viscosity | Major | Physical | DO | Supplier Tc / Is 336 | 27CST | DO | | P | V | V | DO |
| | | 4.Interfacial Tension | Major | Physical | DO | Supplier Tc / Is 337 | .04n/m | DO | | P | V | V | DO |
| | | 5.Flash Point | Major | Physical | DO | Supplier Tc / Is 338 | 1400C | DO | | P | V | V | DO |
| | | 6.Pour Point | Major | Physical | DO | Supplier Tc / Is 339 | MINUS 6 O C | DO | | P | V | V | DO |
| | | | Major | Chemical | DO | Supplier Tc / Is 340 | “0.03mg KOH/gm NIL” | DO | | P | V | V | DO |
| | | 8.Corrosive Sulphur | Major | Electrical | DO | Supplier Tc / Is 341 | NON COR-ROSIVE | DO | | P | V | V | DO |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 9.Electric Strength Un-treated New Oil /Treated Oil | Major | Elctrical | DO | Qai/01 Sec-06 | “30KV rms 60KV rms” | VCS/ QA/02R | | P | V | V | DO |
| | | 10.Tan Delta At 900c | Major | Elctrical | DO | Supplier Tc / Is 341 | 0.002 | SUPPLI-ER TC / VCS LAB REPORT | | P | V | V | DO |
| | | “11.Specific Resistance At 900c At 27oc” | Major | Elctrical | DO | Supplier Tc / Is 341 | “35 X 10 ^ 12 Ω-cm 1500 X 10 ^ 12 Ω-cm” | DO | | P | V | V | DO |
| | | 12.Oxidation Stability Neutralization Value Total Sludge | Major | Chemical | DO | Supplier Tc / Is 341 | 0.04 mg/ KOH/ gm | DO | | P | V | V | DO |
| | | 13.Ageing Characteristics | | | | | | | | | | | |
| | | Specific Resis-tance | | | | | | | | | | | |
| | | A)At 900c | Major | Elctrical | DO | Supplier Tc / Is 341 | 0.2 X 10 ^ 12 Ω-cm | SUPPLI-ER TC / VCS LAB REPORT | | P | V | V | VERIFICATION OF RE-CORD / SUPPLIER TC AT THE TIME OF FINAL INSPECTION BY NESCL INSPECTOR |
| | | B) At 270c | Major | Elctrical | DO | Supplier Tc / Is 342 | 2.5 X 10 ^12 Ω-cm | DO | | P | V | V | DO |
| | | C) Tan Delta At 900c | Major | Elctrical | DO | Supplier Tc / Is 343 | 0.2 | DO | | P | V | V | DO |
| | | D) Total Acidity | Major | Chemical | DO | Supplier Tc / Is 344 | 0.05 mg/ KOH/gm | DO | | P | V | V | DO |
| | | E) Total Sludge | Major | Chemical | DO | Supplier Tc / Is 345 | 0.05% | DO | | P | V | V | DO |
| | | 14.Presence Of Oxidation Inhibitor | Major | Chemical | DO | Supplier Tc / Is 346 | NIL | DO | | P | V | V | DO |
| | | 15. Water Con-tent Max | Major | Chemical | DO | Supplier Tc / Is 347 | 50ppm | DO | | P | V | V | DO |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 12 | Bushings ( Nescl Approved Make) | 1 . Visual | Major | Visual | 100% | Qa/01 Sec - 7 | IS5621 | VCS/ QA/02R | | P | V | V | Verification Of Record / Supplier Tc At The Time Of Final Inspection By Nescl Inspector |
| | | 2 . Dimension | Major | Measure-ment | 5 %/LOT | Supplier Tc | IS 5621 / IS2099 / NESCL AP-PROVED DRW | DO | | P | V | V | DO |
| | | 3 .Routine Electrical Test | Major | Electrical | DO | Do | IS 5621 | SUPPLI-ER TC / VCS LAB REPORT | | P | V | V | DO |
| | | 4 . Porosity | Major | Physical | DO | Do | NO DYE PENTRITA-TION | DO | | P | V | V | DO |
| | | 5 . Temp Cycle Test | Major | Physical | DO | Do | NO CRACK AFTER TEST | DO | | P | V | V | DO |
| 13 | Gaskets | 1. Visual | Major | Visual | 10% | Qai/01 Sec-5 | FREE FROM DAMAGE | VCS/ QA/02R | | P | V | V | DO |
| | | 2. Dimensions | Major | Measure-ment | 5 % /LOT | Do | AS PER DRAWING / SIZE | DO | | P | V | V | DO |
| | | 3. Hardness | Major | Physical | DO | Vcs/Ms/13 | 70 =/-5 SHORE A | SUPPLI-ER TC / VCS LAB REPORT | | P | V | V | DO |
| | | “4. Ageing Test 7 Days In T/F Oil A ) Change In Weight Max B ) Change In Hardness” | Major | Physical | 2 % / LOT | Do | 10 % | DO | | P | V | V | DO |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 14 | Tanks | 1.Visual | Major | Visual | 10% / LOT | Qai/01 Sec-9 | FREE FROM DAMAGE | VS | | P | V | V | DO |
| | | 2.Dimensions | Major | Measure-ment | DO | Do | NESCL AP-PROVED DRW | DO | | P | V | V | DO |
| | | 3.Leak Test | Major | Physical | 100% | Vcs/Ms/11 | NO LEAK AT 1.5 KG/sq.cm FOR 15 | SUPPLI-ER TC / VCS LAB REPORT | | P | V | V | DO |
| 15 | Primary Terminals | 1.Visual | Major | Visual | 10% /LOT | Nescl App.Dwg | FREE FROM DAMAGE | VCS/ QA/02R | | P | V | V | DO |
| | | 2.Dimensions | Major | Measure-ment | 5% / LOT | Do | NESCL AP-PROVED DRW | DO | | P | V | V | DO |
| 16 | Sec.Ter-minals | 1.Visual | Major | Visual | 10% / LOT | Vcs/Ms/14 | FREE FROM DAMAGE | VCS/ QA/02R | | P | V | V | DO |
| | | 2.Dimensions | Major | Measure-ment | 5% / LOT | Do | NESCL AP-PROVED DRW | DO | | P | V | V | DO |
| | | 3.Insulation Resistance | Major | Electrical | 2% / LOT | Qai/01 Sec-8 | 2 M OHMS | DO | | P | V | V | DO |
| | | 4.Dielectric Test | Major | Electrical | DO | Do | 5KV rms / 1 MINUTE | DO | | P | V | V | DO |
| 17 | Chimney Pipe | 1.Visual | Major | Visual | 10% / LOT | Nescl App.Dwg | FREE FROM DAMAGE | VCS/ QA/02R | | P | V | V | DO |
| | | 2.Dimensions | Major | Measure-ment | 5% / LOT | Do | PARTS DWG | DO | | P | V | V | DO |
| 18 | Porcelain Collar | 1.Visual | Major | Visual | 10% / LOT | Nescl App.Dwg | FREE FROM DAMAGE | VCS/ QA/02R | | P | V | V | DO |
| | | 2.Dimensions | Major | Measure-ment | 5% / LOT | Do | PARTS DWG | DO | | P | V | V | DO |
| 19 | Hardware | 1.Visual | Major | Visual | 10% / LOT | Bom / Nescl Spec | FREE FROM DAMAGE | VCS/ QA/02R | | P | V | V | DO |
| | | 2.Dimensions | Major | Measure-ment | 5% / LOT | Do | AS PER NESCL DWG | DO | | P | V | V | DO |

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| 20 | Painting | 1. Visual | Major | Visual | 1% / LOT | Vcs/Ps/11 | FREE FROM DAMAGE | VCS/ QA/02R | | P | V | V | DO |
| | | 2.Dimensions | Major | Measure-ment | 1% / LOT | Do | 40 MIC-CRONS MIN | DO | | P | V | V | DO |
| 21 | Galvaniz-ing | 1.Visual | Major | Visual | 1% / LOT | Do | FREE FROM DAMAGE | VCS/ QA/02R | | P | V | V | DO |
| | | 2.Thickness | Major | Measure-ment | 1% / LOT | Do | 85 MI-CRONS | SUPPLI-ER TC / VCS LAB REPORT | | P | V | V | DO |
| | | 3.Pivot Ham-mer Test | Major | Mechani-cal | 1% / LOT | Do | COATING SHOULD NOT PEEL OFF | DO | | P | V | V | DO |
| **SECTION: 2 IN-PROCESS** | | | | | | | | | | | | | |
| 22 | Second-ary Wind-ing | 1.Basic Insula-tion | Major | Visual | 100% | Pl/01 Sec-1 | FREE FROM DAMAGE | VCS/ PR / 08R | | P | V | V | Verification Of Record / Supplier Tc At The Time Of Final Inspection By Nescl Inspector |
| | | 2.Overlapping Conductor | Major | Visual | 100% | Pl/01 Sec-2 | AVOID OVER LAP-PING | DO | | P | V | V | DO |
| **STAGE 1 TESTING** | | | | | | | | | | | | | |
| 23 | Protection Core | 1.Ratio & Phase Angle Errors | Major | Electrical | 100% | Qai/01 Sec-10 / Is 2705 | AS PER IS 2705 | VCS/ QA/04R | | P | V | V | Verification Of Record / Supplier Tc At The Time Of Final Inspection By Nescl Inspector |
| | | 2.Resistance Measurement | Major | Electrical | 100% | Do | DO | DO | | P | V | V | DO |
| | | 3.Exciting Cur-rent Measurent | Major | Electrical | 100% | Do | DO | DO | | P | V | V | DO |
| | | 4.% Composite Error | Major | Electrical | 100% | Do | DO | DO | | P | V | V | DO |
| 24 | Metering Core | Ratio & Phase Angle Error | Major | Electrical | 100% | Do | DO | DO | | P | V | V | DO |

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| 25 | P.S Core | 1.Resistance Measurement | Major | Electrical | 100% | Do | DO | DO | | P | V | V | DO |
| | | 2.Turns Ratio | Major | Electrical | 100% | Do | DO | DO | | P | V | V | DO |
| | | 3.Vk Measure-ment | Major | Electrical | 100% | Do | DO | DO | | P | V | V | DO |
| | | 4.Magnetizing Current | Major | Electrical | 100% | Do | DO | DO | | P | V | V | DO |
| 26 | Bunching & Chim-ney Fixing | 1.Chimney Position | Major | Visual | 100% | Qai/01 Sec-11 | NESCL SPEC | VCS/PR/ 08R | | P | V | V | DO |
| | | 2.Tightness Of Chimney | Major | Electrical | 100% | Do | NESCL SPEC | DO | | P | V | V | DO |
| **STAGE 2 TESTING** | | | | | | | | | | P | V | V | DO |
| 27 | Protection Core & Metering | 1.Polarity | Major | Electrical | 100% | Qai/01 Sec-11 And Is 2705 | AS PER IS 2705 | VCS/ QA/04R | | P | V | V | DO |
| | | 2.Ratio & Phase Angle Errors | Major | Electrical | 100% | Do | DO | DO | | P | V | V | DO |
| 28 | P.S Core | 1.Polarity | Major | Electrical | 100% | Do | DO | DO | | P | V | V | DO |
| | | Turns Ratio | Major | Electrical | 100% | Do | DO | DO | | P | V | V | DO |
| 29 | Taping | 1.Dimension | Major | Electrical | 100% | Qai/01 Sec-12 | DO | VCS/ PR/08R | | P | V | V | DO |
| | | 2.Tightness Of Taping | Major | Electrical | 100% | Do | DO | DO | | P | V | V | DO |
| 30 | Primary Winding | 1.Cross Sec-tion | Major | Measure-ment | 5% | Qai/01 Sec-13 | NESCL SPEC | DO | | P | V | V | DO |
| | | 2.No Of Turns | Major | Measure-ment | 100% | Do | DO | DO | | P | V | V | DO |
| | | 3.Rigidity | Major | Visual | 5% | Qai/01 Sec-14 | DO | DO | | P | V | V | DO |

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| 31 | Drying & Impregna-tion | 1.Temp.Mea-surement | Major | Physical | EVERY HOUR | Do | DO | VCS/ PR/010R | | P | V | V | DO |
| | | 2.Vacuum Measurment | Major | Physical | EVERY HOUR | Do | DO | DO | | P | V | V | DO |
| | | 3.Filtered Oil Bdv Check | Major | Electrical | 1 SAM-PLE PER LOT | Do | DO | DO | | P | V | V | DO |
| | | 4.Oil Soaking Time | Major | Physical | 100% | Do | DO | DO | | P | V | V | DO |
| 32 | Main As-sembly | 1.Primary Con-nection | Major | Visual | 100% | Qai/01 Sec-15 | DO | VCS/ PR/08R | | P | V | V | DO |
| | | 2.Secondary Connection | Major | Visual | 100% | Do | DO | DO | | P | V | V | DO |
| | | 3.Locking Ar-rangements | Major | Visual | 100% | Do | DO | DO | | P | V | V | DO |
| | | 4.Securing Of Active Part | Major | Visual | 100% | Do | DO | DO | | P | V | V | DO |
| **SECTION: 3 FINAL INSPECTION** | | | | | | | | | | | | | |
| 33 | Routine Test | 1. Verification Of Terminal Marking And Polarity | Critical | Electrical | 100% | Qai/01 Sec-18 & Is 2705 | AS PER IS 2705 | VCS/ QA/05F | √ | P | W | W | |
| | | 2. Power Frequency Dry Withstand Tests On Pri-mary Windings | Critical | Electrical | 100% | Do | DO | DO | √ | P | W | W | |
| | | 3.Power Frequency Dry Withstand Tests On Sec-ondary Wind-ings | Critical | Electrical | 100% | Do | DO | DO | √ | P | W | W | |
| | | 4. Over Voltage Interturn Test | Critical | Electrical | 100% | Do | DO | DO | √ | P | W | W | |
| | | 5 Partial Dis-charge Mea-surement (If Applicable) | Critical | Electrical | 100% | Do | DO | DO | √ | P | W | W | |

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| | | 6 Ratio & Phase Angle Error | Critical | Electrical | 100% | Do | DO | DO | √ | P | W | W | |
| | | Additional Test As Per Nescl Technical Specifications | | | | | | | | | | | |
| | | 7) Measurement Of Capacitance | Critical | Electrical | 100% | Do | DO | DO | √ | W | W | W | |
| | | 8) Oil Leakage Test (Process To Be Mutually Agreed) | Critical | Electrical | 100% | Do | DO | DO | √ | W | W | W | |
| | | 9) Measurement Of Tan Delta At 0.3, 0.7, 1.0 & 1.1 Um | Critical | Electrical | 100% | Do | DO | DO | √ | W | W | W | |
| 39 | Type Tests* | 1.Short-Time Current Test | Critical | Electrical | 1 SAMPLE | Qai/01 & Is-2705 | AS PER IS 2705 | VCS/ PR/008R | √ | W | V | V | |
| | | 2.Temperature Rise Test | Critical | Electrical | 1 SAMPLE | Do | DO | DO | √ | W | V | V | |
| | | 3.Lightning Impulse Voltage Withstand Test | Critical | Electrical | 1 SAMPLE | Do | DO | DO | √ | W | V | V | |
| | | 4.High Voltage Power Frequency Wet Withstand Voltage Test | Critical | Electrical | 1 SAMPLE | Do | DO | DO | √ | W | V | V | |
| | | 5.Determination Of Errors And Other Characteristics According To The Requirement Of The Appro-priate Designation Of Accuracy Class | Critical | Electrical | 1 SAMPLE | Do | DO | DO | √ | W | V | V | |

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| 38 | Finishing | 1.Visual Check | Critical | Visual | 100% | Qai/01 Sec-20 | DO | VCS/ PR/008R | √ | P | V | V | |
| | | 2.Nuts & Washer For Earth Bolts | Critical | Visual | 100% | Do | DO | DO | √ | P | V | V | |
| | | 3.Earthing Symbol | Critical | Visual | 100% | Do | DO | DO | √ | P | V | V | |
| | | 4.Oil Level In Gauge | Critical | Visual | 100% | Do | DO | DO | √ | P | V | V | |
| | | 5.Primary Terminal Markings | Critical | Visual | 100% | Do | DO | DO | √ | P | V | V | |
| | | 6.Oil Leaks | Critical | Visual | 100% | Do | DO | DO | √ | P | V | V | |
| | | 7.Terminal Markings | Critical | Visual | 100% | Do | DO | DO | √ | P | V | V | |
| | | 8.Name Plate & Connection Diagram | Critical | Visual | 100% | Do | DO | DO | √ | P | V | V | |

*-All Type Tests To Be Carried Out As Per Nescl Specification, Contract Agreement And As Per Minutes Of The Meeting Between Nescl And Vel Approval Of Type Tests By Engineering Department Of Nescl Or Waival Thereof To Be Shown At The Time Final Inspection To Enable Nescl Issue Mdcc.
√ - Record Identified'√' ""Tick Mark"" Shall Be Essentially Included By Supplier In Qa Documentations.

√ - Record Identified'√' "Tick Mark" Shall Be Essentially Included By Supplier In Qa Documentations.

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|---|---|---|---|
| | | P.S= Plant Standard | M= Manufacturer |
| P= | Performed By | | N= Customer (NESCL) |
| V= | Verified By | | C = Contactor |
| W= | Witness Of Test | Signature Of The Contractor | SIGNATURE OF THE MANUFACTURER |

| MANUFACTURE'S NAME & ADDRESS: | | | | **Manufacturing Quality Plan** | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | ITEM : 33 kV POTENTIAL TRANSFORMERS | | QP NO: | | PROJECT/UTILITY: | | | | | |
| | | | | | | REV.NO:R0 | | PACKAGE: | | | | | |
| | | | | Sub-System: | | DATE: | | CONTRACT NO: | | | | | |
| | | | | | | | | MAIN-CONTRACTOR: | | | | | |
| Sl. No | Component & Operation | Characteristics | Class | Type Of Check | Quantum of Check | Reference Document | Acceptance Norms | Format of Records | | Agency | | | Remarks |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | D | * 10 | | | 11 |
| **SECTION: 1 RAW MATERIALS** | | | | | | | | | | M | C | N | |
| 1 | S.E Copper Wire | 1. Visual | Major | Visual | 5% | QAI/01 SEC-2 | IS 13778 Pt-1 | VCS/ QA/02R | | P | V | V | Verification Of Record / Supplier Tc At The Time Of Final Inspection By Nescl Inspector |
| | | 2.Diam-eter | Major | Measurement | 1 PER LOT | DO | IS 13778 Pt-1 &2 | DO | | P | V | V | Do |
| | | 3.Resistance | Major | Electrical | 1 MTR EACH SIZE | Suppiler TC | IS 13778 Pt -5 | SUPPLIER TC / VCS LAB REPORT | | P | V | V | Do |
| | | 4.B.D.V | Major | Electrical | 1 SAMPLE PER LOT | Suppiler TC | IS 13778 Pt-5 | DO | | P | V | V | Do |
| | | 5.Elong-ation | Major | Mechanical | DO | Suppiler TC | IS 13778 Pt-3 | DO | | P | V | V | Do |
| | | 6.Conti-nuity Of Enamel Cover | Major | Electrical | DO | Suppiler TC | IS 13778 Pt-5 | DO | | P | V | V | Do |
| 2 | Crgo Coils | 1. Dimension | Major | Measurement | 5% | QAI/01 SEC-3 | AS PER NESCL SPEC | VCS/ QA/02R | | P | V | V | Do |
| | | 2. Visual | Major | Visual | 100% | Do | UNIFORMITY | DO | | P | V | V | Do |



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Endless energy. Infinite possibilities.

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| 3 | Insulat-ing Kraft Paper | 1. Visual | Major | Visual | 5% PER LOT | Qai/01 Sec-4 | UNBLEA-CHED KRAFT PULP | VCS/ QA/02R | | P | V | V | Do |
| | | 2. Thickness | Major | Measurement | 1 SAM-PLE PER LOT | Do | NESCL SPEC | DO | | P | V | V | Do |
| | | 3. Electric Strength | Major | Electrical | DO | Do | 7 KV/mm | SUPPLI-ER TC / VCS LAB REPORT | | P | V | V | Do |
| | | 4. Density | Major | Mechanical | DO | Vcs/Ms/04 | 660-800 Kg/m3 | DO | | P | V | V | Do |
| | | 5. Tensile Strength | Major | Mechanical | DO | Do | MD 95 & CMD 40 Nm/gm | DO | | P | V | V | Do |
| 4 | Insulating Creepe Paper | 1.Visual | Major | Visual | 5% PER LOT | Qai/01 Sec-4 | FREE FROM DAMAGE | VCS/ QA/02R | | P | V | V | Do |
| | | 2. Dimen-sions | Major | Measurement | 1 SAM-PLE PER LOT | Do | AS PER NESCL SPEC | SUPPLI-ER TC / VCS LAB REPORT | | P | V | V | Do |
| | | 3. Electric Strength | Major | Electrical | DO | Vcs/Ms/06 | 1 KV/mm | DO | | P | V | V | Do |
| | | 4.Elongation | Major | Mechanical | DO | Do | “MD 90% TO 110% CMD 3% TO 5%” | DO | | P | V | V | Do |
| 5 | Poly Ethylene Terepha-late Film | 1.Visual | Major | Visual | 1 SAM-PLE PER LOT | Qai/01 Sec-4 | FREE FROM DAMAGE | VCS/ QA/02R | | P | V | V | Do |
| | | 2.Dimen-sions | Major | Measurement | DO | Vcs/Ms/08 | 50 +/- 3 MICRONS | DO | | P | V | V | Do |
| | | 3.Electric Strength | Major | Electrical | DO | Do | 5 KV FOR 50 MI-CRONS | SUPPLI-ER TC / VCS LAB REPORT | | P | V | V | Do |
| | | 4.Tensile Strength | Major | Mechanical | DO | Do | “MD 1732 KG/sq.cm CMD 1710 KG/ sq.cm” | DO | | P | V | V | Do |

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| 6 | Press Board/ Letheroid Sheet | 1.Visual | Major | Visual | 1 SAM-PLE PER LOT | Qai/01 Sec-4 | IS 1576 Free From Damage | VCS/ QA/02R | | P | V | V | Verification Of Record / Supplier Tc At The Time Of Final Inspection By Nescl Inspector |
| | | 2.Dimen-sions | Major | Measurement | DO | Do | IS 1576 Nominal Thickness | DO | | P | V | V | Do |
| 7 | Trans-former Oil | 1. Appear-ance | Major | Visual | 1 SAM-PLE PER LOT | Supplier Tc / Is 335 | Oil Shell Be Clear Transpar-ent And Free From Sus-penede Particals | SUPPLI-ER TC / VCS LAB REPORT | | P | V | V | Do |
| | | 2.Density | Major | Physical | DO | Supplier Tc / Is 335 | 0.89gms/ CC | DO | | P | V | V | Do |
| | | 3.Viscosity | Major | Physical | DO | Supplier Tc / Is 335 | 27 CST | DO | | P | V | V | Do |
| | | 4.Interfacial Tension | Major | Physical | DO | Supplier Tc / Is 335 | 0.04n/m | DO | | P | V | V | Do |
| | | 5.Flash Point | Major | Physical | DO | Supplier Tc / Is 335 | 1400C | DO | | P | V | V | Do |
| | | 6.Pour Point | Major | Physical | DO | Supplier Tc / Is 335 | MINUS 6 O C | DO | | P | V | V | Do |
| | | 7.Neutral-ization Value Total Acidity | Major | Chemical | DO | Supplier Tc / Is 335 | “0.03mg KOH/gm NIL” | DO | | P | V | V | Do |
| | | 8.Corrosive Sulphur | Major | Electrical | DO | Supplier Tc / Is 335 | NON CORRO-SIVE | DO | | P | V | V | Do |
| | | 9.Electric Strength Un-treated New Oil /Treated Oil | Major | Elctrical | DO | Is 335 & Qai/01 Sec-06 | “30KV rms 60KV rms” | VCS/ QA/02R | | P | V | V | Do |
| | | 10.Tan Delta At 900c | Major | Elctrical | DO | Supplier Tc / Is 335 | 0.002 | SUPPLI-ER TC / VCS LAB REPORT | | P | V | V | Do |



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| | | “11.Specific Resistance At 900c At 27oc” | Major | Elctrical | DO | Supplier Tc / Is 335 | “35 X 10 ^ 12 Ω-cm 1500 X 10 ^ 12 Ω-cm” | DO | | P | V | V | Do |
| | | 12.Oxidation Stability Neutraliza-tion Value Total Sludge | Major | Chemical | DO | Supplier Tc / Is 335 | 0.04 mg/ KOH/ gm | DO | | P | V | V | Do |
| | | 13.Ageing Characteris-tics | | | | | | | | | | | |
| | | Specific Re-sistance | | | | | | | | | | | |
| | | A)At 900c | Major | Elctrical | DO | Supplier Tc / Is 335 | 0.2 X 10 ^ 12 Ω-cm | SUPPLI-ER TC / VCS LAB REPORT | | P | V | V | Verification Of Record / Supplier Tc At The Time Of Final Inspection By Nescl Inspector |
| | | B) At 270c | Major | Elctrical | DO | Supplier Tc / Is 335 | 2.5 X 10 ^12 Ω-cm | DO | | P | V | V | Do |
| | | C) Tan Delta At 900c | Major | Elctrical | DO | Supplier Tc / Is 335 | 0.2 | DO | | P | V | V | Do |
| | | D) Total Acid-ity | Major | Chemical | DO | Supplier Tc / Is 335 | 0.05 mg/ KOH/gm | DO | | P | V | V | Do |
| | | E) Total Sludge | Major | Chemical | DO | Supplier Tc / Is 335 | 0.05% | DO | | P | V | V | Do |
| | | 14.Presence Of Oxidation Inhibitor | Major | Chemical | DO | Supplier Tc / Is 335 | NIL | DO | | P | V | V | Do |
| | | 15. Water Content Max | Major | Chemical | DO | Supplier Tc / Is 335 | 50ppm | DO | | P | V | V | Do |

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| 8 | Bushings ( Nescl Approved Make) | 1 . Visual | Major | Visual | 100% | Qa/01 Sec - 7 | IS5621 | VCS/ QA/02R | | P | V | V | Verification Of Record / Supplier Tc At The Time Of Final Inspection By Nescl Inspector |
| | | 2 . Dimen-sion | Major | Measurement | 5 %/LOT | Supplier Tc / Is 5621 / Is2099 | NESCL AP-PROVED DRW | DO | | P | V | V | Do |
| | | 3 .Routine Electrical Test | Major | Electrical | DO | Do | IS 5621 | SUPPLI-ER TC / VCS LAB REPORT | | P | V | V | Do |
| | | 4 . Porosity | Major | Physical | DO | Do | NO DYE PENTRI-TATION | DO | | P | V | V | Do |
| | | 5 . Temp Cycle Test | Major | Physical | DO | Do | NO CRACK AFTER TEST | DO | | P | V | V | Do |
| 9 | Gaskets | 1. Visual | Major | Visual | 10% | Qai/01 Sec-5 | FREE FROM DAMAGE | VCS/ QA/02R | | P | V | V | Do |
| | | 2. Dimen-sions | Major | Measurement | 5 % /LOT | Do | AS PER DRAW-ING / SIZE | DO | | P | V | V | Do |
| | | 3. Hardness | Major | Physical | DO | Vcs/Ms/13 | 70 +/-5 SHORE A | SUPPLI-ER TC / VCS LAB REPORT | | P | V | V | Do |
| | | “4. Ageing Test 7 Days In T/F Oil A ) Change In Weight Max B ) Change In Hardness” | Major | Physical | 2 % / LOT | Do | “10 % “ | DO | | P | V | V | Do |



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| 10 | Tanks | 1.Visual | Major | Visual | 10% / LOT | Qai/01 Sec-9 | FREE FROM DAMAGE | VS | | P | V | V | Do |
| | | 2.Dime-nsions | Major | Measurement | DO | Do | NESCL AP-PROVED DRW | DO | | P | V | V | Do |
| | | 3.Leak Test | Major | Physical | 100% | Vcs/Ms/11 | NO LEAK AT 1.5 KG/sq.cm FOR 15 | SUPPLI-ER TC / VCS LAB REPORT | | P | V | V | Do |
| 11 | Primary Terminals | 1.Visual | Major | Visual | 10% /LOT | Nescl App.Dwg | FREE FROM DAMAGE | VCS/ QA/02R | | P | V | V | Do |
| | | 2.Dime-nsions | Major | Measurement | 5% / LOT | Do | NESCL AP-PROVED DRW | DO | | P | V | V | Do |
| 12 | Sec.Ter-minals | 1.Visual | Major | Visual | 10% / LOT | Vcs/Ms/14 | FREE FROM DAMAGE | VCS/ QA/02R | | P | V | V | Do |
| | | 2.Dime-nsions | Major | Measurement | 5% / LOT | Do | NESCL AP-PROVED DRW | DO | | P | V | V | Do |
| | | 3.Insulation Resistance | Major | Electrical | 2% / LOT | Qai/01 Sec-8 | 2 M OHMS | DO | | P | V | V | Do |
| | | 4.Dielectric Test | Major | Electrical | DO | Do | 5KV rms / 1 MINUTE | DO | | P | V | V | Do |
| 13 | Hardware | 1.Visual | Major | Visual | 10% / LOT | Bom / Nescl Spec | FREE FROM DAMAGE | VCS/ QA/02R | | P | V | V | Do |
| | | 2.Dime-nsions | Major | Measurement | 5% / LOT | Do | AS PER NESCL DWG | DO | | P | V | V | Do |

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| 14 | Painting | 1. Visual | Major | Visual | 1% / LOT | Vcs/Ps/11 | FREE FROM DAMAGE | VCS/ QA/02R | | P | V | V | Do |
| | | 2.Dimen-sions | Major | Measurement | 1% / LOT | Do | 40 MIC-CRONS MIN | DO | | P | V | V | Do |
| 15 | Galvaniz-ing | 1.Visual | Major | Visual | 1% / LOT | Do | Free From Damage | VCS/ QA/02R | | P | V | V | Do |
| | | 2.Thickness | Major | Measurement | 1% / LOT | Do | 85 MI-CRONS | SUPPLI-ER TC / VCS LAB REPORT | | P | V | V | Do |
| | | 3.Pivot Ham-mer Test | Major | Mechanical | 1% / LOT | Do | Coating Should Not Peel Off | DO | | P | V | V | Do |
| **SECTION: 2 IN-PROCESS** | | | | | | | | | | | | | |
| 16 | L.V & H.V Winding | 1.Winding Width | Major | Measurement | 5% | Pl/02 Sec-1 To 3 | Free From Damage | VCS/ PR / 09R | | P | V | V | Verification Of Record / Supplier Tc At The Time Of Final Inspection By Nescl Inspector |
| | | 2.Over Lap-ping Con-ductor | Major | Visual | 100% | Pl/02 Sec-1 To 3 | Avoid Over Lap-ping | DO | | P | V | V | Do |
| | | 3.Interlayer Insulation | Major | Visual | 100% | Pl/02 Sec-1 To 3 | NESCL SPEC | DO | | P | V | V | Do |
| 17 | Cutting , Folding & Hv Taping | 1.Paper Width & Length | Major | Electrical | 10% | Pl / 02 Sec-4 | NESCL SPEC | VCS/ PR/09R | | P | V | V | Do |
| | | 2.Overlap Folding Of Paper | Major | Electrical | 100% | Do | DO | DO | | P | V | V | Do |
| | | 3.Finished Coil Dimen-sion | Major | Electrical | 100% | Do | DO | DO | | P | V | V | Do |

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| 18 | Core & Coil Assembly | 1.Core Limb Insulation | Major | Visual | 100% | Pl/02 Sec-5 & 6 | AS PER IS 2705 | DO | | P | V | V | Do |
| | | 2.Hv-Lv Insulation | Major | Visual | 100% | Do | DO | DO | | P | V | V | Do |
| | | 3.Polarity Check | Major | Visual | 100% | Do | DO | DO | | P | V | V | Do |
| 19 | Stage Testing | Ratio & Phase Angle Errors | Major | Electrical | 100% | Qai/01 Sec-16 & Is 3156 | AS PER IS 3156 | VCS/ QA/04R | | P | V | V | Do |
| 20 | Drying & Impregnation | 1.Temp.Measurement | Major | Physical | EVERY HOUR | Pl/01 Sec-06 | DO | VCS/ PR/010R | | P | V | V | Do |
| | | 2.Vacuum Measurment | Major | Physical | EVERY HOUR | Do | DO | DO | | P | V | V | Do |
| | | 3.Filtered Oil Bdv Check | Major | Electrical | 1 SAMPLE PER LOT | Do | DO | DO | | P | V | V | Do |
| | | 4.Oil Soaking Time | Major | Physical | 100% | Do | DO | DO | | P | V | V | Do |
| 21 | Main Assembly | 1.Primary Connection | Major | Visual | 100% | Pl/01 Sec-06 | DO | VCS/ PR/09R | | P | V | V | Do |
| | | 2.Secondary Connection | Major | Visual | 100% | Do | DO | DO | | P | V | V | Do |
| | | 3.Locking Arrangements | Major | Visual | 100% | Do | DO | DO | | P | V | V | Do |
| | | 4.Securing Of Active Part | Major | Visual | 100% | Do | DO | DO | | P | V | V | Do |
| **SECTION: 3 FINAL INSPECTION** | | | | | | | | | | | | | |
| 22 | Finishing | 1.Visual Check | Critical | Visual | 100% | Qai/01 Sec-20 | AS PER NESCL APP. DRAWING | VCS/ PR/009R | √ | P | V | V | |
| | | 2.Nuts & Washer For Earth Bolts | Critical | Visual | 100% | Do | DO | DO | √ | P | V | V | |
| | | 3.Earthing Symbol | Critical | Visual | 100% | Do | DO | DO | √ | P | V | V | |

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| | | 4.Oil Level In Gauge | Critical | Visual | 100% | Do | DO | DO | √ | P | V | V | |
| | | 5.Primary Terminal Markings | Critical | Visual | 100% | Do | DO | DO | √ | P | V | V | |
| | | 6.Oil Leaks | Critical | Visual | 100% | Do | DO | DO | √ | P | V | V | |
| | | 7.Terminal Markings | Critical | Visual | 100% | Do | DO | DO | √ | P | V | V | |
| | | 8.Name Plate & Connection Diagram | Critical | Visual | 100% | Do | DO | DO | √ | P | V | V | |
| 21 | Routine Test | 1. Verification Of Terminal Marking And Polarity | Major | Visual | 100% | Qai/01 Sec-17 | AS PER NESCL APP. DRAWING | VCS/ QA/05F | √ | P | W | W | |
| | | 2. Power Frequency Dry Withstand Tests On Primary Windings | Critical | Electrical | 100% | Qai/01 Sec-19 & Is 3156 | AS PER IS 3156 | VCS/ QA/05F | √ | P | W | W | |
| | | 3.Power Frequency Dry Withstand Tests On Secondary Windings | Critical | Electrical | 100% | Do | DO | DO | √ | P | W | W | |
| | | 4 Partial Discharge Measurement (If Applicable) | Critical | Electrical | 100% | Do | DO | DO | √ | P | W | W | |
| | | 5 Ratio & Phase Angle Error | Critical | Electrical | 100% | Do | DO | DO | √ | P | W | W | |

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| **SECTION: 4 TYPE TEST** | | | | | | | | | | | | | |
| 23 | Type Test | 1.Temperature Rise Test | Critical | Electrical | AS PER IS; 3156 | Qai/01 Sec-20 & Is 3156 | AS PER IS 3156 | VCS/ PR/009R | √ | W | V | V | |
| | | 2.Lightning Impulse Voltage Withstand Test | Critical | Electrical | AS PER IS; 3156 | Do | DO | DO | √ | W | V | V | |
| | | 3.High Voltage Power Frequency Wet Withstand Voltage Test | Critical | Electrical | AS PER IS; 3156 | Do | DO | DO | √ | W | V | V | |
| | | 4.Determination Of Errors And Other Characteristics According To The Requirement Of The Appropriate Designation Of Accuracy Class | Critical | Electrical | AS PER IS; 3156 | Do | DO | DO | √ | W | V | V | |

*-All type tests to be carried out as per NESCL specification, Contract Agreement and as per minutes of the meeting between NESCL and VEL Approval of type tests by Engineering department of NESCL or waival thereof to be shown at the time final inspection to enable NESCL issue MDCC.
√ - Record identified'√' ""tick mark"" shall be essentially included by supplier in QA Documentations.

√ - Record Identified'√' "Tick Mark" Shall Be Essentially Included By Supplier In Qa Documentations.

| | | | |
|---|---|---|---|
| | | P.S= Plant Standard | M= Manufacturer |
| P= | Performed By | A.D.S= Approved Data Sheet | N= Customer (NESCL) |
| V= | Verified By | M/I=Minor | C = Contactor |
| W= | Witness Of Test | Signature Of The Contractor | |
| | | | SIGNATURE OF THE MANUFACTURER |

| MANUFACTUER'S NAME & ADDRESS: | STANDARD MANUFACTURING QUALITY PLAN | | PROJECT/UTILITY: |
|---|---|---|---|
| | ITEM: BUS POST INSULATORS UPTO 33 kV | QP NO: | |
| | | REV.NO: | PACKAGE: |
| | SUB-SYSTEM: | DATE: | CONTRACT NO: |
| | | PAGE:….OF….. | MAIN-CONTRACTOR: |

| Sl. No | Compo-nent & operation | Characteristics | Class | Type of Check | Quantum of Check | Reference Document | Acceptance Norms | Format of Records | Agency | | | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | ** 10 | | | 11 |
| **SECTION: RAW MATERIALS INSPECTION** | | | | | | | | | M | C | N | |
| 1 | China clays | a) Inspection | Major | Visual | 0.01% in the total wt | IRM/CD/ TP/2 | White/off White, deep cream colour in raw form | QC Report | V | V | V | Record review during final inspection |
| | | b) Residue retained on 300 mesh (BSS) | Major | Test | Do | | 4% Max. The residue shall be free from iron impurities | QC Report | P | V | V | Do |
| | | c) Fired colour | Major | Visual | Do | | white to cream, free from black specks. | QC Report | V | V | V | Do |
| | | "d) Chemical analysis<br><br>Al2 03<br>Sio2<br>Fe2 03<br>Tio2<br>LOI at 1220oc" | Major | Test | Sampling Once in 250 MT | | "Supplier test certifi-cate approx<br>30-40%<br>40-55%<br><4%<br><2%<br>16-19%" | Supplier TC/ QC lab/TPL | P | V | V | T/C review during final inspection |
| | | e) Dry shrink-age | Major | Test | Do | | 6% Max | Supplier TC/ QC lab/TPL | P | V | V | Record review during final inspection |
| | | f) Total shrink-age | Major | Test | Do | | 18% Max | Supplier TC/ QC lab/TPL | P | V | V | Do |
| 2 | Ball clays | a) Inspection | Major | Visual | 0.01% in the total wt | IRM/CD/ TP/2 | white to deep cream/ yellow colour | QC Report | V | V | V | Record review during final inspection |
| | | b) Residue retained on 240 mesh | Major | Test | Do | | < 5% The residue shall be free from iron impurities | QC Report | P | V | V | Do |



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| | | c) fired colour | Major | Visual | Do | | White/off white to cream/Buff free from impurities. | QC Report | V | V | V | Do |
| | | “d) Chemical analysis<br>Al2 03<br>Sio2<br>Fe2 03<br>Tio2<br>LOI at 1220oc” | Major | Test | Once in 250 MT | | “Supplier test certificate approx<br>>25%<br>50-60%<br>< 3%<br>< 3%<br>< 13%” | Supplier TC/ QC lab/TPL | P | V | V | T/C review during final inspection |
| | | e) Dry shrinkage | Major | Test | Do | | 6% Max | Supplier TC/ QC lab/TPL | P | V | V | Record review during final inspection |
| | | f) Total shrinkage | Major | Test | Do | | 18% Max | Supplier TC/ QC lab/TPL | P | V | V | Record review during final inspection |
| 3 | Quartz Powder | a) Inspection | Major | Visual | 0.01% in the total wt | IRM/CD/ TP/1 | White to off White raw colour | QC Report | V | V | V | Record review during final inspection |
| | | b) Residue retained on 240 mesh (BSS) | Major | Test | Do | | < 3%Max The residue shall be free from iron particles and magnetic impurities | QC Report | P | V | V | Do |
| | | c) fired colour | Major | Visual | Do | | Off white to White free from impurities | QC Report | V | V | V | Do |
| | | d) Sintering | Major | Visual | Do | | Nil, No vitrification | QC Report | V | V | V | Do |
| | | “e) Chemical analysis<br>SiO2<br>Fe2 O3<br>LOI at 1000oc” | Major | Test | Sampling Once in 250 MT | | “Supplier test certificate approx<br><br>98% Min<br>0.25% Max.<br>0.5% Max<br><br>“ | Supplier TC/ QC lab/TPL | P | V | V | T/C review during final inspection |

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| 4 | Feldspar powder | a) Inspection | Major | Visual | 0.01% in the total wt | IRM/CD/ TP/1 | White to light pink colour | QC Report | V | V | V | Record review during final inspection |
| | | b) Residue retained on 240 mesh | Major | Test | Do | | < 3% Max The residue shall be free from iron particles and magnetic impurities | QC Report | P | V | V | Do |
| | | c) fired colour | Major | Visual | Do | | Grayish/off white to white | QC Report | V | V | V | Do |
| | | d) Firing behavior | Major | Test | Do | | Vitirified mass free from impurities | QC Report | P | V | V | Do |
| | | “e) Chemical analysis<br>K2O+Na2O<br>K2O<br>Na2O<br>Fe2O3<br>LOI at 1000OC” | Major | Test | Once in 250 MT | | “Suppliertest certificate approx<br>13% Min<br>11% Min.<br>3.5% Max<br>0.2% Max<br>0.5% Max” | Supplier TC/ QC lab/TPL | P | V | V | T/C review during final inspection |
| 5 | Iron oxide | a) Inspection | Major | Visual | 500 gms/MT or part thereof | IRM/CD/ TP/1 | Dark brown colour | QC Report | V | V | V | Record review during final inspection |
| | | b) Residue retained on 300 mesh | Major | Test | Do | | 0.5% Max | QC Report | P | V | V | Do |
| | | c) Fired colour | Major | Visual | Do | | Block/Greyish black free from impurities | QC Report | V | V | V | Do |
| | | “d) Chemical analysis<br>Fe2O3 content<br>“ | Major | Test | Once in 1 MT | | “Supplier test certificate approx<br>85% Min “ | Supplier TC/ QC lab/TPL | P | V | V | T/C review during final inspection |
| 6 | Manganese dioxide | a) Inspection | Major | Visual | 500 gms/MT or part thereof | IRM/CD/ TP/1 | Dark Grey to black colour free from impurities | QC Report | V | V | V | Record review during final inspection |
| | | b) Residue retained on 300 mesh | Major | Test | Do | | 0.5% Max | QC Report | P | V | V | Do |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | c) Fired colour | Major | Visual | Do | | Black/ balckish violet free from impurities | QC Report | V | V | V | Do |
| | | “d) Chemical analysis MnO2 content “ | Major | Test | Once in 10 MT | | Supplier Test certificate 85% Min | Supplier TC/ QC lab/TPL | P | V | V | T/C review during final inspection |
| 7 | Chromium oxide | a) Inspection | Major | Visual | 500 gms/MT or part thereof | IRM/CD/ TP/1 | Bottle Green colour | QC Report | V | V | V | Record review during final inspection |
| | | b) Residue retained on 300 mesh | Major | Test | Do | | 0.5% Max | QC Report | P | V | V | Do |
| | | c) Fired colour | Major | Visual | Do | | Dark Green free from impurities | QC Report | V | V | V | Do |
| | | “d) Chemical analysis Cr2O3 content “ | Major | Test | Once in 10 MT | | Supplier Test certificate 85% Min | Supplier TC/ QC lab/TPL | P | V | V | T/C review during final inspection |
| 8 | Calcite powder | a) Inspection | Major | Visual | 500 gms/MT or part thereof | IRM/CD/ TP/1 | White to cream raw colour. Free from impurities | QC Report | V | V | V | Record review during final inspection |
| | | b) Residue retained on 300 mesh | Major | Test | Do | | 3% Max | QC Report | P | V | V | Do |
| | | c) Fired colour | Major | Visual | Do | | Light greenish | QC Report | V | V | V | Do |
| | | “d) Chemical analysis CaO content “ | Major | Test | Once in 10 MT | | Supplier Test certificate 50% Min | Supplier TC/ QC lab/TPL | P | V | V | T/C review during final inspection |
| **SECTION: ASSEMBLY MATERIALS INSPECTION** | | | | | | | | | M | C | N | |
| 9 | Cement | a) Inspection | Major | Visual | 0.01% of total quantity received | “IS: 12269 IRM/CD/ TP/3 “ | “ No lumpiness/solidification.” | QC Report | V | V | V | Record review during final inspection |
| | | b) Compressive strength | Major | Test | Do | | 380 Kg/cm2 | QC lab/ TPL | P | V | V | T/C review during final inspection |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | c) Expansion | Major | Test | Each consign-ment | | 0.8% Max | QC lab/ TPL | P | V | V | Do |
| **SECTION: METAL PARTS INSPECTION** | | | | | | | | | M | C | N | |
| 11 | Lead Thimble | a) Inspection | Major | Visual | 100% | | No sharp / rough edges. | QC Report | V | V | V | Record review during final inspection |
| | | b) Dimension | Major | Mea-sure-ment | "Lot sample size size (nos) (nos) 1-500 4 501-1000 6 1001+ 10" | | As per drawing | QC Report | P | V | V | Do |
| | | c) Gauge Checking | Major | Visual | Do | "As per IS:2486 part-II" | "As per IS:2486 part-II" | QC Report | P | V | V | Do |
| **SECTION: IN-PROCESS INSPECTION** | | | | | | | | | M | C | N | |
| 12 | Wet grind-ing of ceramic body | a) Inspection | Major | Visual | Each charge | IP/CD/ TP/1 | Pale white to cream colour with no visual impurities | QC Report | V | V | V | Record review during final inspection |
| | | b) Residue retained on 300 mesh | Major | Test | Do | | < 30 grms/Ltrs | QC Report | P | V | V | Do |
| | | c) Particle size Analysis | Major | Test | Once in week | | "<10 Microns-Min 70%<br>< 30 Microns-Min 97%" | QC Report | P | V | V | Do |
| 13 | Slip's Litre Weight | | Major | Test | Daily once | IP/CD/ TP/1 | 1.40-1.50 Kg/litre | QC Report | P | V | V | Do |
| 14 | Pug mill's clay blank | a) Moisture % | Major | Test | Twice in a shift | IP/CD/ TP/1 | 16.5-19% | QC Report | P | V | V | Do |
| | | b) De airing checking | Major | Test | Do | | Min. 700mm of Hg vaccum | QC Report | P | V | V | Do |

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| 15 | During glaze preparation | Residue retained on 300 mesh | Major | Test | Each charge | | Max. 2% | QC Report | P | V | V | Do |
| 16 | Properties of unfired porcelain | a) Linear shrinkage | Major | Test | Once in a day | | Max. 2% | QC Report | P | V | V | Do |
| | | b) Dry MOR | Major | Test | Once in week | | 30 Kgs/cm2 Min | QC Report | P | V | V | Do |
| 17 | Shaping | a) Making cavity check | Major | Test | Once in a shift | | As per drawing | QC Report | P | V | V | Do |
| | | b) Finishing dimension | Major | Measurement | Do | | As per drawing | QC Report | P | V | V | Do |
| | | c) Moisture % before entry into dryer | Major | Test | Once in a day | | 8 to 12% ( depending upon climate condition) | QC Report | P | V | V | Do |
| 18 | Drying | a) Hot rooms temperature | Major | Visual | Once in a day | | Ambient-85oC | QC Report | V | V | V | Do |
| | | b) moisture content | Major | Test | 3 samples per day | | 0.8% Max. | QC Report | P | V | V | Do |
| 19 | Properties of fired porcelain Fired MOR | | Major | Test | Once in 3 month | | Unglazed 750 Kgs/cm2 Min Glazed 850 gs/cm2 Min | QC Report | P | V | V | Do |
| | | a) Linear shrinkage | Major | Test | Once in a day | | “ < 14%” | QC Report | P | V | V | Record review during final inspection |
| | | b) porosity | Major | Test | 4 pieces from every unloaded car of Tunnel Kiln | As per IS: 731 | As per IS: 731 & 5300 | QC Report | P | V | V | Do |
| | | c) Bulk density | Major | Test | Daily once | | 2.38 Min | QC Report | P | V | V | Do |
| | | d) Water absorption | Major | Test | Daily once | | 0.2% Max | QC Report | P | V | V | Do |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 20 | Glazing (Brown glaze) | a) Inspection | Major | Visual | 100% | | Rose pink slip colour slurry with no visual impurities | QC Report | V | V | V | Do |
| | | b) Moissture % | Major | Test | 3 samples per day | | 2-3% Max | QC Report | P | V | V | Do |
| | | c) Sp.gravity | Major | Test | Twice in a day. | | 1.4-1.45 | QC Report | P | V | V | |
| 20 | Temperrature during firing of green wares | | Major | Visual | Hourly | | 1220-1230oC depending on cycle | QC Report | V | V | V | Do |
| 21 | Sorting of fired insulator | a) Inspection | Major | Visual | 100% | | As per IS:2544 | QC Report | V | V | V | Do |
| | | b) Dimension & weight | Major | Measurement | 3 Nos/ day | | As per NESCL approved specified drawings | QC Report | P | V | V | Do |
| | | c) Marking | Major | Measurement | 100% | As per NESCL approved specified drawings/ NESCL Tech. Specs. | | QC Report | P | V | V | Do |
| 23 | Packing (wooden) crate | a) Inspection | Major | Visual | 100% | | No broken planks | QC Report | V | V | V | Do |
| | | b) Dimension | Major | Measurement | “Lot sample size size (nos) (nos) 1-500 4 501-1000 6 1001+ 10” | | As per Approved Drawing | QC Report | P | V | V | Do |

| SECTION: FINAL INSPECTION | | | | | | | | | M | C | N | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 24 | Accep-tance Tests | a) Dimension checking | Major | Mea-sure-ment | As per IS: 2544 | As per IS: 2544 | As per IS: 2544 | QC Report | P | W | W | CHP |
| | | b) Temperature cycle test | Major | Test | As per IS: 2544 | As per IS: 2544 | As per IS: 2544 | QC Report | P | W | W | CHP |
| | | c) Mechanical strength test | Major | Test | As per IS: 2544 | As per IS: 2544 | As per IS: 2544 | QC Report | P | W | W | CHP |
| | | d) Porosity test | Major | Test | As per IS: 2544 | As per IS: 2544 | As per IS: 2544 | QC Report | P | W | W | CHP |
| | | e) Puncture Test | Major | Test | As per IS: 2544 | As per IS: 2544 | As per IS: 2544 | QC Report | P | W | W | CHP |
| | | f) Galvanising Test | Major | Test | As per IS: 2544 | As per IS: 2544 | As per IS: 2544 | QC Report | P | W | W | CHP |
| | | a) Visual Ex-amination | Major | Test | 100% | As per IS: 2544 | As per IS: 2544 | QC Report | P | V | V | |
| 25 | Routine Tests | b) Electrical Tests | Major | Test | 100% | As per IS: 2544 | As per IS: 2544 | QC Report | P | V | V | |
| | | c) Mechanical tests | Major | Test | 100% | As per IS: 2544 | As per IS: 2544 | QC Report | P | V | V | |
| 26 | Type Tests* | All type test as per IS: 2544 & NESCL Tech. Specs. | Major | Test | Sample | As per IS: 2544 | As per IS: 2544 | Type Test Certificate | V | V | V | Type Test Clearance from NESCL Engineer-ing Department |

-All type tests to be carried out as per NESCL specification, Contract Agreement and as per minutes of the meeting between NESCL and main con-tractor. Approval of type tests by Engineering department of NESCL or waival thereof to be shown at the time final inspection to enable NESCL issue MDCC.

√ - Record identified'√' ""tick mark"" shall be essentially included by supplier in QA Documentations.

| LEGEND : | M - MANUFACTURER | V - VERIFICATION |
|---|---|---|
| | C - CONTRACTOR | W - WITNESSING |
| | N - CUSTOMER | QC-QUALITY CONTROL |
| | P - PERFORM | TPL-THIRD PARTY LAB |

| SIGNATURE OF THE CONTRACTOR | SIGNATURE OF THE MANUFACTURER | |
|---|---|---|

| MANUFACTURE'S NAME & ADDRESS: | STANDARD MANUFACTURING QUALITY PLAN | | PROJECT/UTILITY: |
|---|---|---|---|
| | ITEM: 11 kV DISC INSULATORS | QP NO: | |
| | | REV.NO: | PACKAGE: |
| | SUB-SYSTEM: | DATE: | CONTRACT NO: |
| | | | MAIN-CONTRACTOR: |

| Sl. No | Compo-nent & operation | Characteristics | Class | Type of Check | Quantum of Check | Reference Document | Acceptance Norms | Format of Records | Agency | | | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | ** 10 | | | 11 |
| **SECTION:1 RAW MATERIAL INSPECTION** | | | | | | | | | M | C | N | |
| **SECTION: 1.1 RAW MATERIAL FOR BODY** | | | | | | | | | | | | |
| 1 | Quartz Powder | a) Inspection / colour | Major | Visual | 1 Kg/20 MT part thereof | S 1201 | White | QC Report | V | V | V | Record review during final inspection |
| | | b) Residue retained on 200 mesh | Major | Test | Do | S 1201 | 2% Max. the residue shall be free iron particles and magnetic impurities | QC Report | P | V | V | Do |
| | | c) fired colour | Major | Visual | Do | S 1201 | White | QC Report | V | V | V | Do |
| | | d) Sintering/ fired behavior | Major | Visual | Do | S 1201 | Should not stick to the container and no specks | QC Report | V | V | V | Do |
| | | "e) Chemical analysis<br><br>SiO2<br>Fe2 O3<br>LOI at 1000oc" | Major | Test | Sampling Once in 3 month/ 300 MT | S 1201 | "Vendor's test certificate<br><br>98% Min<br>0.25% Max.<br>1% Max" | Supplier TC/ QC lab/TPL | P | V | V | T/C review during final inspection |
| 2 | Feldspar powder | a) Inspection / colour | Major | Visual | 1 Kg/20 MT part thereof | S 1201 | Off White or pink colour | QC Report | V | V | V | Record review during final inspection |
| | | b) Residue retained on 200 mesh | Major | Test | Do | S 1201 | 2% Max. the residue shall be free iron particles and magnetic impurities | QC Report | P | V | V | Do |
| | | c) fired behavior/Sintering | Major | Visual | Do | S 1201 | Translucent (glossy white) and low impurities | QC Report | V | V | V | Do |



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|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | “d) Chemical analysis<br><br>K2O+Na2O<br>K2O<br>Na2O<br>Fe2O3<br>LOI at 1000OC” | Major | Test | Sampling Once in 3 month/ 300MT | S 1201 | “Vendor’s test certificate<br>11% Min<br>8% Min.<br>3.5% Max<br>1% Max<br>1.5% Max” | Supplier TC/ QC lab/TPL | P | V | V | T/C review during final inspection |
| 3 | China clays | a) Inspection | Major | Visual | 1 Kg/20 MT or part thereof | S 1201 | cream/ pink | QC Report | V | V | V | Record review during final inspection |
| | | b) Residue retained on 200 mesh | Major | Test | Do | S 1201 | 3% Max. the residue shall be free iron particles and magnetic impurities | QC Report | P | V | V | Do |
| | | c) Fired colour | Major | Visual | Do | S 1201 | Snow white/ white | QC Report | V | V | V | Do |
| | | d) Dry shrinkage | Major | Test | Do | S 1201 | 7% Max | QC Report | P | V | V | Do |
| | | e) Total shrinkage | Major | Test | Do | S 1201 | 16% Max | QC Report | P | V | V | Do |
| | | “f) Chemical analysis<br>Al2 03<br>Fe2 03<br>Tio2<br>LOI at 1000oc” | Major | Test | Once in 3 month/ 300MT | S 1201 | Vendor’s test certificate<br>30% Min<br>5% Max<br>2% Max<br>18% Max | Supplier TC/ QC lab/TPL | P | V | V | T/C review during final inspection |
| 4 | Ball clay | a) Inspection/ colour | Major | Visual | 1 Kg/20 MT or part thereof | S 1201 | Dull white/ black | QC Report | P | V | V | Record review during final inspection |
| | | b) Residue retained on 200 mesh | Major | Test | Do | S 1201 | 3% Max. the residue shall be free iron particles and magnetic impurities | QC Report | P | V | V | Do |
| | | c) Fired colour | Major | Visual | Do | S 1201 | Pale cream/dull cream or light grey/white | QC Report | V | V | V | Do |
| | | d) Dry shrinkage | Major | Test | Do | S 1201 | 7% Max | QC Report | P | V | V | Do |
| | | e) Total shrinkage | Major | Test | Do | S 1201 | 18% Max | QC Report | P | V | V | Do |

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | ** 10 | | | 11 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | "f) Chemical analysis<br>Tio2<br>Al2 03<br>Fe2 03<br>LOI at 1000oc" | Major | Test | Once in 3 month/ 300MT | S 1201 | Vendor's test certificate<br>3% Min<br>25% Max<br>2% Max<br>13% Max | Supplier TC/ QC lab/TPL | P | V | V | T/C review during final inspection |
| **SECTION: 1.2 RAW MATERIAL FOR GLAZE** | | | | | | | | | | | | |
| 5 | Iron oxide | a) Inspection/ colour | Major | Visual | 1 Kg/05 MT or part thereof | S 1201 | Red coloured powder | QC Report | V | V | V | Record review during final inspection |
| | | b) Residue retained on 200 mesh | Major | Test | Do | S 1201 | 2% Max | QC Report | P | V | V | Do |
| | | c) Fired colour of 1% iron oxide in feldspar powder | Major | Visual | Do | S 1201 | Should match with the standard reference sample | QC Report | V | V | V | Do |
| | | "d) Chemical analysis<br>Fe2O3 content<br>" | Major | Test | Sampling Once in 6 month/ 10 MT | S 1201 | "Vendor's test certificate approx<br>82% Min " | Supplier TC/ QC lab/TPL | P | V | V | T/C review during final inspection |
| 6 | Manganese dioxide | a) Inspection/ colour | Major | Visual | 1 Kg/05 MT or part thereof | S 1201 | "Black coloured powder " | QC Report | V | V | V | Record review during final inspection |
| | | b) Residue retained on 200 mesh | Major | Test | Do | S 1201 | 10% Max | QC Report | P | V | V | Do |
| | | c) Fired colour of 2% manganese dioxide in feldspar powder | Major | Visual | Do | S 1201 | Should match with the standard reference sample | QC Report | V | V | V | Do |
| | | "d) Chemical analysis<br>MnO2 content<br>" | Major | Test | Sampling Once in 6 month/ 10 MT | S 1201 | "Vendor's test certificate<br>78% Min " | Supplier TC/ QC lab/TPL | P | V | V | T/C review during final inspection |

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| 7 | Chromium oxide | a) Inspection/ colour | Major | Visual | 1 Kg/05 MT or part thereof | S 1201 | “Green coloured powder “ | QC Report | V | V | V | Record review during final inspection |
| | | b) Residue retained on 200 mesh | Major | Test | Do | S 1201 | 2% Max | QC Report | P | V | V | Do |
| | | c) Fired colour of 3% chromium oxide in feldspar powder | Major | Visual | Do | S 1201 | Should match with the standard reference sample | QC Report | V | V | V | Do |
| | | “d) Chemical analysis Cr2O3 content “ | Major | Test | Sampling Once in 6 month/ 10 MT | S 1201 | “Vendor’s test certificate 90% Min “ | Supplier TC/ QC lab/TPL | P | V | V | T/C review during final inspection |
| 8 | Calcite powder | a) Inspection/ colour | Major | Visual | 1 Kg/05 MT or part thereof | S 1201 | Off or dull white | QC Report | V | V | V | Record review during final inspection |
| | | b) Residue retained on 200 mesh | Major | Test | Do | S 1201 | 5% Max of the residue shall be free from iron particles and magnetic impurities | QC Report | P | V | V | Do |
| | | Fired characteristic | Major | Visual | Do | S 1201 | Free from ferrous/ferric impurities | QC Report | V | V | V | Do |
| | | “d) Chemical analysis<br><br>CaO<br>Fe2O3<br>SiO2<br>“ | Major | Test | Sampling Once in 6 month/ 10 MT | S 1201 | “Vendor’s test certificate<br>40% Min<br>0.5% Max<br>5% Max” | Supplier TC/ QC lab/TPL | P | V | V | T/C review during final inspection |
| 9 | Cement | a) Inspection | Major | Visual | 0.01% of total quantity received | “IS 12269 S 1003” | No lumpiness | QC Report | V | V | V | Record review during final inspection |
| | | b) Compressive strength | Major | Test | Do | “IS 12269 S 1004” | 380 Kg/cm2 Min | QC Report | P | V | V | Do |
| | | c) Expansion (Autoclave) | Major | Test | Do | “IS 12269 S 1005” | 0.8% Max | Supplier TC/ QC lab/TPL | P | V | V | Do |

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| 10 | Cork sheet | a) Thickness | Major | Visual | 5Nos/ 5000 Nos | S 1003 | 1-2mm | QC Report | V | V | V | Record review during final inspection |
| | | b) specific gravity | Major | Test | Do | S 1003 | 0.2±0.1 | QC Report | P | V | V | Do |
| **SECTION:3 METAL PARTS INSPECTION** | | | | | | | | | M | C | N | |
| 11 | Ball Pin & Tongue Pin | a) Inspection (Black & Galvanizing stage) | Major | Visual | 100% | S 1201 | No sharp edges | QC Report | V | V | V | Record review during final inspection |
| | | b) Gauge checking (black & Galvanizing stage) | Major | Test | 100% | S 1201 | As per IS:2486 part-II | QC Report | P | V | V | "Record review during final inspection & T/C review" |
| | | c) Dimension ( black & Galvanizing stage) | Major | Test | "Lot sample 1-1000 5 1000+ 10" | S 1201 | As per Drawing | QC Report | P | V | V | Record review during final inspection |
| | | d) Mechanical failing load test ( black & Galvanizing stage) | Major | Test | "Lot sample 1-1000 3 1000+ 5" | S 1201 | As per Drawing | QC Report | P | V | V | Do |
| | | e) Yield strength, Tensile Strength & % Elongation on test bar | Major | Test | Do | S 1201 | NESCL spec. | QC Report | P | V | V | T/C review during final inspection |
| | | f) Hardness | Major | Test | Do | S 1201 | Do | QC Report | P | V | V | Do |
| | | g) Galvanizing | Major | Test | "Lot sample 1-10000 3 1000+ 5" | S 1201 | As per IS:2633 | QC Report | P | V | V | Record review during final inspection |



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| | | “h) Chemical Analysis Carbon Manganese Silicon Sulphur Phosphorous” | Major | Test | Each consignment | S 1201 | “Vendor’s test certificate 0.15-0.45 0.6-1.00 0.05-0.35 0.60 Max 0.06 Max “ | Supplier TC/ QC lab/TPL | P | V | V | T/C review during final inspection |
| | | i) Heat Treatment | Major | Test | 100% | S 1201 | Time & Temp chart | Supplier TC/ QC lab/TPL | P | V | V | Do |
| | | j) M.P.I | Major | Test | 100% | S 1201 | NESCL spec. | Supplier TC/ QC lab/TPL | P | V | V | Do |
| 12 | M.C.I. Cap (Socket/ Clevis) | a) Inspection (Black & Galvanizing stage) | Major | Visual | 100% | S 1201 | No blow Holes | QC Report | V | V | V | Record review during final inspection |
| | | b) Gauge checking (black & Galvanizing stage) | Major | Test | 100% | S 1201 | As per IS:2486 part-II | QC Report | P | V | V | Do |
| | | c) Dimension ( black & Galvanizing stage) | Major | Measurement | “Lot sample 1-1000 5 1000+ 10” | S 1201 | As per Drawing | QC Report | P | V | V | Do |
| | | d) Mechanical failing load test ( black & Galvanizing stage) | Major | Test | “Lot sample 1-1000 3 1000+ 5” | S 1201 | As per Drawing | QC Report | P | V | V | Do |
| | | e) Galvanizing | Major | Test | Do | S 1201 | As per IS:2633 | QC Report | P | V | V | Do |
| | | f) Tensile Strength on test bar | Major | Test | Do | S 1201 | 350 N/mm2 Min | QC Report | P | V | V | T/C review during final inspection |

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| | | g) 0.2% Proof stress on test bar | Major | Test | "Lot sample 1-1000 3 1000+ 5" | S 1201 | 200 N/mm2 Min | QC Report | P | V | V | Do |
| | | h) Elongation on test bar | Major | Test | Do | S 1201 | 10% Min | QC Report | P | V | V | Do |
| | | i) Hardness | Major | Test | Do | S 1201 | 150 BHN Max | QC Report | P | V | V | Do |
| | | "j) Chemical Analysis Phosphorous" | Major | Test | Each con-signment | S 1201 | "Vendor's T/C as per BM 350 Gr. Of IS 14329 0.12% max" | QC Report | P | V | V | Do |
| | | k) M.P.L | Major | Test | 100% | S 1201 | NESCL spec. | QC Report | P | V | V | Do |
| | | l) Micro Struc-ture | Major | Test | 1 No/Lot | S 1201 | Do | Supplier TC/ QC lab/TPL | P | V | V | Do |
| 13 | Security Clip (W/R Clip) | a) Inspection | Major | Visual | 100% | S 1201 | No sharp edges | QC Report | V | V | V | Record review dur-ing final inspection |
| | | b) Dimension | Major | Mea-sure-ment | "Lot sample 1-1000 3 1000+ 5" | S 1201 | As per Drawing | QC Report | P | V | V | Do |
| | | c) Chemical Analysis i) Phosphorous | Major | Test | Each con-signment | S 1201 | Vendor's T/C as per IS:7814 Gr.I | Supplier TC/ QC lab/TPL | P | V | V | T/C review during final inspection |
| | | ii) Stainless W/R clip | Major | Test | Do | S 1201 | Vendor's T/C as per AISI 304 | Supplier TC/ QC lab/TPL | P | V | V | Do |
| 14 | Cotter Pin (for T& C Cap) | a) mechanical failing load test | Major | Test | "Lot sample 1-1000 3 1000+ 5" | S 1201 | As per Drawing | QC Report | P | V | V | Record review dur-ing final inspection |
| | | b) Galvanizing | Major | Test | Do | S 1201 | As per IS:2633 | QC Report | P | V | V | Do |



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| 15 | Brass split Pin ( for Tic Cap) | Chemical Analysis | Major | Test | Do | S 1201 | Vendor's T/C as per IS:410 CuZn3OGrI | QC Report | P | V | V | T/C review during final inspection |
| | | | | | | | | | | | | |
| **SECTION: 4 IN PROCESS INSPECTION** | | | | | | | | | M | C | N | |
| 16 | Wet grinding of ceramic body | a) Inspection | Major | Visual | Each charge | | Off White to cream colour with no visual impurities | QC Report | V | V | V | Record review during final inspection |
| | | b) Residue retained on 200 mesh | Major | Test | Do | S 1003 | 0.2% Max. | QC Report | P | V | V | Do |
| | | c) Litre Weight | Major | Test | Do | S 1003 | 1350-1450 | QC Report | P | V | V | Do |
| 17 | Glaze Preparation | a) Residue retained on 300 mesh | Major | Test | Each charge | S 1003 | 0.4% Max. | QC Report | P | V | V | Do |
| | | b) Litre Weight | Major | Test | Do | S 1003 | 1500-1650 | QC Report | P | V | V | Do |
| 18 | Pug mill's clay blank | a) De airing checking | Major | Test | Every 30 Mins | S 1003 | Min. 700mm of Hg vacuum | QC Report | P | V | V | Record review during final inspection |
| 19 | Properties of unfired porcelain | a) Dry MOR | Major | Test | Sampling Once in 3 month | S 1003 | 28 Kgs/cm2 Min | QC Report | P | V | V | Record review during final inspection |
| | | b) Linear shrinkage | Major | Test | Sampling Once in month | S 1003 | Max. 14% | QC Report | P | V | V | Do |
| 20 | Shaping | a) Making cavity check ( Dimension) | Major | Measurement | Once in every shift | As per Drawing | As per Drawing | QC Report | P | V | V | Record review during final inspection |
| | | b) Finishing dimension | Major | Measurement | Do | Do | Do | QC Report | P | V | V | Do |
| | | c) Moisture | Major | Test | Once daily | S 1003 | 8% before entry into drier | QC Report | P | V | V | Do |
| 21 | Drying | a) Hot rooms temperature | Major | Visual | Once in a day | S 1003 | 50-80oC | QC Report | V | V | V | Record review during final inspection |
| | | b) moisture content | Major | Test | 3 samples per day | S 1003 | 1.5% Max | QC Report | P | V | V | Do |

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| 22 | Properties of fired porcelain | a) Fired M.O.R | Major | Test | Sampling Once in 3 month | S 1003 | "Unglazed 750 kg/cm2 Min glazed 850 kg/cm2 Min" | QC Report | P | V | V | Record review during final inspection |
| | | b) porosity | Major | Test | All cars of every shuttle kiln & any one unloaded car of tunnel kiln | As per IS:731 | As per IS:731 | QC Report | P | V | V | Do |
| | | c) Bulk density/ Water absorption | Major | Test | daily & each kiln | S 1003 | 2.38 Min / 0.2% | QC Report | P | V | V | Do |
| 23 | Glazing (Brown glaze) | a) Inspection | Major | Visual | 100% | | Light buff colour slurry with no visual impurities | QC Report | V | V | V | Record review during final inspection |
| | | b) Sp.gravity | Major | Test | Every hour | S 1003 | 1.49-1.51 | QC Report | P | V | V | Do |
| | | c) Moisture % | Major | Test | 3 samples per day | S 1003 | 2.5% Max | QC Report | P | V | V | Do |
| 24 | Temperature during firing of green wares | | Major | Visual | Every hour | S 1003 | As per firing Graph | QC Report | V | V | V | Do |
| 25 | Sorting of fired insulator | a) Inspection | Major | Visual | 100% | Ref.sample | As per IS:731 | QC Report | V | V | V | Do |
| | | b) Dimension | Major | Measurement | 5 Nos/day | S 1003 | As per NESCL approved specified drawings | QC Report | P | V | V | Do |
| 26 | Routine electrical Test on Shell ( Power frequency test) | | Major | Test | 100% | AS per IS 731 | "As per IS:731 For 5 Minutes" | QC Report | P | V | V | Do |

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| 27 | Hydraulic proof load test on shell (if applicable) | | Major | Test | 100% | NESCL spec | NESCL spec | QC Report | P | V | V | Do |
| 28 | Routine electrical (power frequency) & Mechanical Routine Mechanical Test on Assembled insulators | | Major | Test | 100% | AS per IS 731 | "As per IS:731 For 5 Minutes" | QC Report | P | V | V | Do |
| | | a) Routine Mechanical test | Major | Test | 100% | AS per IS 732 | 40% of rated Ems for 5 minutes | QC Report | P | V | V | Do |
| | | b) Routine Electrical test | Major | Test | 100% | AS per IS 733 | "As per IS:731 For 5 Minutes" | QC Report | P | V | V | Do |
| 29 | Packing Crate | a) Inspection | Major | Visual | 100% | S 1201 | No broken planks | QC Report | V | V | V | Do |
| | | b) Dimension | Major | Test | "Lot sample 1-1000 5 1000+ 10" | S 1201 | S 1201 | QC Report | P | V | V | Do |
| **SECTION:5 FINAL INSPECTION** | | | | | | | | | M | C | N | |
| 30 | Acceptance test on assembled insulators | a) Dimension checking | Major | Measurement | As per IS:731 | As per IS:731 | As per IS:731 | QC Report | P | W | W | CHP |
| | | b) Temperature cycle test | Major | Test | As per IS:731 | As per IS:731 | As per IS:731 | QC Report | P | W | W | CHP |
| | | c) Puncture Test | Major | Test | As per IS:731 | As per IS:731 | As per IS:731 | QC Report | P | W | W | CHP |
| | | d) Galvanizing test | Major | Test | As per IS:731 | As per IS:2633 | As per IS:2633 | QC Report | P | W | W | CHP |
| | | e) Electromechanical failing load test | Major | Test | As per IS:731 | As per IS:731 | As per IS:731 | QC Report | P | W | W | CHP |
| | | f) Porosity test | Major | Test | As per IS:731 | As per IS:731 | As per IS:731 | QC Report | P | W | W | CHP |
| 31 | Routine Tests | a) Visual Examination | Major | Test | 100% | As per IS:731 | As per IS:731 | QC Report | P | V | V | |
| | | b) Electrical Tests | Major | Test | 100% | As per IS:731 | As per IS:731 | QC Report | P | V | V | |
| | | c) Mechanical tests | Major | Test | 100% | As per IS:731 | As per IS:731 | QC Report | P | V | V | |

| | | | | | | | | | | | | |
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| 32 | Type Test * | a) Visual Examination | Major | Visually | As per IS: 731 | As per IS: 731 | As per IS: 731 | TPL | W | W | W | CHP |
| | | b) Verification of Dimensions | Major | Measurement | As per IS: 731 | As per IS: 731 | As per IS: 731 | TPL | W | W | W | CHP |
| | | c) Visible discharge test | Major | Test | As per IS: 731 | As per IS: 731 | As per IS: 731 | TPL | W | W | W | CHP |
| | | d) Impulse withstand voltage test | Major | Test | As per IS: 731 | As per IS: 731 | As per IS: 731 | TPL | W | W | W | CHP |
| | | e) Wet power frequency withstand voltage test | Major | Test | As per IS: 731 | As per IS: 731 | As per IS: 731 | TPL | W | W | W | CHP |
| | | f) Temperature cycle test | Major | Test | As per IS: 731 | As per IS: 731 | As per IS: 731 | TPL | W | W | W | CHP |
| | | g) Puncture test | Major | Test | As per IS: 731 | As per IS: 731 | As per IS: 731 | TPL | W | W | W | CHP |
| | | h) Porosity test | Major | Test | As per IS:731 | As per IS:731 | As per IS:731 | TPL | W | W | W | CHP |
| | | i) Galvanizing test | Major | Test | As per IS: 731 | As per IS: 731 | As per IS: 731 | TPL | W | W | W | CHP |
| | | J) Electro-mechanical failing load test | Major | Test | As per IS: 731 | As per IS: 731 | As per IS: 731 | TPL | W | W | W | CHP |
| | | k) Thermal Mechanical Performance Tests | Major | Test | As per IS: 731 | As per IS: 731 | As per IS: 731 | TPL | W | W | W | CHP |
| | | | | | | | | | | | | |

"*-All type tests to be carried out as per NESCL specification, Contract Agreement and as per minutes of the meeting between NESCL and main contractor. Approval of type tests by Engineering department of NESCL or waival thereof to be shown at the time final inspection to enable NESCL issue MDCC.

√ - Record identified'√' ""tick mark"" shall be essentially included by supplier in QA Documentations.

| MANUFACTUER'S NAME & ADDRESS: | STANDARD MANUFACTURING QUALITY PLAN | | PROJECT/UTILITY: |
|---|---|---|---|
| | ITEM: PIN INSU-LATORS UPTO 33 kV | QP NO: | |
| | | REV.NO: | PACKAGE: |
| | SUB-SYSTEM: | DATE: | CONTRACT NO: |
| | | PAGE:….OF….. | MAIN-CONTRACTOR: |

| Sl. No | Compo-nent & operation | Characteristics | Class | Type of Check | Quantum of Check | Reference Document | Acceptance Norms | Format of Records | Agency | | | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
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| **SECTION: RAW MATERIALS INSPECTION** | | | | | | | | | M | C | N | |
| 1 | China clays | a) Inspection | Major | Visual | 0.01% in the total wt | IRM/CD/ TP/2 | White/off White, deep cream colour in raw form | QC Report | V | V | V | Record review during final inspection |
| | | b) Residue retained on 300 mesh (BSS) | Major | Test | Do | | 4% Max. The residue shall be free from iron impurities | QC Report | P | V | V | Do |
| | | c) Fired colour | Major | Visual | Do | | white to cream, free from black specks. | QC Report | V | V | V | Do |
| | | "d) Chemical analysis<br><br>Al2 03<br>Sio2<br>Fe2 03<br>Tio2<br>LOI at 1220oc" | Major | Test | Sampling Once in 250 MT | | "Supplier test certifi-cate approx<br>30-40%<br>40-55%<br><4%<br><2%<br>16-19%" | Supplier TC/ QC lab/TPL | P | V | V | T/C review during final inspection |
| | | e) Dry shrinkage | Major | Test | Do | | 6% Max | Supplier TC/ QC lab/TPL | P | V | V | Record review during final inspection |
| | | f) Total shrinkage | Major | Test | Do | | 18% Max | Supplier TC/ QC lab/TPL | P | V | V | Do |
| 2 | Ball clays | a) Inspection | Major | Visual | 0.01% in the total wt | IRM/CD/ TP/2 | white to deep cream/ yellow colour | QC Report | V | V | V | Record review during final inspection |
| | | b) Residue retained on 240 mesh | Major | Test | Do | | < 5% The residue shall be free from iron impurities | QC Report | P | V | V | Do |

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| | | c) fired colour | Major | Visual | Do | | White/off white to cream/Buff free from impurities. | QC Report | V | V | V | Do |
| | | “d) Chemical analysis<br>Al2 03<br>Sio2<br>Fe2 03<br>Tio2<br>LOI at 1220oc” | Major | Test | Once in 250 MT | | “Supplier test certificate approx<br>>25%<br>50-60%<br>< 3%<br>< 3%<br>< 13%” | Supplier TC/ QC lab/TPL | P | V | V | T/C review during final inspection |
| | | e) Dry shrinkage | Major | Test | Do | | 6% Max | Supplier TC/ QC lab/TPL | P | V | V | Record review during final inspection |
| | | f) Total shrinkage | Major | Test | Do | | 18% Max | Supplier TC/ QC lab/TPL | P | V | V | Record review during final inspection |
| 3 | Quartz Powder | a) Inspection | Major | Visual | 0.01% in the total wt | IRM/CD/ TP/1 | White to off White raw colour | QC Report | V | V | V | Record review during final inspection |
| | | b) Residue retained on 240 mesh (BSS) | Major | Test | Do | | < 3%Max The residue shall be free from iron particles and magnetic impurities | QC Report | P | V | V | Do |
| | | c) fired colour | Major | Visual | Do | | Off white to White free from impurities | QC Report | V | V | V | Do |
| | | d) Sintering | Major | Visual | Do | | Nil, No vitrification | QC Report | V | V | V | Do |
| | | “e) Chemical analysis<br>SiO2<br>Fe2 O3<br>LOI at 1000oc” | Major | Test | Sampling Once in 250 MT | | “Supplier test certificate approx<br><br>98% Min<br>0.25% Max.<br>0.5% Max<br><br>“ | Supplier TC/ QC lab/TPL | P | V | V | T/C review during final inspection |

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| 4 | Feldspar powder | a) Inspection | Major | Visual | 0.01% in the total wt | IRM/CD/ TP/1 | White to light pink colour | QC Report | V | V | V | Record review during final inspection |
| | | b) Residue retained on 240 mesh | Major | Test | Do | | < 3% Max The residue shall be free from iron particles and magnetic impurities | QC Report | P | V | V | Do |
| | | c) fired colour | Major | Visual | Do | | Grayish/off white to white | QC Report | V | V | V | Do |
| | | d) Firing behavior | Major | Test | Do | | Vitirified mass free from impurities | QC Report | P | V | V | Do |
| | | “e) Chemical analysis<br>K2O+Na2O<br>K2O<br>Na2O<br>Fe2O3<br>LOI at 1000OC” | Major | Test | Once in 250 MT | | “Suppliertest certificate approx<br>13% Min<br>11% Min.<br>3.5% Max<br>0.2% Max<br>0.5% Max” | Supplier TC/ QC lab/TPL | P | V | V | T/C review during final inspection |
| 5 | Iron oxide | a) Inspection | Major | Visual | 500 gms/MT or part thereof | IRM/CD/ TP/1 | Dark brown colour | QC Report | V | V | V | Record review during final inspection |
| | | b) Residue retained on 300 mesh | Major | Test | Do | | 0.5% Max | QC Report | P | V | V | Do |
| | | c) Fired colour | Major | Visual | Do | | Block/Greyish black free from impurities | QC Report | V | V | V | Do |
| | | “d) Chemical analysis<br>Fe2O3 content<br>“ | Major | Test | Once in 1 MT | | “Supplier test certifi-cate approx<br>85% Min “ | Supplier TC/ QC lab/TPL | P | V | V | T/C review during final inspection |
| 6 | Man-ganese di-oxide | a) Inspection | Major | Visual | 500 gms/MT or part thereof | IRM/CD/ TP/1 | Dark Grey to black colour free from impu-rities | QC Report | V | V | V | Record review during final inspection |
| | | b) Residue retained on 300 mesh | Major | Test | Do | | 0.5% Max | QC Report | P | V | V | Do |
| | | c) Fired colour | Major | Visual | Do | | Black/ balckish violet free from impurities | QC Report | V | V | V | Do |

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| | | “d) Chemical analysis MnO2 content “ | Major | Test | Once in 10 MT | | Supplier Test certificate 85% Min | Supplier TC/ QC lab/TPL | P | V | V | T/C review during final inspection |
| 7 | Chromium oxide | a) Inspection | Major | Visual | 500 gms/MT or part thereof | IRM/CD/ TP/1 | Bottle Green colour | QC Report | V | V | V | Record review during final inspection |
| | | b) Residue retained on 300 mesh | Major | Test | Do | | 0.5% Max | QC Report | P | V | V | Do |
| | | c) Fired colour | Major | Visual | Do | | Dark Green free from impurities | QC Report | V | V | V | Do |
| | | “d) Chemical analysis Cr2O3 content “ | Major | Test | Once in 10 MT | | Supplier Test certificate 85% Min | Supplier TC/ QC lab/TPL | P | V | V | T/C review during final inspection |
| 8 | Calcite powder | a) Inspection | Major | Visual | 500 gms/MT or part thereof | IRM/CD/ TP/1 | White to cream raw colour. Free from impurities | QC Report | V | V | V | Record review during final inspection |
| | | b) Residue retained on 300 mesh | Major | Test | Do | | 3% Max | QC Report | P | V | V | Do |
| | | c) Fired colour | Major | Visual | Do | | Light greenish | QC Report | V | V | V | Do |
| | | “d) Chemical analysis CaO content “ | Major | Test | Once in 10 MT | | Supplier Test certificate 50% Min | Supplier TC/ QC lab/TPL | P | V | V | T/C review during final inspection |
| **SECTION: ASSEMBLY MATERIALS INSPECTION** | | | | | | | | | M | C | N | |
| 9 | Cement | a) Inspection | Major | Visual | 0.01% of total quantity received | “IS: 12269 IRM/CD/ TP/3 “ | “ No lumpiness/solidification.” | QC Report | V | V | V | Record review during final inspection |
| | | b) Compressive strength | Major | Test | Do | | 380 Kg/cm2 | QC lab/ TPL | P | V | V | T/C review during final inspection |
| | | c) Expansion | Major | Test | Each consignment | | 0.8% Max | QC lab/ TPL | P | V | V | Do |



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| **SECTION: METAL PARTS INSPECTION** | | | | | | | | | M | C | N | |
| 11 | Lead Thimble | a) Inspection | Major | Visual | 100% | | No sharp / rough edges. | QC Report | V | V | V | Record review during final inspection |
| | | b) Dimension | Major | Mea-sure-ment | "Lot sample size size (nos) (nos) 1-500 4 501-1000 6 1001+ 10" | | As per drawing | QC Report | P | V | V | Do |
| | | c) Gauge Check-ing | Major | Visual | Do | "As per IS:2486 part-II" | "As per IS:2486 part-II" | QC Report | P | V | V | Do |
| **SECTION: IN-PROCESS INSPECTION** | | | | | | | | | M | C | N | |
| 12 | Wet grind-ing of ceramic body | a) Inspection | Major | Visual | Each charge | IP/CD/ TP/1 | Pale white to cream colour with no visual impurities | QC Report | V | V | V | Record review during final inspection |
| | | b) Residue retained on 300 mesh | Major | Test | Do | | < 30 grms/Ltrs | QC Report | P | V | V | Do |
| | | c) Particle size Analysis | Major | Test | Once in week | | "<10 Microns-Min 70% < 30 Microns-Min 97%" | QC Report | P | V | V | Do |
| 13 | Slip's Litre Weight | | Major | Test | Daily once | IP/CD/ TP/1 | 1.40-1.50 Kg/litre | QC Report | P | V | V | Do |
| 14 | Pug mill's clay blank | a) Moisture % | Major | Test | Twice in a shift | IP/CD/ TP/1 | 16.5-19% | QC Report | P | V | V | Do |
| | | b) De airing checking | Major | Test | Do | | Min. 700mm of Hg vaccum | QC Report | P | V | V | Do |

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| 15 | During glaze prepara-tion | Residue re-tained on 300 mesh | Major | Test | Each charge | | Max. 2% | QC Report | P | V | V | Do |
| 16 | Proper-ties of unfired porcelain | a) Linear shrink-age | Major | Test | Once in a day | | Max. 2% | QC Report | P | V | V | Do |
| | | b) Dry MOR | Major | Test | Once in week | | 30 Kgs/cm2 Min | QC Report | P | V | V | Do |
| 17 | Shaping | a) Making cavity check | Major | Test | Once in a shift | | As per drawing | QC Report | P | V | V | Do |
| | | b) Finishing dimension | Major | Mea-sure-ment | Do | | As per drawing | QC Report | P | V | V | Do |
| | | c) Moisture % before entry into dryer | Major | Test | Once in a day | | 8 to 12% ( depending upon climate condi-tion) | QC Report | P | V | V | Do |
| 18 | Drying | a) Hot rooms temperature | Major | Visual | Once in a day | | Ambient-85oC | QC Report | V | V | V | Do |
| | | b) moisture content | Major | Test | 3 sam-ples per day | | 0.8% Max. | QC Report | P | V | V | Do |
| 19 | Proper-ties of fired porcelain Fired MOR | | Major | Test | Once in 3 month | | Unglazed 750 Kgs/ cm2 Min Glazed 850 gs/cm2 Min | QC Report | P | V | V | Do |
| | | a) Linear shrink-age | Major | Test | Once in a day | | “ < 14%” | QC Report | P | V | V | Record review during final inspection |
| | | b) porosity | Major | Test | 4 pieces from every unloaded car of Tunnel Kiln | As per IS: 731 | As per IS: 731 & 5300 | QC Report | P | V | V | Do |
| | | c) Bulk density | Major | Test | Daily once | | 2.38 Min | QC Report | P | V | V | Do |
| | | d) Water absorp-tion | Major | Test | Daily once | | 0.2% Max | QC Report | P | V | V | Do |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 20 | Glazing (Brown glaze) | a) Inspection | Major | Visual | 100% | | Rose pink slip colour slurry with no visual impurities | QC Report | V | V | V | Do |
| | | b) Moissture % | Major | Test | 3 samples per day | | 2-3% Max | QC Report | P | V | V | Do |
| | | c) Sp.gravity | Major | Test | Twice in a day. | | 1.4-1.45 | QC Report | P | V | V | |
| 20 | Temperrature during firing of green wares | | Major | Visual | Hourly | | 1220-1230oC depending on cycle | QC Report | V | V | V | Do |
| 21 | Sorting of fired insulator | a) Inspection | Major | Visual | 100% | | As per IS:731 | QC Report | V | V | V | Do |
| | | b) Dimension & weight | Major | Measurement | 3 Nos/ day | | As per NESCL approved specified drawings | QC Report | P | V | V | Do |
| 22 | Routine electrical (power frequency) & Mechnical Test on Assembled insulators | a) Routine Electrical test | Major | Test | 100% | As per IS 731 for Min. 5 minutes | As per IS 731 for Min. 5 minutes | QC Report | P | V | V | Do |
| | | b) Routine Mechanical test | Major | Test | 100% | As per IS 731 for Min. 5 minutes | As per IS 731 for Min. 5 minutes | QC Report | P | V | V | Do |
| 23 | Packing ( wooden ) crate | a) Inspection | Major | Visual | 100% | | No broken planks | QC Report | V | V | V | Do |
| | | b) Dimension | Major | Measurement | “Lot sample size size (nos) (nos) 1-500 4 501-1000 6 1001+ 10” | | As per Approved Drawing | QC Report | P | V | V | Do |

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| **SECTION: FINAL INSPECTION** | | | | | | | | | M | C | N | |
| 24 | Accep-tance Tests | a) Dimension checking | Major | Mea-sure-ment | As per IS:731 | As per IS:731 | As per IS:731 | QC Report | P | W | W | CHP |
| | | b) Temperature cycle test | Major | Test | As per IS:731 | As per IS:731 | As per IS:731 | QC Report | P | W | W | CHP |
| | | c) Mechanical failing load test | Major | Test | As per IS:731 | As per IS:731 | As per IS:731 | QC Report | P | W | W | CHP |
| | | d) Porosity test | Major | Test | As per IS:731 | As per IS:731 | As per IS:731 | QC Report | P | W | W | CHP |
| | | e) Puncture Test | Major | Test | As per IS:731 | As per IS:731 | As per IS:731 | QC Report | P | W | W | CHP |
| | | a) Visual Exami-nation | Major | Test | 100% | As per IS:731 | As per IS:731 | QC Report | P | V | V | |
| 25 | Routine Tests | b) Electrical Tests | Major | Test | 100% | As per IS:731 | As per IS:731 | QC Report | P | V | V | |
| | | c) Mechanical tests | Major | Test | 100% | As per IS:731 | As per IS:731 | QC Report | P | V | V | |
| 26 | Type Tests* | a) Visual Exami-nation | Major | Visual | As per IS:731 | As per IS:731 | As per IS:731 | TPL | W | W | W | CHP |
| | | b)Verification of Dimensions | Major | Mea-sure-ment | As per IS:731 | As per IS:731 | As per IS:731 | TPL | W | W | W | CHP |
| | | c) Visible Dis-charge test | Major | Test | As per IS:731 | As per IS:731 | As per IS:731 | TPL | W | W | W | CHP |
| | | d) Impulse With-stand voltage test | Major | Test | As per IS:731 | As per IS:731 | As per IS:731 | TPL | W | W | W | CHP |
| | | e) Wet power frequnecy with-stand voltage test | Major | Test | As per IS:731 | As per IS:731 | As per IS:731 | TPL | W | W | W | CHP |
| | | f) Dry power frequnecy with-stand voltage test | Major | Test | As per IS:731 | As per IS:731 | As per IS:731 | TPL | W | W | W | CHP |

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | ** 10 | | | 11 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | g) Temperature cycle test | Major | Test | As per IS:731 | As per IS:731 | As per IS:731 | TPL | W | W | W | CHP |
| | | h) Mechanical failing load test | Major | Test | As per IS:731 | As per IS:731 | As per IS:731 | TPL | W | W | W | CHP |
| | | i) Puncture test | Major | Test | As per IS:731 | As per IS:731 | As per IS:731 | TPL | W | W | W | CHP |
| | | j) Porosity test | Major | Test | As per IS:731 | As per IS:731 | As per IS:731 | TPL | W | W | W | CHP |

*-All type tests to be carried out as per NESCL specification, Contract Agreement and as per minutes of the meeting between NESCL and main contractor. Approval of type tests by Engineering department of NESCL or waival thereof to be shown at the time final inspection to enable NESCL issue MDCC.
√ - Record identified'√' ""tick mark"" shall be essentially included by supplier in QA Documentations.

| LEGEND : | | |
|---|---|---|
| | M - MANUFACTURER | V - VERIFICATION |
| | C - CONTRACTOR | W - WITNESSING |
| | N - CUSTOMER | QC-QUALITY CONTROL |
| | P - PERFORM | TPL-THIRD PARTY LAB |

| SIGNATURE OF THE CONTRACTOR | SIGNATURE OF THE MANUFACTURER |
|---|---|

| MANUFACTURER'S NAME & ADDRESS: | STANDARD MANUFACTURING QUALITY PLAN | | PROJECT/UTILITY: |
|---|---|---|---|
| | ITEM: GUY STRAIN INSULATORS (TYPE "" A "" AND "" C "") | QP NO: | |
| | | REV.NO: | PACKAGE: |
| | SUB-SYSTEM: | DATE: | CONTRACT NO: |
| | | | MAIN-CONTRACTOR: |

| Sl. No | Component & operation | Characteristics | Class | Type of Check | Quantum of Check | Reference Document | Acceptance Norms | Format of Records | Agency | | | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | ** 10 | | | 11 |
| **SECTION:1 RAW MATERIAL INSPECTION** | | | | | | | | | M | C | N | |
| **SECTION: 1.1 RAW MATERIAL FOR BODY** | | | | | | | | | | | | |
| 1 | Quartz Powder | a) Inspection / colour | Major | Visual | 1 Kg/20 MT part thereof | S 1201 | White | QC Report | V | V | V | Record review during final inspection |
| | | b) Residue retained on 200 mesh | Major | Test | Do | S 1201 | 2% Max. the residue shall be free iron particles and magnetic impurities | QC Report | P | V | V | Do |
| | | c) fired colour | Major | Visual | Do | S 1201 | White | QC Report | V | V | V | Do |
| | | d) Sintering/ fired behavior | Major | Visual | Do | S 1201 | Should not stick to the container and no specks | QC Report | V | V | V | Do |
| | | "e) Chemical analysis<br><br>SiO2<br>Fe2 O3<br>LOI at 1000oc" | Major | Test | Sampling Once in 3 month/ 300 MT | S 1201 | "Vendor's test certificate<br><br>98% Min<br>0.25% Max.<br>1% Max" | Supplier TC/ QC lab/TPL | P | V | V | T/C review during final inspection |
| 2 | Feldspar powder | a) Inspection / colour | Major | Visual | 1 Kg/20 MT part thereof | S 1201 | Off White or pink colour | QC Report | V | V | V | Record review during final inspection |
| | | b) Residue retained on 200 mesh | Major | Test | Do | S 1201 | 2% Max. the residue shall be free iron particles and magnetic impurities | QC Report | P | V | V | Do |



REC
Endless energy. Infinite possibilities.

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|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | c) fired behavior/Sintering | Major | Visual | Do | S 1201 | Translucent (glossy white) and low impurities | QC Report | V | V | V | Do |
| | | "d) Chemical analysis<br><br>K2O+Na2O<br>K2O<br>Na2O<br>Fe2O3<br>LOI at 1000OC" | Major | Test | Sampling Once in 3 month /300MT | S 1201 | "Vendor's test certificate<br>11% Min<br>8% Min.<br>3.5% Max<br>1% Max<br>1.5% Max" | Supplier TC/ QC lab/TPL | P | V | V | T/C review during final inspection |
| 4 | Ball clay | a) Inspection/ colour | Major | Visual | 1 Kg/20 MT or part thereof | S 1201 | Dull white/ black | QC Report | P | V | V | Record review during final inspection |
| | | b) Residue retained on 200 mesh | Major | Test | Do | S 1201 | 3% Max. the residue shall be free iron particles and magnetic impurities | QC Report | P | V | V | Do |
| | | c) Fired colour | Major | Visual | Do | S 1201 | Pale cream/dull cream or light grey/white | QC Report | V | V | V | Do |
| | | d) Dry shrinkage | Major | Test | Do | S 1201 | 7% Max | QC Report | P | V | V | Do |
| | | e) Total shrinkage | Major | Test | Do | S 1201 | 18% Max | QC Report | P | V | V | Do |
| | | "f) Chemical analysis<br>Tio2<br>Al2 03<br>Fe2 03<br>LOI at 1000oc" | Major | Test | Once in 3 month/ 300MT | S 1201 | "Vendor's test certificate<br>3% Min<br>25% Max<br>2% Max<br>13% Max<br>" | Supplier TC/ QC lab/TPL | P | V | V | T/C review during final inspection |
| **SECTION: 1.2 RAW MATERIAL FOR GLAZE** | | | | | | | | | M | C | N | |
| | | c) Fired colour of 2% manganese dioxide in feldspar powder | Major | Visual | Do | S 1201 | Should match with the standard reference sample | QC Report | V | V | V | Do |
| | | d) Chemical analysis MnO2 content | Major | Test | Sampling Once in 6 month/ 10 MT | S 1201 | "Vendor's test certificate<br>78% Min " | Supplier TC/ QC lab/TPL | P | V | V | T/C review during final inspection |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 7 | Chromi-um oxide | a) Inspection/ colour | Major | Visual | 1 Kg/05 MT or part thereof | S 1201 | “Green coloured powder “ | QC Report | V | V | V | Record review during final inspection |
| | | b) Residue retained on 200 mesh | Major | Test | Do | S 1201 | 2% Max | QC Report | P | V | V | Do |
| | | c) Fired colour of 3% chro-mium oxide in feldspar powder | Major | Visual | Do | S 1201 | Should match with the standard reference sample | QC Report | V | V | V | Do |
| | | “d) Chemical analysis $Cr_2O_3$ content “ | Major | Test | Sampling Once in 6 month/ 10 MT | S 1201 | “Vendor’s test certifi-cate 90% Min “ | Supplier TC/ QC lab/TPL | P | V | V | T/C review during final inspection |
| 8 | Calcite powder | a) Inspection/ colour | Major | Visual | 1 Kg/05 MT or part thereof | S 1201 | Off or dull white | QC Report | V | V | V | Record review during final inspection |
| | | b) Residue retained on 200 mesh | Major | Test | Do | S 1201 | 5% Max of the residue shall be free from iron particles and magnetic impurities | QC Report | P | V | V | Do |
| | | Fired charac-teristic | Major | Visual | Do | S 1201 | Free from ferrous/fer-ric impurities | QC Report | V | V | V | Do |
| | | “d) Chemical analysis<br><br>CaO<br>$Fe_2O_3$<br>$SiO_2$<br>“ | Major | Test | Sampling Once in 6 month/ 10 MT | S 1201 | “Vendor’s test certifi-cate<br>40% Min<br>0.5% Max<br>5% Max” | Supplier TC/ QC lab/TPL | P | V | V | T/C review during final inspection |
| **SECTION: 2 IN PROCESS INSPECTION** | | | | | | | | | M | C | N | |
| 9 | Wet grind-ing of ceramic body | a) Inspection | Major | Visual | Each charge | | Off White to cream colour with no visual impurities | QC Report | V | V | V | Record review during final inspection |

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | ** 10 | | | 11 |
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| | | b) Residue retained on 200 mesh | Major | Test | Do | S 1003 | 0.2% Max. | QC Report | P | V | V | Do |
| | | c) Litre Weight | Major | Test | Do | S 1003 | 1350-1450 | QC Report | P | V | V | Do |
| 10 | Glaze Prepara-tion | a) Residue retained on 300 mesh | Major | Test | Each charge | S 1003 | 0.4% Max. | QC Report | P | V | V | Do |
| | | b) Litre Weight | Major | Test | Do | S 1003 | 1500-1650 | QC Report | P | V | V | Do |
| 11 | Pug mill's clay blank | a) De airing checking | Major | Test | Every 30 Mins | S 1003 | Min. 700mm of Hg vacuum | QC Report | P | V | V | Record review during final inspection |
| 12 | Proper-ties of unfired porcelain | a) Dry MOR | Major | Test | Sampling Once in 3 month | S 1003 | 28 Kgs/cm2 Min | QC Report | P | V | V | Record review during final inspection |
| | | b) Linear shrinkage | Major | Test | Sam-pling Once in month | S 1003 | Max. 14% | QC Report | P | V | V | Do |
| 13 | Shaping | a) Making cavity check ( Dimension) | Major | Mea-sure-ment | Once in every shift | As per Draw-ing | As per Drawing | QC Report | P | V | V | Record review during final inspection |
| | | b) Finishing dimension | Major | Mea-sure-ment | Do | Do | Do | QC Report | P | V | V | Do |
| | | c) Moisture | Major | Test | Once daily | S 1003 | 8% before entry into drier | QC Report | P | V | V | Do |
| 14 | Drying | a) Hot rooms temperature | Major | Visual | Once in a day | S 1003 | 50-80oC | QC Report | V | V | V | Record review during final inspection |
| | | b) moisture content | Major | Test | 3 sam-ples per day | S 1003 | 1.5% Max | QC Report | P | V | V | Do |
| 15 | Proper-ties of fired porcelain | a) Fired M.O.R | Major | Test | Sampling Once in 3 month | S 1003 | "Unglazed 750 kg/cm2 Min glazed 850 kg/cm2 Min" | QC Report | P | V | V | Record review during final inspection |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | b) porosity | Major | Test | All cars of every shuttle kiln & any one unloaded car of tunnel kiln | As per IS 5300 | As per IS: 5300 | QC Report | P | V | V | Do |
| | | c) Bulk density/Water absorption | Major | Test | daily & each kiln | S 1003 | 2.38 Min / 0.2% | QC Report | P | V | V | Do |
| 16 | Glazing (Brown glaze) | a) Inspection | Major | Visual | 100% | | Light buff colour slurry with no visual impurities | QC Report | V | V | V | Record review during final inspection |
| | | b) Sp.gravity | Major | Test | Every hour | S 1003 | 1.49-1.51 | QC Report | P | V | V | Do |
| | | c) Moisture % | Major | Test | 3 samples per day | S 1003 | 2.5% Max | QC Report | P | V | V | Do |
| 17 | Temperature during firing of green wares | | Major | Visual | Every hour | S 1003 | As per firing Graph | QC Report | V | V | V | Do |
| 18 | Sorting of fired insulator | a) Inspection | Major | Visual | 100% | Ref. sample | As per IS: 5300 | QC Report | V | V | V | Do |
| | | b) Dimension | Major | Measurement | 5 Nos/ day | S 1003 | As per NESCL approved specified drawings | QC Report | P | V | V | Do |
| 19 | Routine Test | Visual Examination | Major | Visual | 100% | AS per IS 5300 | Insulator to be free from cracks and physical distortion of shape | QC Report | V | V | V | Do |
| 20 | Packing Crate | a) Inspection | Major | Visual | 100% | S 1003 | No broken planks | QC Report | V | V | V | Do |

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| **SECTION: 3 FINAL INSPECTION** | | | | | | | | | M | C | N | |
| | Routine Test | a) Visual Examination | Major | Test | 100% | As per IS 5300 | As per IS 5300 | QC Report | P | V | V | |
| | | b) Electrical Tests | Major | Test | 100% | As per IS 5300 | As per IS 5300 | QC Report | P | V | V | |
| | | c) Mechanical tests | Major | Test | 100% | As per IS 5300 | As per IS 5300 | QC Report | P | V | V | |
| 21 | Acceptance test | a) Verification of Dimension | Major | Measurement | As per IS: 5300 | As per IS 5300 | As per IS: 5300 | QC Report | P | W | W | |
| | | b) Temperature cycle test | Major | Test | As per IS: 5300 | As per IS 5300 | As per IS: 5300 | QC Report | P | W | W | |
| | | c) Mechanical failing load test | Major | Test | As per IS: 5300 | As per IS 5300 | As per IS: 5300 | QC Report | P | W | W | |
| | | d) Porosity test | Major | Test | As per IS: 5300 | As per IS 5300 | As per IS: 5300 | QC Report | P | W | W | |
| 22 | Type Test * | a) Visual Examination | Major | Visually | As per IS 5300 | As per IS: 5300 | As per IS 5300 | TPL | V | V | V | |
| | | b) Verification of Dimensions | Major | Measurement | As per IS 5300 | As per IS: 5300 | As per IS 5300 | TPL | V | V | V | |
| | | c) Visible discharge test | Major | Test | As per IS 5300 | As per IS: 5300 | As per IS 5300 | TPL | V | V | V | |
| | | d) Wet power frequency withstand voltage test | Major | Test | As per IS 5300 | As per IS 5300 | As per IS 5300 | TPL | V | V | V | |
| | | e) Dry power frequency withstand voltage test | Major | Test | As per IS 5300 | As per IS 5300 | As per IS 5300 | TPL | V | V | V | |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | f) Temperature cycle test | Major | Test | As per IS 5300 | As per IS 5300 | As per IS 5300 | TPL | V | V | V | |
| | | g) Porosity test | Major | Test | As per IS: 5300 | As per IS 5300 | As per IS: 5300 | TPL | V | V | V | |
| | | | | | | | | | | | | |

*-All type tests to be carried out as per NESCL specification, Contract Agreement and as per minutes of the meeting between NESCL and MAIN CONTRACTOR. Approval of type tests by Engineering department of NESCL or waival thereof to be shown at the time final inspection to enable NESCL issue MDCC.
√ - Record identified'√' ""tick mark"" shall be essentially included by supplier in QA Documentations.

| MANUFACTURE'S NAME & ADDRESS: | STANDARD MANUFACTURING QUALITY PLAN | | PROJECT/UTILITY: |
|---|---|---|---|
| | ITEM: SHACKLE INSULATORS | QP NO: | |
| | | REV.NO: | PACKAGE: |
| | SUB-SYSTEM: | DATE: | CONTRACT NO: |
| | | | MAIN-CONTRACTOR: |

| Sl. No | Component & operation | Characteristics | Class | Type of Check | Quantum of Check | Reference Document | Acceptance Norms | Format of Records | Agency | | | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | ** 10 | | | 11 |
| **SECTION:1 RAW MATERIAL INSPECTION** | | | | | | | | | M | C | N | |
| **SECTION: 1.1 RAW MATERIAL FOR BODY** | | | | | | | | | | | | |
| 1 | Quartz Powder | a) Inspection / colour | Major | Visual | 1 Kg/20 MT part thereof | S 1201 | White | QC Report | V | V | V | Record review during final inspection |
| | | b) Residue retained on 200 mesh | Major | Test | Do | S 1201 | 2% Max. the residue shall be free iron particles and magnetic impurities | QC Report | P | V | V | Do |
| | | c) fired colour | Major | Visual | Do | S 1201 | White | QC Report | V | V | V | Do |
| | | d) Sintering/ fired behavior | Major | Visual | Do | S 1201 | Should not stick to the container and no specks | QC Report | V | V | V | Do |
| | | "e) Chemical analysis<br><br>SiO2<br>Fe2 O3<br>LOI at 1000oc" | Major | Test | Sampling Once in 3 month/ 300 MT | S 1201 | "Vendor's test certificate<br><br>98% Min<br>0.25% Max.<br>1% Max" | Supplier TC/ QC lab/TPL | P | V | V | T/C review during final inspection |
| 2 | Feldspar powder | a) Inspection / colour | Major | Visual | 1 Kg/20 MT part thereof | S 1201 | Off White or pink colour | QC Report | V | V | V | Record review during final inspection |
| | | b) Residue retained on 200 mesh | Major | Test | Do | S 1201 | 2% Max. the residue shall be free iron particles and magnetic impurities | QC Report | P | V | V | Do |

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | ** 10 | | | 11 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | c) fired behavior/Sintering | Major | Visual | Do | S 1201 | Translucent (glossy white) and low impurities | QC Report | V | V | V | Do |
| | | “d) Chemical analysis<br><br>K2O+Na2O<br>K2O<br>Na2O<br>Fe2O3<br>LOI at 1000OC” | Major | Test | Sampling Once in 3 month /300MT | S 1201 | “Vendor’s test certificate<br>11% Min<br>8% Min.<br>3.5% Max<br>1% Max<br>1.5% Max” | Supplier TC/ QC lab/TPL | P | V | V | T/C review during final inspection |
| 3 | China clays | a) Inspection | Major | Visual | 1 Kg/20 MT or part thereof | S 1201 | cream/ pink | QC Report | V | V | V | Record review during final inspection |
| | | b) Residue retained on 200 mesh | Major | Test | Do | S 1201 | 3% Max. the residue shall be free iron particles and magnetic impurities | QC Report | P | V | V | Do |
| | | c) Fired colour | Major | Visual | Do | S 1201 | Snow white/ white | QC Report | V | V | V | Do |
| | | d) Dry shrinkage | Major | Test | Do | S 1201 | 7% Max | QC Report | P | V | V | Do |
| | | e) Total shrinkage | Major | Test | Do | S 1201 | 16% Max | QC Report | P | V | V | Do |
| | | “f) Chemical analysis<br>Al2 03<br>Fe2 03<br>Tio2<br>LOI at 1000oc” | Major | Test | Once in 3 month/ 300MT | S 1201 | “Vendor’s test certificate<br>30% Min<br>5% Max<br>2% Max<br>18% Max<br>“ | Supplier TC/ QC lab/TPL | P | V | V | T/C review during final inspection |
| 4 | Ball clay | a) Inspection/ colour | Major | Visual | 1 Kg/20 MT or part thereof | S 1201 | Dull white/ black | QC Report | P | V | V | Record review during final inspection |
| | | b) Residue retained on 200 mesh | Major | Test | Do | S 1201 | 3% Max. the residue shall be free iron particles and magnetic impurities | QC Report | P | V | V | Do |

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| | | c) Fired colour | Major | Visual | Do | S 1201 | Pale cream/dull cream or light grey/white | QC Report | V | V | V | Do |
| | | d) Dry shrink-age | Major | Test | Do | S 1201 | 7% Max | QC Report | P | V | V | Do |
| | | e) Total shrink-age | Major | Test | Do | S 1201 | 18% Max | QC Report | P | V | V | Do |
| | | “f) Chemical analysis<br>Tio2<br>Al2 03<br>Fe2 03<br>LOI at 1000oc” | Major | Test | Once in 3 month /300MT | S 1201 | “Vendor’s test certifi-cate<br>3% Min<br>25% Max<br>2% Max<br>13% Max<br>“ | Supplier TC/ QC lab/TPL | P | V | V | T/C review during final inspection |
| **SECTION: 1.2 RAW MATERIAL FOR GLAZE** | | | | | | | | | | | | |
| 5 | Iron oxide | a) Inspection/ colour | Major | Visual | 1 Kg/05 MT or part thereof | S 1201 | Red coloured powder | QC Report | V | V | V | Record review during final inspection |
| | | b) Residue re-tained on 200 mesh | Major | Test | Do | S 1201 | 2% Max | QC Report | P | V | V | Do |
| | | c) Fired colour of 1% iron ox-ide in feldspar powder | Major | Visual | Do | S 1201 | Should match with the standard reference sample | QC Report | V | V | V | Do |
| | | d) Chemical analysis Fe2O3 content | Major | Test | Sampling Once in 6 month/ 10 MT | S 1201 | “Vendor’s test certifi-cate approx 82% Min “ | Supplier TC/ QC lab/TPL | P | V | V | T/C review during final inspection |
| 6 | Man-ganese di-oxide | a) Inspection/ colour | Major | Visual | 1 Kg/05 MT or part thereof | S 1201 | “Black coloured powder “ | QC Report | V | V | V | Record review during final inspection |
| | | b) Residue re-tained on 200 mesh | Major | Test | Do | S 1201 | 10% Max | QC Report | P | V | V | Do |
| | | c) Fired colour of 2% manga-nese dioxide in feldspar powder | Major | Visual | Do | S 1201 | Should match with the standard reference sample | QC Report | V | V | V | Do |
| | | “d) Chemical analysis MnO2 content “ | Major | Test | Sampling Once in 6 month/ 10 MT | S 1201 | “Vendor’s test certifi-cate 78% Min “ | Supplier TC/ QC lab/TPL | P | V | V | T/C review during final inspection |

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| 7 | Chromi-um oxide | a) Inspection/ colour | Major | Visual | 1 Kg/05 MT or part thereof | S 1201 | “Green coloured powder “ | QC Report | V | V | V | Record review during final inspection |
| | | b) Residue re-tained on 200 mesh | Major | Test | Do | S 1201 | 2% Max | QC Report | P | V | V | Do |
| | | c) Fired colour of 3% chro-mium oxide in feldspar powder | Major | Visual | Do | S 1201 | Should match with the standard reference sample | QC Report | V | V | V | Do |
| | | “d) Chemical analysis Cr2O3 content “ | Major | Test | Sampling Once in 6 month/ 10 MT | S 1201 | “Vendor’s test certifi-cate 90% Min “ | Supplier TC/ QC lab/TPL | P | V | V | T/C review during final inspection |
| 8 | Calcite powder | a) Inspection/ colour | Major | Visual | 1 Kg/05 MT or part thereof | S 1201 | Off or dull white | QC Report | V | V | V | Record review during final inspection |
| | | b) Residue re-tained on 200 mesh | Major | Test | Do | S 1201 | 5% Max of the residue shall be free from iron particles and magnetic impurities | QC Report | P | V | V | Do |
| | | Fired charac-teristic | Major | Visual | Do | S 1201 | Free from ferrous/fer-ric impurities | QC Report | V | V | V | Do |
| | | “d) Chemical analysis<br><br>CaO<br>Fe2O3<br>SiO2<br>“ | Major | Test | Sampling Once in 6 month/ 10 MT | S 1201 | “Vendor’s test certifi-cate<br>40% Min<br>0.5% Max<br>5% Max” | Supplier TC/ QC lab/TPL | P | V | V | T/C review during final inspection |
| **SECTION: 2 IN PROCESS INSPECTION** | | | | | | | | | M | C | N | |
| 9 | Wet grind-ing of ceramic body | a) Inspection | Major | Visual | Each charge | | Off White to cream colour with no visual impurities | QC Report | V | V | V | Record review during final inspection |
| | | b) Residue re-tained on 200 mesh | Major | Test | Do | S 1003 | 0.2% Max. | QC Report | P | V | V | Do |
| | | c) Litre Weight | Major | Test | Do | S 1003 | 1350-1450 | QC Report | P | V | V | Do |

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| 10 | Glaze Prepara-tion | a) Residue re-tained on 300 mesh | Major | Test | Each charge | S 1003 | 0.4% Max. | QC Report | P | V | V | Do |
| | | b) Litre Weight | Major | Test | Do | S 1003 | 1500-1650 | QC Report | P | V | V | Do |
| 11 | Pug mill's clay blank | a) De airing checking | Major | Test | Every 30 Mins | S 1003 | Min. 700mm of Hg vacuum | QC Report | P | V | V | Record review during final inspection |
| 12 | Proper-ties of unfired porcelain | a) Dry MOR | Major | Test | Sampling Once in 3 month | S 1003 | 28 Kgs/cm2 Min | QC Report | P | V | V | Record review during final inspection |
| | | b) Linear shrinkage | Major | Test | Sampling Once in month | S 1003 | Max. 14% | QC Report | P | V | V | Do |
| 13 | Shaping | a) Making cavity check ( Dimension) | Major | Mea-sure-ment | Once in every shift | As per Draw-ing | As per Drawing | QC Report | P | V | V | Record review during final inspection |
| | | b) Finishing dimension | Major | Mea-sure-ment | Do | Do | Do | QC Report | P | V | V | Do |
| | | c) Moisture | Major | Test | Once daily | S 1003 | 8% before entry into drier | QC Report | P | V | V | Do |
| 14 | Drying | a) Hot rooms temperature | Major | Visual | Once in a day | S 1003 | 50-80oC | QC Report | V | V | V | Record review during final inspection |
| | | b) moisture content | Major | Test | 3 samples per day | S 1003 | 1.5% Max | QC Report | P | V | V | Do |
| 15 | Proper-ties of fired porcelain | a) Fired M.O.R | Major | Test | Sampling Once in 3 month | S 1003 | "Unglazed 750 kg/cm2 Min glazed 850 kg/cm2 Min" | QC Report | P | V | V | Record review during final inspection |
| | | b) porosity | Major | Test | All cars of every shuttle kiln & any one unloaded car of tun-nel kiln | As per IS 1445 | As per IS: 1445 | QC Report | P | V | V | Do |
| | | c) Bulk den-sity/Water absorption | Major | Test | daily & each kiln | S 1003 | 2.38 Min / 0.2% | QC Report | P | V | V | Do |

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| 16 | Glazing (Brown glaze) | a) Inspection | Major | Visual | 100% | | Light buff colour slurry with no visual impurities | QC Report | V | V | V | Record review during final inspection |
| | | b) Sp.gravity | Major | Test | Every hour | S 1003 | 1.49-1.51 | QC Report | P | V | V | Do |
| | | c) Moisture % | Major | Test | 3 samples per day | S 1003 | 2.5% Max | QC Report | P | V | V | Do |
| 17 | Temperature during firing of green wares | | Major | Visual | Every hour | S 1003 | As per firing Graph | QC Report | V | V | V | Do |
| 18 | Sorting of fired insulator | a) Inspection | Major | Visual | 100% | Ref. sample | As per IS: 1445 | QC Report | V | V | V | Do |
| | | b) Dimension | Major | Measurement | 5 Nos/day | S 1003 | As per NESCL approved specified drawings | QC Report | P | V | V | Do |
| 19 | Routine Test | Visual Examination | Major | Visual | 100% | AS per IS 1445 | Insulator to be free from cracks and physical distortion of shape | QC Report | V | V | V | Do |
| 20 | Packing Crate | a) Inspection | Major | Visual | 100% | S 1003 | No broken planks | QC Report | V | V | V | Do |
| **SECTION: 3 FINAL INSPECTION** | | | | | | | | | M | C | N | |
| | Routine Tests | a) Visual Examination | Major | Test | 100% | As per IS 1445 | As per IS: 1445 | QC Report | P | V | V | |
| | | b) Electrical Tests | Major | Test | 100% | As per IS 1445 | As per IS: 1445 | QC Report | P | V | V | |
| | | c) Mechanical tests | Major | Test | 100% | As per IS 1445 | As per IS: 1445 | QC Report | P | V | V | |
| 21 | Acceptance Tests | a) Verification of Dimension | Major | Measurement | As per IS: 1445 | As per IS 1445 | As per IS: 1445 | QC Report | P | W | W | |
| | | b) Temperature cycle test | Major | Test | As per IS: 1445 | As per IS 1445 | As per IS: 1445 | QC Report | P | W | W | |
| | | c) Mechanical failing load test | Major | Test | As per IS: 1445 | As per IS 1445 | As per IS: 1445 | QC Report | P | W | W | |
| | | d) Porosity test | Major | Test | As per IS: 1445 | As per IS 1445 | As per IS: 1445 | QC Report | P | W | W | |

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| 22 | Type Tests | a) Visual Examination | Major | Visually | As per IS 1445 | As per IS: 1445 | As per IS 1445 | TPL | V | V | V | |
| | | b) Verification of Dimensions | Major | Measurement | As per IS 1445 | As per IS: 1445 | As per IS 1445 | TPL | V | V | V | |
| | | c) Visible discharge test | Major | Test | As per IS 1445 | As per IS: 1445 | As per IS 1445 | TPL | V | V | V | |
| | | d) Wet power frequency withstand voltage test | Major | Test | As per IS 1445 | As per IS 1445 | As per IS 1445 | TPL | V | V | V | |
| | | e) Dry power frequency withstand voltage test | Major | Test | As per IS 1445 | As per IS 1445 | As per IS 1445 | TPL | V | V | V | |
| | | f) Temperature cycle test | Major | Test | As per IS 1445 | As per IS 1445 | As per IS 1445 | TPL | V | V | V | |
| | | g) Porosity test | Major | Test | As per IS: 1445 | As per IS 1445 | As per IS: 1445 | TPL | V | V | V | |
| | | h) Puncture test | Major | Test | As per IS: 1445 | As per IS 1445 | As per IS: 1445 | TPL | V | V | V | |

*-All type tests to be carried out as per NESCL specification, Contract Agreement and as per minutes of the meeting between NESCL and MAIN CONTRACTOR. Approval of type tests by Engineering department of NESCL or waival thereof to be shown at the time final inspection to enable NESCL issue MDCC.

√ - Record identified'√' ""tick mark"" shall be essentially included by supplier in QA Documentations.

| MANUFACTURE'S NAME & ADDRESS: | | | | MANUFACTURING QUALITY PLAN | | | | PROJECT/UTILITY: | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | ITEM: All Aluminum Conductor (AAC) | | QP NO: | | | | | | |
| | | | | | | REV.NO: | | PACKAGE: | | | | |
| | | | | SUB-SYSTEM: | | DATE: | | CONTRACT NO: | | | | |
| | | | | | | No of pages:5 | | MAIN-CONTRACTOR: | | | | |
| Sl. No | Compo-nent & operation | Characteristics | Class | Type of Check | Quantum of Check | Reference Document | Acceptance Norms | Format of Re-cords | Agency | | | Remarks |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | | | 11 |
| 1.1 | **SECTION-I : RAW MATERIAL** | | | | | | | | M | C | N | |
| 1.1.1 | AL wire ROD | a) Chemical Analysis | Major | Test | One sample per heat of 4MT | IS - 398 - Part I 1996 | NESCL SPEC | QC RE-CORD | V | V | V | Review of Mfg test cer-tificate at the time of final inspection. In absence of Mfg TCs and proper correlation, one sample per lot of 1000 MT or part there of shall be tested at 3rd party lab and TCs from lab shall be re-viewed at the time of final inspection |
| 1.1.2 | | a) Diameter of Al Wire Rod | Major | Di-men-sional | One sample from each coil | IS - 5484 & NESCL SPEC | IS - 5484 & NESCL SPEC | QC RE-CORD | P | V | V | Review of supplier TCs at the time of final inspec-tion. |
| 1.1.3 | | b) Breaking Load/ Tensile Test | Major | Test | One sample from each coil | IS- 5484 & NESCL SPEC | IS - 5484 & NESCL SPEC | QC RE-CORD | P | V | V | DO |
| 1.1.4 | | c) Conductivity | Major | Test | One sample from each coil | IS- 5484 & NESCL SPEC | IS - 5484 & NESCL SPEC | QC RE-CORD | P | V | V | DO |
| 1.1.5 | | d) Elongation | Major | Test | One sample from each coil | IS- 5484 & NESCL SPEC | IS - 5484 & NESCL SPEC | QC RE-CORD | P | V | V | DO |



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| 1.1.6 | | e) Cleanliness & surface smoothness | Major | Visual | 100% on each coil | IS- 5484 & NESCL SPEC | The wire rod shall be smooth & free from pipes, laps, cracks, kinks, twists, scams and other injurious defects with in the limits of good commercial practices. | QC RECORD | P | V | V | Review of supplier TCs at the time of final inspection. |
| 2.1 | **SECTION - II : INPROCESS INSPECTION** | | | | | | | | | | | |
| 2.1.1 | Intermediate Draswing | a)INTERMEDATE DRAWING & SOLUTIONISING OF DRAWN BATCH | Major | Visual | | | "Solutionising Temp : 510 +/- 30 deg C Soaking time : 60 +/- 10 Minutes Continuous Temp record by graph" | QC RECORD | P | V | V | This Process is suitable for M or O temper wire rod materials |
| 2.1.2 | AL drawn wire (Before Ageing) | a) Diameter of drawn Aluminium wire | Major | Dimensional | One Sample from each spool | IS 398 (P-I) & NESCL SPEC | IS 398 (P-I) & NESCL SPEC | QC RECORD | P | V | V | Review of records at the time of final inspection |
| 2.1.3 | | b) Tensile Test | Major | Test | One Sample from each spool | Plant Standards | IS 398 (P-I) & NESCL SPEC | QC RECORD | P | V | V | DO |
| 2.1.4 | | c) Resitivity | Major | Test | One Sample from each spool | Plant Standards | IS 398 (P-I) & NESCL SPEC | QC RECORD | P | V | V | DO |
| 2.1.5 | | d) AL wire Ageing process time and temperature control process | Major | Visual | for each batch | Plant Stadards | Plant Stadards | QC RECORD | P | V | V | DO |
| 2.1.6 | | a) Surface finish & winding (Visual check) | Major | Visual | 100% on each spool | IS 398 (P-I) & NESCL SPEC | The wire shall smooth, uniform and free from all imperfection such as spills, splits, scale | QC RECORD | P | V | V | DO |

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| 2.1.7 | | b) Diameter of AL Wire | Major | Di-men-sional | One Sam-ple each Spool | IS 398 (P-I) & NESCL SPEC | IS 398 (P-I) & NESCL SPEC | QC RE-CORD | P | V | V | DO |
| 2.1.8 | | c) Breaking Load/ Tensile Test | Major | Test | One Sam-ple each Spool | IS 398 (P-I) & NESCL SPEC | IS 398 (P-I) & NESCL SPEC | QC RE-CORD | P | V | V | DO |
| 2.1.9 | | d) Resistance | Major | Test | One Sam-ple each Spool | IS 398 (P-I) & NESCL SPEC | IS 398 (P-I) & NESCL SPEC | QC RE-CORD | P | V | V | DO |
| 2.1.10 | | d) Wrapping Test | Major | Test | One Sam-ple each Spool | IEC 104 & NESCL SPEC | IEC 104 & NESCL SPEC | QC RE-CORD | P | V | V | DO |
| 2.1.11 | | e) Elongation | Major | Test | One Sam-ple each Spool | IS 398 (P-I) & NESCL SPEC | IS 398 (P-I) & NESCL SPEC | QC RE-CORD | P | V | V | DO |
| 2.1.12 | | f) Micro Struc-ture | Major | Test | One Sam-ple per 40 MT or Part there of | IS 398 (P-I) & NESCL SPEC | Fine Grains | QC RE-CORD | V | V | V | Review of records ( Test is conducted at any ap-proved third party lab) |
| 2.1.13 | | g) Density | Major | Test | One Sam-ple each Spool | IS 398 (P-I) & NESCL SPEC | IS 398 (P-I) & NESCL SPEC | QC RE-CORD | P | V | V | Review of supplier TCs at the time of final inspec-tion. |
| 2.1.14 | | h) Coefficient of linear expan-sion | Major | Test | One Sam-ple each Spool | IS 398 (P-I) & NESCL SPEC | IS 398 (P-I) & NESCL SPEC | QC RE-CORD | P | V | V | DO |
| 2.1.15 | | i) Constant Mass-tempera-ture Coefficient ( α) | Major | Test | One Sam-ple each Spool | IS 398 (P-I) & NESCL SPEC | IS 398 (P-I) & NESCL SPEC | QC RE-CORD | P | V | V | DO |
| 2.1.16 | | j) Final Modu-lus of elasticity | Major | Test | One Sam-ple each Spool | IS 398 (P-I) & NESCL SPEC | IS 398 (P-I) & NESCL SPEC | QC RE-CORD | P | V | V | DO |
| 3.1 | **SECTION - III : FINAL CONDUCTOR STRADING** | | | | | | | | | | | |
| 3.1.1 | | a) Lay Ratio/ direction of the Lay and Com-pactness | Major | Visual | Each length at the begin-ning | IS 398 (P-I) & NESCL SPEC | IS 398 (P-I) & NESCL SPEC | QC RE-CORD | P | V | V | DO |

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| 3.1.2 | | b) Smoothness/ Surface finish | Major | Visual | 100% | IS 398 (P-I) & NESCL SPEC | The finished conductor shall be smooth, compact, uniform & free from all imperfection including kinks (protrusion of wire) iwre cross cover, over looseness ( wire being dislocated by finger/ hand pressure and or unusual bangle noise on tapping material inclusion or black spot (on account of reaction with trapped rain water) dirt, grease etc. | QC RECORD | P | V | V | DO |
| 3.1.3 | | “c) Joints “ | Major | Visual | 100% | IS 398 (P-I) & NESCL SPEC | There shall be no Joints. Medium grade Kraft/ Crepe/ Polythene paper shall be used in between the layers of conductors | QC RECORD | P | V | V | Review of records of the contractor at the time of final inspection. The contractor shall furnish an under taking to this effect at the time of final inspection |
| 3.1.4 | | d) Surface cleanliness | Major | Visual | 100% | AS PER NESCL | After reeling the conducotr the exposed surface of the outer most layer of conductor shall be wrapped with waterproof thick bituminised paper/ polythene paper to preserve the conductor from dirt, grit and damage during transporation & handling | QC RECORD | P | V | V | Review of records of the contractor at the time of final inspection. |

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| 4.1 | **SECTION - IV : TYPE TEST ON FINAL CONDUCTOR AS APPLICABLE** | | | | | | | | | | | |
| 4.1.1 | | Type Test of finished conductor | CRITCAL | Inspection | AS PER NESCL SPEC | As Per NESCL Contract Agreement, Minutes Of The Meeting As Applicable | All the type tests to be carried out as per NESCL Specification by NESCL Engineering Department. | QC RECORD | W | W | W | Approved Type Test reports or waiver by Engg Dept to be shown at time of final inspection |
| 5.1 | **SECTION - V : FINAL INPECTION & TESTING** | | | | | | | | | | | |
| 5.1.1 | ROUTINE TEST | a) Check for Joints | Major | Visual | 100% on each drum | IS 398 (P-I) & NESCL SPEC | No Joints are allowed | QC RECORD | P | V | V | Review of records of the contractor |
| 5.1.2 | | b) Surface Condition of the strand and stranded conductor | Major | Visual | 100% on each drum | IS 398 (P-I) & NESCL SPEC | The wire shall smooth, uniform and free from all imperfection such as spills, splits, scale | QC RECORD | P | V | V | Contractor to ensure that there is no surface defects on AL. strands of complete conductor as NESCL requirement |
| 5.1.3 | | c) All Acceptance test | Major | Test/ Dimensional | 20% on each drum and part there of | IS 398 (P-I) & NESCL SPEC | AS PER NESCL SPEC | QC RECORD | P | V | V | Review of records of the contractor at the time of final inspection. |
| 5.1.4 | | d) Check the drums | Major | Visual/ Dimesional | AS PER NESCL SPEC | AS PER NESCL SPEC | AS PER NESCL SPEC | QC RECORD | P | V | V | Review of records of the contractor at the time of final inspection. |
| 5.1.5 | Acceptance Test | a) Lay Ratio/ direction of the Lay | CRITCAL | Visual/ Dimesional | One Sample for Every 10 Drums | IS 398 (P-I) & NESCL SPEC | IS 398 (P-I) & NESCL SPEC | QC RECORD | P | W | W | |
| 5.1.6 | | b) Diameter | CRITCAL | Dimensional | One Sample for Every 10 Drums | IS 398 (P-I) & NESCL SPEC | IS 398 (P-I) & NESCL SPEC | QC RECORD | P | W | W | |
| 5.1.7 | | c) Breaking Load/ Tensile Test | CRITCAL | Test | One Sample for Every 10 Drums | IS 398 (P-I) & NESCL SPEC | IS 398 (P-I) & NESCL SPEC | QC RECORD | P | W | W | |



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| 5.1.8 | | d) Resistance | CRIT-CAL | Test | One Sample for Every 10 Drums | IS 398 (P-I) & NESCL SPEC | IS 398 (P-I) & NESCL SPEC | QC RE-CORD | P | W | W | |
| 5.1.9 | | d) Wrapping Test | CRIT-CAL | Test | One Sample for Every 10 Drums | IEC 104 & NESCL SPEC | IS 398 (P-I) & NESCL SPEC | QC RE-CORD | P | W | W | |
| 5.1.10 | | e) Elongation | CRIT-CAL | Test | One Sample for Every 10 Drums | IS 398 (P-I) & NESCL SPEC | IS 398 (P-I) & NESCL SPEC | QC RE-CORD | P | W | W | |
| 5.1.11 | | f) Micro Struc-ture | CRIT-CAL | Test | One Sample for Every 10 Drums | Plant Stan-dards | Fine Grains | QC RE-CORD | P | W | W | |
| 7.1 | **SECTION - VII : WOODEN DRUMS** | | | | | | | | | | | |
| 7.1.1 | | a) Dimensions | CRIT-CAL | Di-men-sional | One Sample for Every 10 Drums | IS - 1778 - 1980 & NESCL SPEC | All Dimensions shall correlate with approved drawing | QC RE-CORD | P | W | W | |
| 7.1.2 | | b) Barrel batten strength test | CRIT-CAL | Test | One Sample for Every 10 Drums | IS - 1778 - 1980 & NESCL SPEC | Minmum Barrel Strength to be mutully agreed between contrac-tor and customer as per techincal Spec | QC RE-CORD | P | W | W | |
| 7.1.3 | | c) Chemical test on pack-ing paper, corrugated kraft paper & adhesive | Major | Visual | One Sample for Every 10 Drums | | “Chloride - 0.05 %Max<br>Sulphate - 0.25%Max<br>Copper - 0.01%Max<br>pH - 5.5 to 7.5 (Aq Extract)” | QC RE-CORD | P | V | V | Review of results at the time of final inspection |

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| 7.1.4 | | d) check of wooden drums | Major | Visual | 100% | IS - 1778 - 1980 & NESCL SPEC | The inner cheek of the flange and drum barrel surface shall be secured with carboard or double corrogated or thick bitumised water proof bamboo paper by means of suitable adhesive material. After reeling the conductor the exposed surface of the outer layer of the conductor shall be wrapped with water proof thick bituminsed papar/ polythene paper to preserve the conductor from dirt and demaged during transport and handling | QC RECORD | P | V | V | "care shall be taken while handling the drums by lifters<br>Medium grade kraft/ crepe/polythene paper shall be used between the layers of the conductors" |
| 8.1 | **SECTION - VIII :PACKING & MARKING** | | | | | | | | | | | |
| 8.1.1 | Check for identification and packing | a)Application of water proof paper | Major | Visual | 100% | NESCL SPEC | NESCL SPEC | QC RECORD | P | V | V | VERIFICATION OF THE INTERNAL DOCUMENTS DURING FINAL INSPECTION |
| 8.1.2 | | b) Space between outermost layer and inner surface of lagging | | Dimensional | | | | QC RECORD | P | V | V | |
| 8.1.3 | | c) Proper Packing | | Visual | | | | QC RECORD | P | V | V | |

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| 8.1.4 | | d) Contract/ Award Letter No. | | | | | | QC RE-CORD | P | V | V | |
| 8.1.5 | | e) Name and Consignee Ad-dress | | | | | | QC RE-CORD | P | V | V | |
| 8.1.6 | | f) MFG Name and Address | | | | | | QC RE-CORD | P | V | V | |
| 8.1.7 | | g) Drum No. | | | | | | QC RE-CORD | P | V | V | |
| 8.1.8 | | h) Size & code of conductor | | | | | | QC RE-CORD | P | V | V | |
| 8.1.9 | | i) Length of conductor | | | | | | QC RE-CORD | P | V | V | |
| 8.1.10 | | J) Gross weight of drum | | | | | | QC RE-CORD | P | V | V | |
| 8.1.11 | | K) Tare weight of drum | | | | | | QC RE-CORD | P | V | V | |
| 8.1.12 | | L) Net weight | | | | | | QC RE-CORD | P | V | V | |
| 8.1.13 | | M) Arrow mark-ing for unwind-ing | | | | | | QC RE-CORD | P | V | V | |
| 8.1.14 | | N) Sealing the two out-ter ends with heat shrinkable sleeves | | | | | | QC RE-CORD | P | V | V | |
| 8.1.15 | | o) Lead sealing with plier at both ens | | | | | | QC RE-CORD | P | V | V | |
| 8.1.16 | | p) Marking of CHP/MCHP | | | | | | QC RE-CORD | P | V | V | |
| 8.1.17 | | q) Position of conductor | | | | | | QC RE-CORD | P | V | V | |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 8.1.18 | | r) Tack welding on the Nuts on the barrel & hube plate | | | | | | QC RE-CORD | P | V | V | |
| 8.1.19 | | s) Barrel Diameter at three locations & arrow marking at the location of measurement | | | | | | QC RE-CORD | P | V | V | |
| 8.1.20 | | t) Project Name Marking | Major | Visual | 100% | NESCL SPEC | RGGVY by NESCL | QC RE-CORD | P | V | V | |

*-All type tests to be carried out as per NESCL specification, Contract Agreement and as per minutes of the meeting between NESCL and VEL Approval of type tests by Engineering department of NESCL or waival thereof to be shown at the time final inspection to enable NESCL issue MDCC.
√ - Record identified'√' ""tick mark"" shall be essentially included by supplier in QA Documentations.

| | | |
|---|---|---|
| LEGEND : | M - MANUFACTURER<br>C - CONTRACTOR<br>N - CUSTOMER | P - PERFOM<br>V - VERIFICATION<br>W - WITNESSING<br>QC - QUALITY CONTROL |
| SIGNATURE OF THE CONTRACTOR | | SIGNATURE OF THE CONTRACTOR |

| MANUFACTURER'S NAME & ADDRESS: | MANUFACTURING QUALITY PLAN | | PROJECT/UTILITY: |
|---|---|---|---|
| | ITEM: All Aluminum Alloy Standard Conductor (AAAC) | QP NO: | |
| | | REV.NO: | PACKAGE: |
| | SUB-SYSTEM: | DATE: | CONTRACT NO: |
| | | No.of pages:5 | MAIN-CONTRACTOR: |

| Sl. No | Component & operation | Characteristics | Class | Type of Check | Quantum of Check | Reference Document | Acceptance Norms | Format of Records | Agency | | | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | ** 10 | | | 11 |
| 1.1 | **SECTION I : RAW MATERIAL** | | | | | | | | M | C | N | |
| 1.1.1 | AL ALLOY WIRE ROD | a) Chemical Analysis | Major | Test | One sample per heat of 4MT | IS- 9997-1991 & NESCL SPEC | IS- 9997- 1991 & NESCL SPEC | QC RECORD | V | V | V | Review of Mfg test certificate at the time of final inspection. In absence of Mfg TCs and proper correlation, one sample per lot of 1000 MT or part there of shall be tested at 3rd party lab and TCs from lab shall be reviewed at the time of final inspection |
| 1.1.2 | | b) Diameter of AL Alloy Wire Rod | Major | Dimensional | One sample from each coil | IS- 9997-1991 & NESCL SPEC | IS- 9997- 1991 & NESCL SPEC | QC RECORD | P | V | V | Review of supplier TCs at the time of final inspection. |
| 1.1.3 | | c) Breaking Load/ Tensile Test | Major | Test | One sample from each coil | IS- 9997-1991 & NESCL SPEC | IS- 9997- 1991 & NESCL SPEC | QC RECORD | P | V | V | DO |
| 1.1.4 | | d) Conductivity | Major | Test | One sample from each coil | IS- 9997-1991 & NESCL SPEC | IS- 9997- 1991 & NESCL SPEC | QC RECORD | P | V | V | DO |
| 1.1.5 | | e) Elongation | Major | Test | One sample from each coil | IS- 9997-1991 & NESCL SPEC | IS- 9997- 1991 & NESCL SPEC | QC RECORD | P | V | V | DO |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1.1.6 | | f) Cleanliness & surface smoothness | Major | Visual | 100% on each coil | IS- 9997-1991 & NESCL SPEC | The wire rod shall be smooth & free from pipes, laps, cracks, kinks, twists, scams and other injurious defects with in the limits of good commercial practices. | QC RE-CORD | P | V | V | Review of supplier TCs at the time of final inspection. |
| 2.1 | **SECTION II : INPROCESS INSPECTION** | | | | | | | | | | | |
| 2.1.1 | AL ALLOY drawn wire (Before Ageing) | a)INTER-MEDATE DRAWING & SOLUI-ONISING OF DRAWN BATCH | Major | Visual | | | "Solutionising Temp : 510 +/- 30 deg C Soaking time : 60 +/- 10 Minutes Continuous Temp record by graph" | QC RE-CORD | P | V | V | This Process is suitable for M or O temper wire rod materials |
| 2.1.2 | | a) Diameter of drawn Alu-minium alloy wire | Major | Di-men-sional | One Sample from each spool | IS 398 (P-IV) & NESCL SPEC | IS 398 (P-IV) & NESCL SPEC | QC RE-CORD | P | V | V | Review of records of the contrac-tor at the time of final inspection |
| 2.1.3 | | b) Tensile Test | Major | Test | One Sample from each spool | Plant Stadards | IS 398 (P-IV) & NESCL SPEC | QC RE-CORD | P | V | V | DO |
| 2.1.4 | | c) Resitivity | Major | Test | One Sample from each spool | Plant Stadards | IS 398 (P-IV) & NESCL SPEC | QC RE-CORD | P | V | V | DO |
| 2.1.5 | | d) Al Alloy wire Ageing process time and tempera-ture control process | Major | Visual | for each batch | Plant Stadards | IS 398 (P-IV) & NESCL SPEC | QC RE-CORD | P | V | V | DO |



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| 2.1.6 | | a) Surface finish & wind-ing (Visual check) | Major | Visual | 100% on each spool | IS 398 (P-IV) & NESCL SPEC | The wire shall smooth, uniform and free from all imperfection such as spills, splits, scale | QC RE-CORD | P | V | V | DO |
| 2.1.7 | | b) Diameter of AL Alloy Wire | Major | Di-men-sional | One Sample each Spool | IS 398 (P-IV) & NESCL SPEC | IS 398 (P-IV) & NESCL SPEC | QC RE-CORD | P | V | V | DO |
| 2.1.8 | | c) Breaking Load/ Tensile Test | Major | Test | One Sample each Spool | IS 398 (P-IV) & NESCL SPEC | IS 398 (P-IV) & NESCL SPEC | QC RE-CORD | P | V | V | DO |
| 2.1.9 | | d) Resistance | Major | Test | One Sample each Spool | IS 398 (P-IV) & NESCL SPEC | IS 398 (P-IV) & NESCL SPEC | QC RE-CORD | P | V | V | DO |
| 2.1.10 | | d) Wrapping Test | Major | Test | One Sample each Spool | IEC 104 & NESCL SPEC | IEC 104 & NESCL SPEC | QC RE-CORD | P | V | V | DO |
| 2.1.11 | | e) Elongation | Major | Test | One Sample each Spool | IS 398 (P-IV) & NESCL SPEC | IS 398 (P-IV) & NESCL SPEC | QC RE-CORD | P | V | V | DO |
| 2.1.12 | | f) Micro Structure | Major | Test | One Sample per 40 MT or Part there of | IS 398 (P-IV) & NESCL SPEC | IS 398 (P-IV) & NESCL SPEC | QC RE-CORD | V | V | V | Review of records ( Test is conducted at any approved third party lab) |
| 2.1.13 | | g) Density | Major | Test | One Sample each Spool | IS 398 (P-IV) & NESCL SPEC | IS 398 (P-IV) & NESCL SPEC | QC RE-CORD | P | V | V | Review of supplier TCs at the time of final inspection. |
| 2.1.14 | | h) Coefficient of linear ex-pansion | Major | Test | One Sample each Spool | IS 398 (P-IV) & NESCL SPEC | IS 398 (P-IV) & NESCL SPEC | QC RE-CORD | P | V | V | DO |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2.1.15 | | i) Constant Mass-temperature Coefficient ( α) | Major | Test | One Sample each Spool | IS 398 (P-IV) & NESCL SPEC | IS 398 (P-IV) & NESCL SPEC | QC RECORD | P | V | V | DO |
| 2.1.16 | | j) Final Modulus of elasticity | Major | Test | One Sample each Spool | IS 398 (P-IV) & NESCL SPEC | IS 398 (P-IV) & NESCL SPEC | QC RECORD | P | V | V | DO |
| 3.1 | **SECGION IV : FINAL CONDUCTOR STRANDING** | | | | | | | | | | | |
| 3.1.1 | | a) Lay Ratio/ direction of the Lay and Compactness | Major | Visual | Each length at the beginning | IS 398 (P-IV) & NESCL SPEC | IS 398 (P-IV) & NESCL SPEC | QC RECORD | P | V | V | DO |
| 3.1.2 | | b) Smoothness/ Surface finish | Major | Visual | 100% | IS 398 (P-IV) & NESCL SPEC | The finished conductor shall be smooth, compact, uniform & free from all imperfection including kinks (protrusion of wire) iwre cross cover, over looseness ( wire being dislocated by finger/ hand pressure and or unusual bangle noise on tapping material inclusion or black spot (on account of reaction with trapped rain water) dirt, grease etc. | QC RECORD | P | V | V | DO |
| 3.1.3 | | c) Joints | Major | Visual | 100% | IS 398 (P-IV) & NESCL SPEC | There shall be no Joints. | QC RECORD | P | V | V | Review of records of the contractor at the time of final inspection. The contractor shall furnish an under taking to this effect at the time of final inspection |

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| 3.1.4 | | d) Surface cleanliness | Major | Visual | 100% | AS PER NESCL | After reeling the conducotr the exposed surface of the outer most layer of conductor shall be wrapped with waterproof thick bituminised paper/ polythene paper to preserve the conductor from dirt, grit and damage during transporation & handling | QC RECORD | P | V | V | Review of records of the contractor at the time of final inspection. |
| 4.1 | **SECTION - V : TYPE TEST ON FINAL CONDUCTOR AS APPLICABLE **** | | | | | | | | | | | |
| 4.1.1 | | Type Test of finished conductor | Critical | Inspection | AS PER NESCL SPEC | As Per Nescl Contract Agreement, Minutes Of The Meeting As Applicable | All the type tests to be carried out as per NESCL Specification | QC RECORD | W | W | W | Approved Type Test reports or waiver by Engg Dept to be shown at time of final inspection |
| 5.1 | **SECTION - VI : FINAL INPECTION & TESTING** | | | | | | | | | | | |
| 5.1.1 | ROUTINE TEST | a) Check for Joints | Major | Visual | 100% on each drum | IS 398 (P-IV) & NESCL SPEC | No Joints are allowed | QC RECORD | P | V | V | Review of records of the contractor |
| 5.1.2 | | b) Surface Condition of the strand and stranded conductor | Major | Visual | 100% on each drum | IS 398 (P-IV) & NESCL SPEC | The wire shall smooth, uniform and free from all imperfection such as spills, splits, scale | QC RECORD | P | V | V | Contractor to ensure that there is no surface defects on AL. Alloy strands of complete conductor as NESCL requirement |

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| 5.1.3 | | c) All Accep-tance test | Major | Test/ Di-men-sional | 20% on each drum and part there of | IS 398 (P-IV) & NESCL SPEC | AS PER NESCL SPEC | QC RE-CORD | P | V | V | Review of records of the contrac-tor at the time of final inspection. |
| 5.1.4 | | d) Check the drums | Major | Visual/ Dime-sional | AS PER NESCL SPEC | AS PER NESCL SPEC | AS PER NESCL SPEC | QC RE-CORD | P | V | V | Review of records of the contrac-tor at the time of final inspection. |
| 5.1.5 | AC-CEP-TANCE TEST | a) Lay Ratio/ direction of the Lay | Crit-cal | Visual/ Dime-sional | One Sample for Every 10 Drums | IS 398 (P-IV) & NESCL SPEC | IS 398 (P-IV) & NESCL SPEC | QC RE-CORD | P | W | W | |
| 5.1.6 | | b) Diameter | Crit-cal | Di-men-sional | One Sample for Every 10 Drums | IS 398 (P-IV) & NESCL SPEC | IS 398 (P-IV) & NESCL SPEC | QC RE-CORD | P | W | W | |
| 5.1.7 | | c) Breaking Load/ Tensile Test | Crit-cal | Test | One Sample for Every 10 Drums | IS 398 (P-IV) & NESCL SPEC | IS 398 (P-IV) & NESCL SPEC | QC RE-CORD | P | W | W | |
| 5.1.8 | | d) Resistance | Crit-cal | Test | One Sample for Every 10 Drums | IS 398 (P-IV) & NESCL SPEC | IS 398 (P-IV) & NESCL SPEC | QC RE-CORD | P | W | W | |
| 5.1.9 | | d) Wrapping Test | Crit-cal | Test | One Sample for Every 10 Drums | IEC 104 & NESCL SPEC | IEC 104 & NESCL SPEC | QC RE-CORD | P | W | W | |
| 5.1.10 | | e) Elongation | Crit-cal | Test | One Sample for Every 10 Drums | IS 398 (P-IV) & NESCL SPEC | IS 398 (P-IV) & NESCL SPEC | QC RE-CORD | P | W | W | |

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| 5.1.11 | Con-ductor Length | f) Micro Structure | Crit-cal | Test | One Sample for each order | | Fine Grains | QC RE-CORD | P | W | W | |
| 6.1 | | a) Checks for Joints, Surface finish and Rewinding the Length of conductor | Crit-cal | Test | One Sample for Every 10 Drums | IS 398 (P-IV) & NESCL SPEC | IS 398 (P-IV) & NESCL SPEC | QC RE-CORD | P | W | W | |
| 7.1 | **SECTION - VII - WOODEN DRUMS** | | | | | | | QC RE-CORD | | | | |
| 7.1.1 | | a) Dimen-sions | Crit-cal | Di-men-sional | One Sample for Every 10 Drums | IS - 1778 - 1980 & NESCL SPEC | All Dimensions shall correlate with approved drawing | QC RE-CORD | P | W | W | |
| 7.1.2 | | b) Barrel bat-ten strength test | Crit-cal | Test | One Sample for Every 10 Drums | IS - 1778 - 1980 & NESCL SPEC | Minmum Barrel Strength to be mutully agreed between contrac-tor and customer as per techincal Spec | QC RE-CORD | P | W | W | |
| 7.1.3 | | c) Chemical test on pack-ing paper, corrugated kraft paper & adhesive | Major | Visual | One Sample for Every 10 Drums | | “Chloride - 0.05 %Max Sulphate - 0.25%Max Copper - 0.01%Max pH - 5.5 to 7.5 (Aq Extract)” | QC RE-CORD | P | V | V | Review of results at the time of final inspection |

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| 7.1.4 | | d) check of wooden drums | Major | Visual | 100% | IS - 1778 - 1980 & NESCL SPEC | The inner cheek of the flange and drum barrel surface shall be secured with car-board or double corrogated or thick bitumised water proof bamboo paper by means of suitable adhesive mate-rial. After reeling the conductor the exposed surface of the outer layer of the conductor shall be wrapped with water proof thick bituminsed papar/ polythene paper to preserve the conductor from dirt and demaged during transport and handling | QC RE-CORD | P | V | V | "care shall be taken while han-dling the drums by lifters Medium grade kraft/ crepe/ polythene paper shall be used between the layers of the con-ductors" |
| 8.1 | **SECTIO - VII : PACKING & MARKING** | | | | | | | | | | | |
| 8.1.1 | Check for identi-fication and pack-ing | a)Application of water proof paper | Major | Visual | 100% | NESCL SPEC | NESCL SPEC | QC RE-CORD | P | V | V | VERIFICATION OF THE INTER-NAL DOCUMENTS DURING |
| 8.1.2 | | b) Space between outermost layer and in-ner surface of lagging | | Di-men-sional | | | | QC RE-CORD | P | V | V | |
| 8.1.3 | | c) Proper Packing | | Visual | | | | QC RE-CORD | P | V | V | |

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| 8.1.4 | | d) Contract/ Award Letter No. | | | | | | QC RE-CORD | P | V | V | |
| 8.1.5 | | e) Name and Consignee Address | | | | | | QC RE-CORD | P | V | V | |
| 8.1.6 | | f) MFG Name and Address | | | | | | QC RE-CORD | P | V | V | |
| 8.1.7 | | g) Drum No. | | | | | | QC RE-CORD | P | V | V | |
| 8.1.8 | | h) Size & code of con-ductor | | | | | | QC RE-CORD | P | V | V | |
| 8.1.9 | | i) Length of conductor | | | | | | QC RE-CORD | P | V | V | |
| 8.1.10 | | J) Gross weight of drum | | | | | | QC RE-CORD | P | V | V | |
| 8.1.11 | | K) Tare weight of drum | | | | | | QC RE-CORD | P | V | V | |
| 8.1.12 | | L) Net weight | | | | | | QC RE-CORD | P | V | V | |
| 8.1.13 | | M) Arrow marking for unwinding | | | | | | QC RE-CORD | P | V | V | |
| 8.1.14 | | N) Sealing the two outter ends with heat shrink-able sleeves | | | | | | QC RE-CORD | P | V | V | |
| 8.1.15 | | o) Lead seal-ing with plier at both ens | | | | | | QC RE-CORD | P | V | V | |
| 8.1.16 | | p) Marking of CHP/MCHP | | | | | | QC RE-CORD | P | V | V | |

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| 8.1.17 | | q) Position of conductor | | | | | | QC RE-CORD | P | V | V | |
| 8.1.18 | | r) Tack welding on the Nuts on the barrel & hube plate | | | | | | QC RE-CORD | P | V | V | |
| 8.1.19 | | s) Barrel Diameter at three locations & arrow marking at the location of measurement | | | | | | QC RE-CORD | P | V | V | |
| 8.1.20 | | t) Project Name Marking | Major | Visual | 100% | NESCL SPEC | RGGVY by NESCL | QC RE-CORD | P | V | V | |

*-All type tests to be carried out as per NESCL specification, Contract Agreement and as per minutes of the meeting between NESCL and VEL Approval of type tests by Engineering department of NESCL or waival thereof to be shown at the time final inspection to enable NESCL issue MDCC.
√ - Record identified'√' ""tick mark"" shall be essentially included by supplier in QA Documentations.

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| LEGEND : | M - MANUFACTURER | P - PERFOM |
| | C - CONTRACTOR | V - VERIFICATION |
| | N - CUSTOMER | W - WITNESSING |
| | | QC - QUALITY CONTROL |
| SIGNATURE OF THE CONTRACTOR | | SIGNATURE OF THE MANUFACTURER |
| Prepared By : Sh. Malay Mandal, Sr. Engineer(QA&I) | Reviewed By: Sh. | Approved By: Sh. A. K. Sharma, DGM (QA&I) |

| MANUFACTURE'S NAME & ADDRESS: | STANDARD MANUFACTURING QUALITY PLAN | | |
|---|---|---|---|
| | "ITEM :ACSR CONDUCTOR Size :" | QP NO: | PROJECT/UTILITY: |
| | | REV.NO: | PACKAGE: |
| | SUB-SYSTEM: | DATE: | CONTRACT NO: |
| | | | MAIN-CONTRACTOR: |

| Sl. No | Component & Operation | Characteristics | Class | Type Of Check | Quantum of Check | Reference Document | Acceptance Norms | Format Of Records | | Agency | | | Remarks |
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| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | D | * 10 | | | 11 |
| **SECTION: 1 RAW MATERIALS INSPECTION** | | | | | | | | | | M | C | N | |
| 1 | Aluminium Wire Rod | 1.Chemical | Minor | Chemical | ONE SAMPLE FROM 4 MT OR PART THEREOF | Is 4026-1976 | Is 4026-1976 | Supplier Tc / Third Party Tc | | P | V | V | |
| | | 2. Diameter Of Aluminium Rod | Minor | Measurement | ONE SAMPLE FROM EACH COIL | Is 5484-1978 | Is 5484-1978 | Supplier Tc / Qc Record | | P | V | V | |
| | | 3.Breaking Load / Tensile Test | Minor | Mechanical | DO | Do | Do | Do | | P | V | V | |
| | | 4.Resistivity Test | Minor | Electrical | DO | Do | Do | Do | | P | V | V | |
| | | 5.Elongation Test | Minor | Mechanical | DO | Do | Do | Do | | P | V | V | |
| | | 6. Cleanliness & Surface Smoothness | Minor | Visual | 100% ON EACH COIL | Do | The Wire Rod Shall Be Smoooth & Free From Pipes, Laps Cracks, Kinks, Twists, Seams & Other Injurious Defects Within The Limits Of Good Commercial Practice | Qc Record | | P | V | V | |
| 2 | Galvanised Steel Wire | 1. Chemical Analysis | Minor | Chemical | THREE SAMPLES PER HEAT | Is 398 (Pt-Ii) 1996 | Is 398 (Pt-Ii) 1996 | Supplier Tc | | P | V | V | |
| | | 2.Diameter Galvanised Steel Wire | Critical | Measurement | ONE SAMPLE FROM EACH COIL | Do | Do | Supplier Tc / Qc Record | | P | V | V | |

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| | | 3.Breaking Load / Tensile Test | Critical | Mechanical | DO | Do | Do | Do | | P | V | V | |
| | | 4.Elongation Test | Critical | Mechanical | DO | Do | Do | Do | | P | V | V | |
| | | 5. Torsion Test | Critical | Mechanical | DO | Do | Do | Do | | P | V | V | |
| | | 6. Wrapping Test | Major | Mechanical | DO | Do | Do | Do | | P | V | V | |
| | | 7. Preece Test | Major | Chemical | DO | "Is 4826-1979 Is 2633-1972" | "Is 4826-1979 Is 2633-1972" | Do | | P | V | V | |
| | | 8. Weight Of Zinc Coating | Major | Chemical | DO | "Is 4826-1979 Is 2633-1972 & Gtp" | "Is 4826-1979 Is 2633-1972 & Gtp" | Do | | P | V | V | |
| **SECTION: 2 IN PROCESS INSPECTION** | | | | | | | | | | M | C | N | |
| 1 | Aluminium Drawn Wire | 1. Surface Finish & Winding | Major | Visual | 100% ON EACH SPOOL | Is 398(Pt-Ii) 1996 | The Wire Shall Be Smooth & Free From All Imperfections Such As Spikes Spites Scale Inclusions, Die Marks, Scratches, Fillings, Blow Holes Etc. | Qc Record | | P | V | V | |
| | | 2. Dia Of Drawn Wire | Critical | Measurement | ONE SAMPLE FROM EACH COIL | Do | Is 398(Pt-Ii) 1996 | Do | | P | V | V | |
| | | 3. Breaking Load / Tensile Test | Critical | Mechanical | ONE SAMPLE FROM EACH SPOOL | Do | Is 398(Pt-Ii) 1996 | Do | | P | V | V | |
| | | 4. Resistance Test | Major | Electrical | DO | Do | Is 398(Pt-Ii) 1996 | Do | | P | V | V | |
| | | 5.Wrapping Test | Major | Mechanical | DO | Do | The Wire Shall Not Crack Or Break | Do | | P | V | V | |



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| 2 | Steel Stranding | 1. Lay Ratio / Direction & Compact-ness | Major | Measure-ment | ONE SAM-PLE FROM EACH SPOOL | Is 398 (Pt-Ii)-1996 | Is 398 (Pt-Ii)-1996 | Do | | P | V | V | |
| 3 | Con-ductor Stranding | 1. Lay Ratio / Direction & Compact-ness | | | | | | | | | | | |
| | | A).Inner Aluminium Layer | Minor | Measure-ment | ONE SAM-PLE FROM EACH SPOOL | Is 398 (Pt-Ii)-1996 | Is 398 (Pt-Ii)-1996 | Do | | P | V | V | |
| | | B).Outer Aluminium Layer | Minor | Measure-ment | ONE SAM-PLE FROM EACH SPOOL | Is 398 (Pt-Ii)-1996 | Is 398 (Pt-Ii)-1996 | Do | | P | V | V | |
| | | 2) Smooth-ness / Surface Scratches | Minor | Visual | 100% | Do | There Shall Be Lose-ness Over Lapping Of Strands, Chipping Of Aluminium Etc. | Do | | P | V | V | |
| | | 3) Joints | Major | Visual | 100% | Do | No Joints | Do | | P | V | V | |
| **SECTION: 3 FINAL INSPECTION & TESTING** | | | | | | | | | | M | C | N | |
| 1 | Accep-tance Test On Finished Conduc-tor | Lay Ratio | Minor | Measure-ment | ONE SAM-PLE FROM EACH 10 DRUMS | Is 398 (Pt-Ii)-1996 | Is 398 (Pt-Ii)-1996 | Qc Re-cord | | P | W | W | |
| 2 | Accep-tance Test On Alumini-um Test On Alu-minium Wire Of Finished Conduc-tor | 1.Diameter | Major | Do | DO | Do | Do | Do | | P | W | W | |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 2.Breaking Load / Tensile Test | Major | Mechanical | DO | Do | Do | Do | | P | W | W | |
| | | 3.Resistance | Major | Electrical | DO | Do | Do | Do | | P | W | W | |
| | | 4.Wrapping Test | Major | Mechanical | DO | Do | The Wire Shall Not Crack Or Break | Do | | P | W | W | |
| | | 5.Surface Finish | Major | Visual | DO | Do | There Shall Be No Spill & Splits, Slag, Inclusion, Diemark, Scratches, Fittings Blow Holes. | Do | | P | W | W | |
| | | 6.Ductility Test | Major | Mechanical | DO | Do | Is 398 (Pt-Ii)-1996 | Do | | P | W | W | |
| 3 | Acceptance Test Of Galvanised Steel Wire Of Finished | 1. Diameter | Major | Measurement | ONE SAMPLE FROM EACH 10 DRUMS OR PART THEREOF | Is 398 (Pt-Ii) 1996 | Do | Qc Record | | P | W | W | EITHER ELONGATION OR TORSION TEST TO BE DONE |
| | | 2.Breaking Load / Tensile Test | Major | Mechanical | DO | Do | Do | Do | | P | W | W | |
| | | 3.Elongation | Major | Do | DO | Do | Do | Do | | P | W | W | |
| | | 4.Torsion Test(Either Test Of 3 Or 4) | Minor | Do | DO | Do | Do | Do | | P | W | W | |
| | | 5.Wrapping Test | Minor | Do | DO | Do | “The Wire Shall Not Break Or Flake<br>“ | Do | | P | W | W | |
| | | 6.Preece Test | Minor | Chemical | DO | “Is 4826-1979<br>Is 2633-1972” | “Is 4826-1979<br>Is 2633-1972” | Do | | P | W | W | |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 7.Weight Of Zinc Coating | Minor | Chemical | DO | “Is 4826-1979 Is 2633-1972” | “Is 4826-1979 Is 2633-1972” | Do | | P | W | W | |
| | | 8.Adhesion Test | Minor | Mechani-cal | DO | Do | No Cracking On Surface | Do | | P | W | W | |
| 4 | Length Measure-ment Of Finished Conduc-tor | Chech For Joints Surface Finished And Length Mea-surement | Major | Visual/ Mechani-cal | DO | Is : 398 (Pt-Ii) - 1996 | No Scale On The Surface | Do | | P | W | W | |
| 5 | Sealing At Both Ends By The In-specting Authority | | | | | | | | | | | P | |
| 6 | Wooden Drums | Dimensions | Major | Measure-ment | DO | Is : 1778 - 1980 | As Detailed In The Specification | Do | | P | W | W | |
| 7 | Packing & Des-patch Check For Iden-tification & Pack-ing | 1. Proper Packing | Major | Visual | 100% | As Per P.O.. & Gtp | As Per P.O.. & Gtp | Visual Checking At The Contractor Primises | | P | V | | |
| | | 2. Manufac-turer Name | Major | Visual | 100% | As Per P.O.. & Gtp | As Per P.O.. & Gtp | Do | | P | V | | |
| | | 3. Size & Code | Major | Visual | 100% | As Per P.O.. & Gtp | As Per P.O.. & Gtp | Do | | P | V | | |
| | | 4. Gross Weight | Major | Visual | 100% | As Per P.O.. & Gtp | As Per P.O.. & Gtp | Do | | P | V | | |
| | | 5. Tare Weight | Major | Visual | 100% | As Per P.O.. & Gtp | As Per P.O.. & Gtp | Do | | P | V | | |

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 6. Nett Weight | Major | Visual | 100% | As Per P.O.. & Gtp | As Per P.O.. & Gtp | Do | | P | V | | |
| | | 7. Length Of Conductor | Major | Visual | 100% | As Per P.O.. & Gtp | As Per P.O.. & Gtp | Do | | P | V | | |
| | | 8. Painting | Major | Visual | 100% | As Per P.O.. & Gtp | As Per P.O.. & Gtp | Do | | P | V | | |

NOTE:

A) Proper Co-Relation Of Test Certificate From Raw Materials To Finished Conductor For All Thr Drums Shall Be Maintaind.
B) The Manufacturer Will Carry Over The Acceptance Test On Aluminium & Steel Strands On 10% Of The Drum Offered For Inspection And Will Submit The Records At The Time Of Inspection.You Will Witness Acceptance Test On 10% Of The Drums Offered.
C) All Aluminium & Galvanised Steel Wire Strands Are Required To Be Tested For Each Sample Drawn For Acceptance Test.
D) Aluminium Wire Rods :- The Contractor Shall Obtain The Following Test Certificates From The Supplier Of Aluminum Wire Rod For Rewiew By You :
i) Chemical Coposition Of Aluminium Wire Rod
ii) All The Test Results Of The Tests Carried Out By The Sub-Vendor On The Finished Aluminium Wire Rod
E) Galvanised Steel Wire : - The Contractor Shall Obtain The Following Test Certificate From Their Sub- Vendor For Revies By You:
i) Chemical Composition Of Steel Wire Rod.
ii) Purity Of Zinc
iii) All ThE Test Result Of The Test Carried Our By The Sub- Vendor On The Finished Steel Wire
F) The Conductor Ends Shall Be Properly Sealed And Secured With The Help Of Nails On Then Side Of One The Flanges
G) The Following Test Facility / Calibration Certificate Shall Be At Suppliers Works :
i) Calibration Of Various Testing Machine”

| | |
|---|---|
| M= Manufacturer<br>P= Performed By<br>V= Verified By | N= Customer (NESCL)<br>C = Contactor |

| | | |
|---|---|---|
| W= Witness Of Test | Signature Of The Contractor | Signature Of The Manufacturer |

| MANUFACTURER'S NAME AND ADDRESS : | MANUFACTURING QUALITY PLAN | PROJECT/ UTILITY:<br>PACKAGE:<br>CONTRACT NO.:<br>MAIN-SUPPLIER: |
|---|---|---|
| | ITEM :11 KV D O FUSE<br>QP NO.:<br>REV. NO.:<br>Date: | |

| Sl. No | Component & Operations | Characteristics | Class | Type Of Check | Quantum Of Check | Reference Document | Acceptance Norms | Format Of Records | Agency | | | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | M | C | N | |
| **SECTIION: 1 RAW MATERIAL** | | | | | | | | | | | | |
| 1. | Copper Flats | Visual Examination | Major | PH | IS-191 Part-IV, IS-1897 | IS-191 Part-IV, IS-1897 | IS-191 Part-IV, IS-1897 | QC Record | P | V | V | Review Of Records At The Time Of Final Inspection |
| | | Dimension | Major | PH | IS-191 Part-II IS-1897 | IS-191 Part-II IS-1897 | IS-191 Part-II IS-1897 | QC Record | P | V | V | ----DO--- |
| | | Tensile Strength | Major | ME | IS-1608 | IS-1608 | IS-1608 | Supplier TC | V | V | V | Review of Manufacturer TC/Reputed lab TC at the time of final inspection |
| | | Chemical Composition | Major | CH | IS-191 Part-IV IS-1897 | IS-191 Part-IV IS-1897 | IS-191 Part-IV IS-1897 | Supplier TC | V | V | V | ---DO--- |
| | | Bend Test | Major | ME | IS-191 Part-IV IS-1897 | IS-191 Part-IV IS-1897 | IS-191 Part-IV IS-1897 | Supplier TC | V | V | V | ---DO--- |
| | | Resistivity / Conductivity | Major | E | IS-191 Part-IV IS-1897 | IS-191 Part-IV IS-1897 | IS-191 Part-IV IS-1897 | Supplier TC | V | V | V | ---DO--- |
| 2. | Aluminium Flats | Visual Examination | Major | PH | IS-5082 | IS-5082 | IS-5082 | QC Record | P | V | V | Review Of Records At The Time Of Final Inspection |
| | | Dimension | Major | PH | IS-3965 | IS-3965 | IS-3965 | QC Record | P | V | V | ---DO--- |
| | | Tensile Strength | Major | ME | IS-1608 | IS-1608 | IS-1608 | Supplier TC | V | V | V | Review of Manufacturer TC/Reputed lab TC at the time of final inspection |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Bend Test | Major | ME | IS-5082 | IS-5082 | IS-5082 | Supplier TC | V | V | V | ---DO--- |
| | | Resistivity / Conductivity | Major | E | IS-5082 | IS-5082 | IS-5082 | Supplier TC | V | V | V | ---DO--- |
| | | Chemical Composition | Major | CH | IS-5082 | IS-5082 | IS-5082 | Supplier TC | V | V | V | ---DO--- |
| 3. | MILD STEEL SECTIONS | Visual Examination | Major | PH | IS-2062 | IS-2062 | IS-2062 | QC Record | P | V | V | Review Of Records At The Time Of Final Inspection |
| | | Dimension | Major | PH | IS-808, IS-1730, IS-1732, IS-3954 | IS-808, IS-1730, IS-1732, IS-3954 | IS-808, IS-1730, IS-1732, IS-3954 | QC Record | P | V | V | ---DO--- |
| | | Tensile Strength | Major | ME | IS-1608 | IS-1608 | IS-1608 | Supplier TC | V | V | V | Review of Manufacturer TC/Reputed lab TC at the time of final inspection |
| | | Chemical Composition | Major | CH | IS-2062 | IS-2062 | IS-2062 | Supplier TC | V | V | V | ---DO--- |
| | | Bend Test | Major | ME | IS-2062 | IS-2062 | IS-2062 | Supplier TC | P | V | V | Review Of Records At The Time Of Final Inspection |
| 4. | CONTACT SPRIGS | Visual Examination | Major | PH | 100% | Plant Standard | Plant Standard | QC Record | P | V | V | ---DO--- |
| | | Dimension | Major | PH | 10 Nos. per lot | Plant Standard | Plant Standard | QC Record | P | V | V | ---DO--- |
| | | Functional check | Major | PH | --DO-- | Plant Standard | Plant Standard | QC Record | P | V | V | ---DO--- |
| | | Fitment/Springs | Major | PH | --DO-- | Plant Standard | Plant Standard | QC Record | P | V | V | ---DO--- |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 5. | Fastners | Visual Examination | Major | PH | IS-1367-III | IS-1367-III | IS-1367-III | QC Record | P | V | V | Review Of Records At The Time Of Final Inspection |
| | | Dimension | Major | PH | IS-1363 | IS-1363 | IS-1363 | QC Record | P | V | V | ---DO--- |
| | | Wedge Test | Major | ME | IS-1367-III | IS-1367-III | IS-1367-III | Supplier TC | V | V | V | Review of Manufacturer TC/Reputed lab TC at the time of final inspection |
| | | Hardness | Major | ME | IS-1367-III | IS-1367-III | IS-1367-III | Supplier TC | V | V | V | ---DO--- |
| | | Galvanizing | Major | CH | IS-1367-XIII | IS-1367-XIII | IS-1367-XIII | Supplier TC | V | V | V | ---DO--- |
| 6. | Gi Pins | Visual | Major | PH | IS-2486-II | IS-2486-II | IS-2486- II | QC Record | P | V | V | Review Of Records At The Time Of Final Inspection |
| | | Dimension | Major | PH | IS-2486-II | IS-2486-II | IS-2486- II | QC Record | P | V | V | ---DO--- |
| | | Galvanization Checks | Major | CH | IS-4759 | IS-4759 | IS-4759 | Supplier TC | V | V | V | Review of Manufacturer TC /Reputed lab TC at the time of final inspection |
| 7. | Insulator | Visual | Major | PH | 100% | IS-2544 IS-5350 IS-731 | IS-2544 IS-5350 Is-731 | QC Record | V | V | V | NGK Birla/ WSI/ Jayshree Makes only. Insulators will be Inspected at the manufacturers factory |
| | | Dimension | Major | PH | IS-2544 IS-5350 IS-731 | App-roved Drgs. | Approved Drgs. | QC Record | V | V | V | ---DO--- |

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | | | 11 |
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| | | High Voltage Test | Major | E | IS-2544 IS-731 | IS-2544 IS-731 | IS-2544 IS-731 | Supplier TC | V | V | V | Review of Manufacturer TC/Reputed lab TC at the time of final inspection |
| | | Temperature Cycle | Major | E | IS-2544 IS-731 | IS-2544 IS-731 | IS-2544 IS-731 | Supplier TC | V | V | V | -----DO---- |
| | | Mechanical Strength/Failing load Test | Major | ME | IS-2544 IS-731 | IS-2544 IS-731 | IS-2544 IS-731 | Supplier TC | V | V | V | -----DO---- |
| | | Puncture Test | Major | E | IS-2544 IS-731 | IS-2544 IS-731 | IS-2544 IS-731 | Supplier TC | V | V | V | -----DO---- |
| | | Porosity Test | Major | PH | IS-2544 IS-731 | IS-2544 IS-731 | IS-2544 IS-731 | Supplier TC | V | V | V | -----DO---- |
| | | Galvanizing Test | Major | CH | IS-2544 IS-4759 IS-731 | IS-2544 IS-4759 IS-731 | IS-2544 IS-4759 IS-731 | Supplier TC | V | V | V | -----DO---- |
| 8. | Al. Alloy | Chemical Composition | Major | CH | IS-617 | SI-617 | IS-617 | Supplier TC | V | V | V | ---DO--- |
| 9.. | Zinc | Chemical Composition | Major | CH | IS-209 IS-13229 | IS-209 IS-13229 | IS-209, IS-4759 | Supplier TC | V | V | V | ---DO--- |
| 10. | GI TUBES | Visual | Major | PH | IS-1239 | IS-1239 | IS-1239 | QC Record | P | V | V | Review Of Records At The Time Of Final Inspection |
| | | Dimension | Major | PH | IS-1239 | Approved Drgs | IS-1239 | QC Record | P | V | V | -----DO---- |
| | | Chemical Analysis | Major | CH | IS-1239 | IS-1239 | IS-1239 | Supplier TC | V | V | V | Review of Manufacturer TC/Reputed lab TC at the time of final inspection |
| | | Tensile Strength | Major | ME | IS-1239 | IS-1239 | IS-1239 | Supplier TC | V | V | V | -----DO---- |
| | | Elongation | Major | ME | IS-1239 | IS-1239 | IS-1239 | Supplier TC | V | V | V | -----DO---- |
| | | Bend Test | Major | ME | IS-1239 | IS-1239 | IS-1239 | Supplier TC | P | V | V | Review Of Records At The Time Of Final Inspection |
| | | Galvanizing | Major | CH | IS-1239 | IS-1239 | IS-1239 | Supplier TC | V | V | V | Review of Manufacturer TC / Reputed lab TC at the time of final inspection |

| Sl. No | Component & Operations | Characteristics | Class | Type Of Check | Quantum Of Check | Reference Document | Acceptance Norms | Format Of Records | Agency | | | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | M | C | N | |
| 1. | 2. | 3. | 4. | 5. | 6. | 7. | 8. | 9. | 10. | | | 11. |
| **SECTIION: 2 INPROCESS INSPECTION** | | | | | | | | | | | | |
| 1. | Welded/ Fabricated M.S. Component | Visual Examination | Major | PH | 100% | -FQP | -FQP | QC Record | P | V | V | Review Of Records At The Time Of Final Inspection |
| | | Dimension | Major | PH | Min. five sample per lot | -FQP | -FQP | QC Record | P | V | V | ----DO--- |
| | | Fitment/Assembly | Major | PH | One sample per lot | -FQP | -FQP | QC Record | P | V | V | ----DO--- |
| 2. | Fabrication Of Copper Contacts | Visual Examination | Major | PH | 100% | -FQP | -FQP | QC Record | P | V | V | ----DO--- |
| | | Dimension | Major | PH | Min. five sample per lot | -FQP | -FQP | QC Record | P | V | V | ---DO--- |
| | | Fitment /Assembly | Major | PH | One sample per lot | -FQP | -FQP | QC Record | P | V | V | ----DO--- |
| 3. | Hot Dip Galvanizing | Visual Examination | Major | PH | 100% | IS-4759 | IS-4759 | QC Record | P | V | V | ----DO--- |
| | | Appearance | Major | PH | One sample of each compo-nent per lot | IS-2629 | IS-2629 | QC Record | P | V | V | ----DO--- |
| | | Uniformity | Major | CH | -----DO--- | IS-2633 | IS-2633 | QC Record | P | V | V | ----DO--- |
| | | Mass of zinc | Major | CH | -----DO---- | IS-6745 | IS-6745 | QC Record | P | V | V | ----DO--- |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 4. | Terminals Connector | Visual Examination | Major | PH | 100% | IS-5561 | IS-5561 | QC RECORD | P | V | V | Review Of Records At The Time Of Final Inspection |
| | | Dimension | Major | PH | One sample per lot | Approve d drags. | Approved Drgs. | QC RECORD | P | V | V | -----DO---- |
| | | Tensile | Major | ME | Type test | IS-5561 | IS-5561 | Type Test Report | W | V | V | Review of type test from CPRI/NABL approved lab on similar connector. |
| | | Resistance | Major | E | Type test | IS-5561 | IS-5561 | Type Test Report | W | V | V | -----DO---- |
| | | Temperature Rise | Major | E | Type test | IS-5561 | IS-5561 | Type Test Report | W | V | V | -----DO---- |
| | | Short Time Current test | Major | E | Type test | IS-5561 | IS-5561 | Type Test Report | W | V | V | -----DO---- |
| 5. | Electroplating | Visual Examination | Major | PH | 100% | IS-3203 IS-6012 | IS-3203 IS-6012 | SV | W | V | V | Review Of Inspection Records At The Time of Final Inspection |
| | | Thickness of plating | Major | PH | One sample of each compo-nents per lot | IS-3203 IS-6012 | IS-3203 IS-6012 | SV | W | V | V | ---DO--- |



REC
Endless energy. Infinite possibilities.

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|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 6. | Assemblies/ Subasse-mblies | Visual Examination | Major | PH | 100% | -FQP | -FQP | QC Record | P | V | V | Review Of Records At The Time Of Final Inspection |
| | | Dimension | Major | PH | 10% | Approved/ Floor Drgs. | Approved/ Floor Drgs. | QC Record | P | V | V | ---DO--- |
| | | Verification of components | Major | PH | 10% | Approved/ Floor Drgs. | Approved/ Floor Drgs. | QC Record | P | V | V | ---DO--- |
| | | Functional check | Major | PH | Min. one sample per lot | -FQP | -FQP | QC Record | P | V | V | ---DO--- |
| 7. | Packing | Visual | Major | PH | 100% | Packing list Approved Drgs. | Packing list Approved Drgs. | QC Record | P | V | V | Verification of packing List at the time of final inspection & review |

| Sl. No | Component & Operations | Characteristics | Class | Type Of Check | Quantum Of Check | Reference Document | Acceptance Norms | Format Of Records | Agency | | | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | M | C | N | |
| **SECTIION: 3 PRODUCT TESTING** | | | | | | | | | | | | |
| 1. | Type Test – Do Fuse | All type tests as per relevant IS & Technical Specifications | Major | TTR | Proto-type | IS-9385, NESCL Technical specification | IS-9385 & NESCL Technical speci-fication | Type Test Report | W | V | V | Type Test Clearance from NESCL Engineering Department |
| 2. | Routine Test-Do Fuse | 1) Dielectric Tests<br>2) Temperature Rise Tests at rated current | Major | Routine Checks | 100% | IS-9385, NESCL Tech. Spec., Approved Drgs. | IS-9385, NESCL Technical speci-fication, Approved Drgs. | QC Record | P | V | V | Review Of Routine test reports during final Inspection |
| | | 1) Visual Examination | Major | PH | 100% | IS-9385, Part-I-V | IS-9385, Part-I-V | Test Report | P | W | W | |
| | | 2) Dimension | Major | PH | Sample as Per IS: 2500 | Approved Drgs. | Approved Drgs. | Test Report | P | W | W | |
| | | 3) Verification of component | Major | PH | Sample as Per IS: 2500 | Approved Drgs | Approved Drgs | Test Report | P | W | W | |
| | | 4) Dry Power Frequency withstand voltage test | Major | E | Sample as Per IS: 2500 | IS-9385, Part-I-V | IS-9385, Part-I-V | Test Report | P | W | W | |
| | | 5) Temperature Rise Tests at rated current | Major | E | Sample as Per IS: 2500 | IS-9385, Part-I-V | IS-9385, Part-I-V | Test Report | P | W | W | |
| | | 6) Test for composition and mechanical strength of Aluminum used | Major | E | Sample as Per IS: 2500 | IS-9385, Part-I-V | IS-9385, Part-I-V | Test Report | P | W | W | Please mention name of Sub-Vendor for Aluminum |

| SECTIION: 5 REMARKS | |
|---|---|
| 1. | The MQP should be read in conjunction with NESCL specification and shall deem to include additional tests if any required as per contract. |
| 2. | In case of any contradiction between the manufacturer's manufacturer FQP & NESCL FQP, this MQP and NESCL specification following precedence shall be followed:<br>a) NESCL specification<br>b) This Manufacturing Quality Plan<br>c) Manufacturer's FQP. |
| 3. | 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. |
| 4. | In case of any tests being carried out at third party lab, such lab/facility should be NABL accredited / accepted by NESCL. |
| 5. | The raw material/bought out items should be procured from reputed sources. |
| 6. | The manufact<br>should be available during inspection by NESCL. |
| 7. | Any material rejected during power grid inspection shall be disposed off with the approval of NESCL. For destructive disposal NESCL may depute its representative for witnessing. In case the material is to be returned to sub-vendor, all such items shall be indelibly marked (to prevent mixing) at the works of the manufacturer and offered to NESCL Inspector for verification of marking. |
| 8. | Insulators shall be procured from M/S Birla NGK (JSI)/ India pottery only. |

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|---|---|---|---|---|---|---|
| Manufacturer/ Sub-Supplier | Main-Supplier | Legend<br>M: Manufacturer/Sub-Supplier<br>C: Supplier/ Nominated Inspection Agency (Subject To Prior Approval Of Nescl), N: Nescl P: Perform W: Witness And V: Verification. As Appropriate, ,Ph:physical, E:electrical Me:mechanical,Ch:chemical Chp: Nescl Shall Identified In Colum "N" | एनटीपीसी NTPC इलेक्ट्रिक सप्लाई Electric Supply | Doc. No.: Rev…… Cat….. | | |
| Signature | | | For Nescl Use | Reviewed By | Approved By | Approval Seal |

| Manufacturer's Name And Address | Manufacturing Quality Plan<br>Item :11 kV HG Fuse<br>Qp No.:<br>Rev. No.:<br>Date: | Project/ Utility:<br>Package:<br>Contract No.:<br>Main-Supplier: |
|---|---|---|

| Sl. No | Comp-onent & Operations | Characteristics | Class | Type Of Check | Quan-tum of Check | Reference Document | Acceptance Norms | Format Of Records | Agency | | | Remarks |
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| | | | | | | | | | M | C | N | |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | | | 11 |
| **SECTIION: 1 RAW MATERIAL** | | | | | | | | | | | | |
| 1. | Copper Flats | Visual Examination | Major | PH | IS-191 Part-IV, IS-1897 | IS-191 Part-IV, IS-1897 | IS-191 Part-IV, IS-1897 | Qc Record | P | V | V | Review Of Records At The Time Of Final Inspection |
| | | Dimension | Major | PH | IS-191 Part-II IS-1897 | IS-191 Part-II IS-1897 | IS-191 Part-II IS-1897 | Qc Record | P | V | V | ----DO--- |
| | | Tensile Strength | Major | ME | IS-1608 | IS-1608 | IS-1608 | Supplier TC | V | V | V | Review of Manufacturer TC/Reputed lab TC at the time of final inspection |
| | | Chemical Composition | Major | CH | IS-191 Part-IV IS-1897 | IS-191 Part-IV IS-1897 | IS-191 Part-IV IS-1897 | Supplier TC | V | V | V | ---DO--- |
| | | Bend Test | Major | ME | IS-191 Part-IV IS-1897 | IS-191 Part-IV IS-1897 | IS-191 Part-IV IS-1897 | Supplier TC | V | V | V | ---DO--- |
| | | Resistivity / Conductivity | Major | E | IS-191 Part-IV IS-1897 | IS-191 Part-IV IS-1897 | IS-191 Part-IV IS-1897 | Supplier TC | V | V | V | ---DO--- |
| 2. | Aluminium Flats | Visual Examination | Major | PH | IS-5082 | IS-5082 | IS-5082 | Qc Record | P | V | V | Review Of Records At The Time Of Final Inspection |
| | | Dimension | Major | PH | IS-3965 | IS-3965 | IS-3965 | Qc Record | P | V | V | ---DO--- |
| | | Tensile Strength | Major | ME | IS-1608 | IS-1608 | IS-1608 | Supplier Tc | V | V | V | Review of Manufacturer TC/Reputed lab TC atthe time of final inspection |

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | | | 11 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Bend Test | Major | ME | IS-5082 | IS-5082 | IS-5082 | Supplier TC | V | V | V | ---DO--- |
| | | Resistivity / Conductivity | Major | E | IS-5082 | IS-5082 | IS-5082 | Supplier TC | V | V | V | ---DO--- |
| | | Chemical Composition | Major | CH | IS-5082 | IS-5082 | IS-5082 | Supplier TC | V | V | V | ---DO--- |
| | | Visual Examination | Major | PH | IS-2062 | IS-2062 | IS-2062 | QC Record | P | V | V | Review Of Records At The Time Of Final Inspection |
| 3. | Mild Steel Sections | Dimension | Major | PH | IS-808, IS-1730, IS-1732, IS-3954 | IS-808, IS-1730, IS-1732, IS-3954 | IS-808, IS-1730, IS-1732, IS-3954 | QC Record | P | V | V | ---DO--- |
| | | Tensile Strength | Major | ME | IS-1608 | IS-1608 | IS-1608 | Supplier TC | V | V | V | Review of Manufacturer TC/Reputed lab TC at the time of final inspection |
| | | Chemical Composition | Major | CH | IS-2062 | IS-2062 | IS-2062 | Supplier TC | V | V | V | ---DO--- |
| | | Bend Test | Major | ME | IS-2062 | IS-2062 | IS-2062 | QC Record | P | V | V | Review Of Records At The Time Of Final Inspection |
| 4. | Contact Sprigs | Visual Examination | Major | PH | 100% | Plant Standard | Plant Standard | QC Record | P | V | V | ---DO--- |
| | | Dimension | Major | PH | 10 Nos. per lot | Plant Standard | Plant Standard | QC Record | P | V | V | ---DO--- |
| | | Functional check | Major | PH | --DO-- | Plant Standard | Plant Standard | QC Record | P | V | V | ---DO--- |
| | | Fitment/Springs | Major | PH | --DO-- | Plant Standard | Plant Standard | QC Record | P | V | V | ---DO--- |
| 5. | Fastners | Visual Examination | Major | PH | IS-1367-III | IS-1367-III | IS-1367-III | QC Record | P | V | V | Review Of Records At The Time Of Final Inspection |
| | | Dimension | Major | PH | IS-1363 | IS-1363 | IS-1363 | QC Record | P | V | V | ---DO--- |

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | | | 11 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Wedge Test | Major | ME | IS-1367-III | IS-1367-III | IS-1367-III | Supplier TC | V | V | V | Review of Manufacturer TC/Reputed lab TC at the time of final inspection |
| | | Hardness | Major | ME | IS-1367-III | IS-1367-III | IS-1367-III | Supplier TC | V | V | V | ---DO--- |
| | | Galvanizing | Major | CH | IS-1367-XIII | IS-1367-XIII | IS-1367-XIII | Supplier TC | V | V | V | ---DO--- |
| 6. | Gi Pins | Visual | Major | PH | IS-2486-II | IS-2486- II | IS-2486- II | QC Record | P | V | V | Review Of Records At The Time Of Final Inspection |
| | | Dimension | Major | PH | IS-2486-II | IS-2486- II | IS-2486- II | QC Record | P | V | V | ---DO--- |
| | | Galvanization Checks | Major | CH | IS-4759 | IS-4759 | IS-4759 | Supplier TC | V | V | V | Review of Manufacturer TC /Reputed lab TC at the time of final inspection |
| 7. | Insulator | Visual | Major | PH | 100% | IS-2544<br>IS-5350<br>IS-731 | IS-2544<br>IS-5350<br>Is-731 | QC Record | P | V | V | NGK Birla/ WSI/ Jayshree Makes only. Insulators will be Inspected at the manufacturers factory |
| | | Dimension | Major | PH | IS-2544<br>IS-5350<br>IS-731 | Approved Drgs. | Approved Drgs. | QC Record | P | V | V | ---DO--- |
| | | High Voltage Test | Major | E | IS-2544<br>IS-731 | IS-2544<br>IS-731 | IS-2544<br>IS-731 | Supplier TC | V | V | V | Review of Manufacturer TC/Reputed lab TC at the time of final inspection |
| | | Temperature Cycle | Major | E | IS-2544<br>IS-731 | IS-2544<br>IS-731 | IS-2544<br>IS-731 | Supplier TC | V | V | V | -----DO---- |



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| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | | | 11 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Mechanical Strength/Failing load Test | Major | ME | IS-2544 IS-731 | IS-2544 IS-731 | IS-2544 IS-731 | Supplier TC | V | V | V | -----DO---- |
| | | Puncture Test | Major | E | IS-2544 IS-731 | IS-2544 IS-731 | IS-2544 IS-731 | Supplier TC | V | V | V | -----DO---- |
| | | Porosity Test | Major | PH | IS-2544 IS-731 | IS-2544 IS-731 | IS-2544 IS-731 | Supplier TC | V | V | V | -----DO---- |
| | | Galvanizing test | Major | CH | IS-2544 IS-4759 IS-731 | IS-2544 IS-4759 IS-731 | IS-2544 IS-4759 IS-731 | Supplier TC | V | V | V | -----DO---- |
| 8. | Al. Alloy | Chemical Composition | Major | CH | IS-617 | SI-617 | IS-617 | Supplier TC | V | V | V | ---DO--- |
| 9.. | Zinc | Chemical Composition | Major | CH | IS-209 IS-13229 | IS-209 IS-13229 | IS-209, IS-4759 | Supplier TC | V | V | V | ---DO--- |
| 10. | Gi Tubes | Visual | Major | PH | IS-1239 | IS-1239 | IS-1239 | QC Record | P | V | V | Review Of Records At The Time Of Final Inspection |
| | | Dimension | Major | PH | IS-1239 | Approved Drgs | IS-1239 | QC Record | P | V | V | -----DO---- |
| | | Chemical Analysis | Major | CH | IS-1239 | IS-1239 | IS-1239 | Supplier TC | V | V | V | Review of Manufacturer TC/Reputed lab TC at the time of final inspection |
| | | Tensile Strength | Major | ME | IS-1239 | IS-1239 | IS-1239 | Supplier TC | V | V | V | -----DO---- |
| | | Elongation | Major | ME | IS-1239 | IS-1239 | IS-1239 | Supplier TC | V | V | V | -----DO---- |
| | | Bend Test | Major | ME | IS-1239 | IS-1239 | IS-1239 | QC Record | P | V | V | Review Of Records At the Time Of Final Inspection |
| | | Galvanizing | Major | CH | IS-1239 | IS-1239 | IS-1239 | Supplier TC | V | V | V | Review of Manufacturer TC /Reputed lab TC at the time of final inspection |

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | | | 11 |
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| **SECTIION: 2 INPROCESS INSPECTION** | | | | | | | | | | | | |
| 1. | Welded/ Fabricated M.S. Comp-onent | Visual Examination | Major | PH | 100% | -FQP | -FQP | QC Record | P | V | V | Review Of Records At The Time Of Final Inspection |
| | | Dimension | Major | PH | Min. five sample per lot | -FQP | -FQP | QC Record | P | V | V | ----DO--- |
| | | Fitment/ Assembly | Major | PH | One sample per lot | -FQP | -FQP | QC Record | P | V | V | ----DO--- |
| 2. | Fabrication Of Copper Contacts | Visual Examination | Major | PH | 100% | -FQP | -FQP | QC Record | P | V | V | ----DO--- |
| | | Dimension | Major | PH | Min. five sample per lot | -FQP | -FQP | QC Record | P | V | V | ---DO--- |
| | | Fitment / Assembly | Major | PH | One sample per lot | -FQP | -FQP | QC Record | P | V | V | ----DO--- |
| 3. | Hot Dip Galva-nizing | Visual Examination | Major | PH | 100% | IS-4759 | IS-4759 | QC Record | P | V | V | ----DO--- |
| | | Appearance | Major | PH | One sample of each comp-onent per lot | IS-2629 | IS-2629 | QC Record | P | V | V | ----DO--- |
| | | Uniformity | Major | CH | | IS-2633 | IS-2633 | QC Record | P | V | V | ----DO--- |
| | | Mass of zinc | Major | CH | | IS-6745 | IS-6745 | QC Record | P | V | V | ----DO--- |
| 4. | Terminals Connector | Visual Examination | Major | PH | 100% | IS-5561 | IS-5561 | QC Record | P | V | V | Review Of Records At The Time Of Final Inspection |
| | | Dimension | Major | PH | One sample per lot | Approve d drags. | Approved Drgs. | QC Record | P | V | V | -----DO---- |

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | | | 11 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Tensile | Major | ME | Type test | IS-5561 | IS-5561 | Type Test Report | W | V | V | Review of type test from CPRI/NABL approved lab on similar connector. |
| | | Resistance | Major | E | Type test | IS-5561 | IS-5561 | Type Test Report | W | V | V | -----DO---- |
| | | Temperature Rise | Major | E | Type test | IS-5561 | IS-5561 | Type Test Report | W | V | V | -----DO---- |
| | | Short Time Current test | Major | E | Type test | IS-5561 | IS-5561 | Type Test Report | W | V | V | -----DO---- |
| 5. | Electro-Plating | Visual Examination | Major | PH | 100% | IS-3203 IS-6012 | IS-3203 IS-6012 | SV | W | V | V | Review Of Inspection Records At The Time of Final Inspection |
| | | Thickness of plating | Major | PH | One sample of each | IS-3203 IS-6012 | IS-3203 IS-6012 | SV | W | V | V | ---DO--- |
| 6. | Assem-blies/ Sub-assemblies | Visual Examination | Major | PH | 100% | -FQP | -FQP | QC Record | P | V | V | Review Of Records At The Time Of Final Inspection |
| | | Dimension | Major | PH | 10% | Approved/ Floor Drgs. | Approved/Floor Drgs. | QC Record | P | V | V | ---DO--- |
| | | Verification of components | Major | PH | 10% | Approved/ Floor Drgs. | Approved/Floor Drgs. | QC Record | P | V | V | ---DO--- |
| | | Functional check | Major | PH | Min. one sample per lot | -FQP | -FQP | QC Record | P | V | V | ---DO--- |
| 7. | Packing | Visual | Major | PH | 100% | Packing list Approved Drgs. | Packing list Approved Drgs. | QC Record | P | V | V | Verification of packing List at the time of final inspection & review |

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | | | 11 |
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| **SECTIION: 3 PRODUCT TESTING** | | | | | | | | | | | | |
| 1. | Type Test – Hg Fuse | All type tests as per relevant IS & Technical Specifications | Major | TTR | Proto-type | IS-9385, NESCL Technical specification | IS-9385 & NESCL Technical specification | TYPE TEST REPORT | W | V | V | Type Test Clearance from NESCL Engineering Department |
| 2. | Routine Test-Hg Fuse | 1) Dielectric Tests<br>2) Temperature Rise Tests at rated current | Major | Rout-ine Che-cks | 100% | IS-9385, NESCL Tech. Spec., Approved Drgs. | IS-9385, NESCL Technical specification, Approved Drgs. | QC RECORD | P | V | V | Review Of Routine test reports during final Inspection |
| 3. | Accep-tance Tests-Hg Fuse | 1) Visual Examination | Major | PH | 100% | IS-9385, Part-I-V | IS-9385, Part-I-V | Test Report | P | W | W | |
| | | 2) Dimension | Major | PH | Sample as Per IS: 2500 | Approved Drgs. | Approved Drgs. | Test Report | P | W | W | |
| | | 3) Verification of component | Major | PH | Sample as Per IS: 2500 | Approved Drgs | Approved Drgs | Test Report | P | W | W | |
| | | 4) Dry Power Frequency withstand voltage test | Major | E | Sample as Per IS: 2500 | IS-9385, Part-I-V | IS-9385, Part-I-V | Test Report | P | W | W | |
| | | 5) Temperature Rise Tests at rated current | Major | E | Sample as Per IS: 2500 | IS-9385, Part-I-V | IS-9385, Part-I-V | Test Report | P | W | W | |
| | | 6) Test for composition and mechanical strength of Aluminum used | Major | E | Sample as Per IS: 2500 | IS-9385, Part-I-V | IS-9385, Part-I-V | Test Report | P | W | W | Please mention name of Sub-Vendor for Aluminum |

**SECTIION: 5 REMARKS**

1. The MQP should be read in conjunction with NESCL specification and shall deem to include additional tests if any required as per contract.
2. In case of any contradiction between the manufacturer's manufacturer FQP & NESCL FQP, this MQP and NESCL specification following precedence shall be followed:
   a) NESCL specification
   b) This Manufacturing Quality Plan
   c) Manufacturer's FQP.
3. 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.
4. In case of any tests being carried out at third party lab, such lab/facility should be NABL accredited / accepted by NESCL.
5. The raw material/bought out items should be procured from reputed sources.
6. The manufacturer sh
be available during inspection by NESCL.
7. Any material rejected during power grid inspection shall be disposed off with the approval of NESCL. For destructive disposal NESCL may depute its representative for witnessing. In case the material is to be returned to sub vendor, all such items shall be indelibly marked (to prevent mixing) at the works of the manufacturer and offered to NESCL Inspector for verification of marking.
8. Insulators shall be procured from M/S Birla NGK (JSI)/ India pottery only.

| | | | | | | |
|---|---|---|---|---|---|---|
| Manufacturer/ Sub-Supplier | Main-Supplier | Legend<br>M: Manufacturer/Sub-Supplier<br>C: Supplier/ Nominated Inspection Agency (Subject To Prior Approval Of Nescl), N: Nescl P: Perform W: Witness And<br>V: Verification. As Appropriate, ,Ph:physical, E:electrical Me:mechanical,Ch:chemical<br>Chp: Nescl Shall Identified In Colum "N" | एनटीपीसी NTPC इलेक्ट्रिक सप्लाई Electric Supply | Doc. No.: Rev…… Cat….. | | |
| Signature | | | For Nescl Use | Reviewed By | Approved By | Approval Seal |

STANDARD MANUFACTURING QUALITY PLAN- PSCC POLES

Item : PRE-STRESSED CEMENT CONCRETE POLES

Name of the Contractor :

Name of the Sub- contractor :

Name of the Package :

LOA No :

LOA Date : MQP NO:

Date:.....

| Sl. No | Component & operation | Characteristics | Class | Type of Check | Quantum of Check | Reference Document | Accep-tance Norms | Format of Records | Agency | | | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | **RAW MATERIAL** | | | | | | | | M | C | N | |
| 1.1 | High tensile Prestressing Cold Drawn Indented wire | a) Dimensions | Major | Mea-sure | As per IS:6003 | IS: 6003 | IS: 6003 | Supplier TC | V | V | V | SOURCING : _____ _____ |
| | | b) Chemical Analysis | Major | Test | As per IS:6003 | IS: 6003 | IS: 6003 | Supplier TC | V | V | V | |
| | | c) Tensile strength | Major | Test | As per IS:6003 | IS: 6003 | IS: 6003 | Supplier TC | V | V | V | |
| 1.2 | GI Wire for Earthing | a) Chemical Composition | Major | Test | As per IS:280 | IS:280 | IS:280 | Supplier TC | V | V | V | |
| | | b) Zinc Grade | Major | Test | As per IS:209 | IS:209 | IS:209 | Supplier TC | V | V | V | |
| | | c) Zinc Coating | Major | Test | One Sample per Spool | As per IS:4826 | As per IS:4826 | Supplier TC | V | V | V | |
| | | d) Galvanizing | Major | Visual | | "IS:2629/ 6745/ 2633" | "IS:2629 /6745/ 2633" | Supplier TC | V | V | V | |
| 1.3 | Cement 43Grade, OPC | a) Chemical Composition | Major | Test | As per IS:8112 | IS:8112 | IS: 8112 (1989) | Supplier TC | V | V | V | SOURCING: _____ _____ |
| | | b) Physical Test | Major | Test | As per IS:8112 | IS:8112 | IS: 8112 (1989) | Supplier TC | V | V | V | |
| | | c) Setting Time | Major | Test | As per IS:8112 | IS:8112 | IS: 8112 (1989) | Supplier TC | V | V | V | |
| | | d) Compres-sive Strength | Major | Cube Test | As per IS:8112 | IS:8112 | IS: 8112 (1989) | supplier TC | V | V | V | |



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|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1.4 | Aggregates | Size | Major | Sieve Analy-sis | As per IS:2430 | IS : 383 | IS : 383/ Shall not exceed 12 mm | supplier TC | P | V | V | |
| | | Crushing Strength | Major | Mech | As per IS:2386 | IS:2386 | IS:2386 | supplier TC | P | V | V | |
| 1.5 | Steel Stirrups | a) Physical | Major | visual | Eatch Batch | IS:432 / IS:1786 | IS:432 / IS:1786 | supplier TC | P | V | V | |
| | | b) Chemical | Major | Test | Eatch Batch | IS:432 / IS:1786 | IS:432 / IS:1786 | supplier TC | P | V | V | |
| 2 | Manufactur-ing | a) Check Cast-ing Moulds for Dimensions, soundness, supports, alignment and Cleanliness | Major | Mea-sure | 100% | NESCL Spec | NESCL Spec/Ap-proved drg | QC Record | P | V | V | |
| | | b) Pre-stress-ing of HT wires | Major | Mea-sure | 100% | NESCL Spec/ IS:1343 | NESCL Spec/ IS:1343 | QC Record | P | V | V | |
| | | c) Concrete Mix M420 | Major | Cube Test | Sample as per IS:516 | IS:516 | IS:516/28 days strength shall not be less than 420 kg/ sq.cm | QC Record | P | W | W | Samples shall be tested at third party lab if desired by NESCL |
| | | d) Casting | Major | Visual | 100% | IS:456/ Standard Practice | IS:456/ Standard Practice | QC Record | P | V | V | |
| | | e) Position, Nos. and Dimensions of Lifting Hooks | Major | Visual | For every casting | NESCL Spec/Ap-proved drg | NESCL Spec/Ap-proved drg | QC Record | P | V | V | |
| | | f) Demoulding and De-ten-sioning | Major | Physi-cal | 100% | Standard Practice / NESCL Specs | Detensio-ing shall be done when the concrete attains 210 Kg/cm2/ NESCL Spec | QC Record | P | V | V | |
| | | g) Curing | Major | Physi-cal | 100% | Plant Standard | Plant Stan-dard | QC Record | P | V | V | |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3 | Final Product Testing | a) Dimensional check for overall length, cross-sectional Dimensions and upright-ness | Criti-cal | Mea-sure | Sampled as per IS:1678 | IS:1678 / Approved drg | IS:1678 / Approved drg | QC Record | P | W | W | |
| | | b) Transverse Strength Test | Criti-cal | Test | Sampled as per IS:1678 | IS : 2905 | IS : 2905 | QC Record | P | W | W | |
| | | c) Test for Cover | Criti-cal | Test | Sampled as per IS:1678 | IS:1678 / Approved drg | IS:1678 / Approved drg | QC Record | P | W | W | Poles Tested for Ultimate Transverse Strength Shall be tested for Cover |
| 4 | Marking Above The Planting Depth | Project name : RGGVY NESCL | Major | Visual | 100% | NESCL Specs/ Approved drg | NESCL Specs/Ap-proved drg | QC Record | P | V | V | |
| | | Month&Year of Manufacture | | | | | | | | | | |
| | | Transverse Strength of pole | | | | | | | | | | |
| | | Makers Serial No. and Mark | | | | | | | | | | |
| | | Coloured indelible depth marker at 1.5 mtrs, from bot-tom to verify planting depth | | | | | | | | | | |
| 5 | Pre-Ship-ment | a) Stacking | Major | Visual | Random | NESCL Specs | stack-ing with broader face vertic-al,Max. 4 nos. of vertical layers | QC Record | P | V | V | |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | b) Handling/ Transportation | Major | Visual | Random | NESCL Specs | NESCL Specs | QC Record | P | V | V | |
| | | c) Physical Inspection | Major | Visual/ Physi-cal | 100% | | No physi-cal Dam-age | QC Record | P | V | V | |
| LEGEND : | | | M - MANUFACTURER<br>C - CONTRACTOR<br>N - CUSTOMER -- NESCL<br>P - PERFOM | | | | V - VERIFICATION<br>W - WITNESSING<br>QC-QUALITY CONTROL | | | | | |
| SIGNATURE OF THE CONTRACTOR | | | | | | SIGNATURE OF THE MANUFACTURER | | | | | | |
| Prepared By : Sh. Malay Mandal, Sr. Engineer(QA&I) | | | Reviewed By: Sh. | | | | Approved By: Sh. A. K. Sharma, DGM (QA&I) | | | | | |

| MANUFACTURE'S NAME & ADDRESS: | | | | Manufacturing Quality Plan | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Item: LTDB For Distribution Transformer Substation | | Qp No: | | PROJECT/UTILITY: | | | | | |
| | | | | | | Rev.No: | | PACKAGE: | | | | | |
| | | | | Sub-System: | | Date: | | CONTRACT NO: | | | | | |
| | | | | | | | | MAIN-CONTRACTOR: | | | | | |
| Sl. No | Component & Operation | Characteristics | Class | Type Of Check | Quantum Of Check | Reference Document | Acceptance Norms | Format of Records | | Agency | | | Remarks |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | D | 10 | | | 11 |
| **SECTION: 1 RAW MATERIALS** | | | | | | | | | | M | C | N | |
| 1 | Ms Sheet | 1) Visual Examination | Major | Visual | Random | Plant Standard | Nescl Approved Drawing | QC Record | | P | V | V | |
| | | 2) Dimension | Major | Measurement | Random | Plant Standard | Nescl Approved Drawing | QC Record | | P | V | V | |
| 2 | Aluminum Bus Bar | 1) Visual Examination | Major | Visual | Random | Plant Standard | Nescl Approved Drawing | QC Record | | P | V | V | |
| | | 2) Dimension | Major | Measurement | Random | Plant Standard | Nescl Approved Drawing | QC Record | | P | V | V | |
| | | 3) Chemical Analysis | Major | Test | Random | Is 617 / Nescl Spec | Nescl Spec | SUPPLIER TC | | V | V | V | |
| 3 | Mccb | 1)Rating And Make | Major | Visual | Random | App.Drg / Nescl Spec | Nescl Spec | SUPPLIER TC | | V | V | V | |
| | | 2) Routine Tests | | | | | | | | | | | |
| | | I) Mechanical Operation Test | Major | Test | 100% | Nescl Spec | Nescl Spec | SUPPLIER TC | | V | V | V | |
| | | Ii)Calibration Test | Major | Test | 100% | Nescl Spec | Nescl Spec | SUPPLIER TC | | V | V | V | |
| | | Iii) Dielectric Tests | Major | Test | 100% | Nescl Spec | Nescl Spec | SUPPLIER TC | | V | V | V | |

| SECTION: 2 FINAL INSPECTION AND TESTING | | | | | | | | | | M | C | N | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 4 | Routine Test | A) Visual Check | Major | Visual | 100% | Plant Standard | Plant Standard | QC Record | √ | P | V | V | Verification Of Record At The Time Of Final Inspection |
| | | B) Verification Of Component Rating | Major | Visual | 100% | Plant Standard | As Per Approved Drawing And Nescl Spec | QC Record | √ | P | V | V | DO |
| | | C) Other Check | | | | | | | | | | | |
| | | i) Easy Accessibility And Maintenance | Major | Visual | 100% | Plant Standard | Plant Standard | QC Record | √ | P | V | V | DO |
| | | ii) Colour Coding Provided By Coloured Tapes | Major | Visual | 100% | Plant Standard | Plant Standard | QC Record | √ | P | V | V | DO |
| | | iii) Bus Bar Dimensions | Major | Measurement | 100% | Plant Standard | As Per Approved Drawing And Nescl Spec | QC Record | √ | P | V | V | DO |
| | | iv) Degree Of Protection Check By Paper | Major | Test | 100% | Plant Standard | Nescl Spec | QC Record | √ | P | V | V | |
| | | D) Dimension Check | Major | Measurement | 100% | Plant Standard | Approved Nescl Drawing | QC Record | √ | P | V | V | DO |
| | | E) Insulation Resistance Tests | Major | Electrical Test | 100% | Plant Standard | Plant Standard | QC Record | √ | P | V | V | DO |
| | | F) Mechanical Operation Tests | Major | Mechanical Test | 100% | Plant Standard | Plant Standard | QC Record | √ | P | V | V | DO |
| | | G) Bus Bar Support And Clearance | Major | Measurement | 100% | Plant Standard | Approved Nescl Drawing | QC Record | √ | P | V | V | DO |
| | | H) Continuity Of Circuits And Function | Major | Electrical And Mechanical Test | 100% | Plant Standard | Plant Standard | QC Record | √ | P | V | V | DO |

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | I) Painting | Major | Measure-ment | 100% | Plant Standard | Dry Film Thickness 40-60 Micron | QC Record | √ | P | V | V | DO |
| | | J) Overload Release Setting Of The Mccb | Major | Electrical Test | 100% | Suplier Tc | Suplier Tc | QC Record | √ | V | V | V | DO |
| 5 | Type Test* | All Type Test As Per Is: 13947 & Is:8623 | Critical | Visual / Measure-ment/ Electrical/ Mechani-cal | Plant Standard | Is 8623 | Nescl Spec | TYPE TEST RE-PORTS | √ | P | V | V | Type Test Clearance From Necsl Engineering Department |
| 6 | Accep-tance Test | A) Visual Check | Major | Visual | Sample As Per Is: 2500 | Plant Standard | Plant Standard | QC Record | | P | W | W | |
| | | B) Verification Of Component Rating | Major | Visual | Sample As Per Is: 2500 | Plant Standard | As Per Approved Drawing And Nescl Spec | QC Record | | P | W | W | |
| | | C) Other Check | | | | | | | | | | | |
| | | i) Colour Cod-ing Provided By Coloured Tapes | Major | Visual | Sample As Per Is: 2500 | Plant Standard | Plant Standard | QC Record | | P | W | W | |
| | | ii) Bus Bar Di-mensions | Major | Measure-ment | Sample As Per Is: 2500 | Plant Standard | As Per Approved Drawing And Nescl Spec | QC Record | | P | W | W | |
| | | iii) Degree Of Protection Check By Paper | Major | Test | Sample As Per Is: 2500 | Plant Standard | Nescl Spec | QC Record | | P | W | W | |
| | | iv) Easy Ac-cessibility And Mainatenance | Major | Test | Sample As Per Is: 2500 | Plant Standard | Nescl Spec | QC Record | | P | W | W | |
| | | D) Dimension Check | Major | Measure-ment | Sample As Per Is: 2500 | Plant Standard | Approved Nescl Drawing | QC Record | | P | W | W | |

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | E) Insulation Resistance Tests | Major | Electrical Test | Sample As Per Is: 2500 | Plant Standard | Plant Standard | QC Record | | P | W | W | |
| | | F) Mechanical Operation Tests | Major | Mechanical Test | Sample As Per Is: 2500 | Plant Standard | Plant Standard | QC Record | | P | W | W | |
| | | G) Bus Bar Support And Clearance | Major | Measurement | Sample As Per Is: 2500 | Plant Standard | Approved Nescl Drawing | QC Record | | P | W | W | |
| | | H) Continuity Of Circuits And Function | Major | Electrical And Mechanical Test | Sample As Per Is: 2500 | Plant Standard | Plant Standard | QC Record | | P | W | W | |
| | | I) Painting | Major | Measurement | Sample As Per Is: 2500 | Plant Standard | Dry Film Thickness 40-60 Micron | QC Record | | P | W | W | |
| | | J) Overload Release Setting Of The Mccb | Major | Measurement | Sample As Per Is: 2500 | Plant Standard | Dry Film Thickness 40-60 Micron | QC Record | | P | W | W | |
| | | | | | | | | | | | | | |

*-All type tests to be carried out as per NESCL specification, Contract Agreement and as per minutes of the meeting between NESCL and main contractor. Approval of type tests by Engineering department of NESCL or waival thereof to be shown at the time final inspection to enable NESCL issue MDCC.

√ - Record identified'√' ""tick mark"" shall be essentially included by supplier in QA Documentations.

| | | |
|---|---|---|
| Legend : | M - Manufacturer<br>C - Contractor<br>N - Customer-Nescl | P - Perform<br>V - Verification<br>W - Witnessing<br>Qc - Quality Control |
| | Signature Of The Contractor | Signature Of The Manufacturer |

| Manufacture's Name & Address: | Manufacturing Quality Plan | | | |
|---|---|---|---|---|
| | Item:Pole Top Distributiuon Box | Qp No: | | Project/Utility: |
| | | Rev.No: | | Package: |
| | Sub-System: | Date: | | Contract No: |
| | | | | Main-Contractor: |

| Sl. No | Component & Operation | Characteristics | Class | Type Of Check | Quantum Of Check | Reference Document | Acceptance Norms | Format of Records | | Agency | | | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | D | 10 | | | 11 |
| **SECTION: 1 RAW MATERIALS** | | | | | | | | | | M | C | N | |
| 1 | Polycarbonate Raw Material | 1) Visual Examination | Major | Visual | Random | Plant Standard | NESCL Approved Drawing | QC Record | | P | V | V | |
| | | 2) Dimension | Major | Measurement | Random | Plant Standard | NESCL Approved Drawing | QC Record | | P | V | V | |
| 2 | Aluminum Bus Bar | 1) Visual Examination | Major | Visual | Random | Plant Standard | NESCL Approved Drawing | QC Record | | P | V | V | |
| | | 2) Dimension | Major | Measurement | Random | Plant Standard | NESCL Approved Drawing | QC Record | | P | V | V | |
| | | 3) Chemical Analysis | Major | Test | Random | Is 617 / NESCL Spec | NESCL Spec | SUPPLIER TC | | V | V | V | |
| 3 | Mccb If Applicable | 1)Rating And Make | Major | Visual | Random | App.Drg / NESCL Spec | NESCL Spec | SUPPLIER TC | | V | V | V | |
| **2) ROUTINE TESTS** | | | | | | | | | | | | | |
| | | I) Mechanical Operation Test | Major | Test | 100% | NESCL Spec | NESCL Spec | SUPPLIER TC | | V | V | V | |
| | | Ii)Calibration Test | Major | Test | 100% | NESCL Spec | NESCL Spec | SUPPLIER TC | | V | V | V | |
| | | Iii) Dielectric Tests | Major | Test | 100% | NESCL Spec | NESCL Spec | SUPPLIER TC | | V | V | V | |

| | | | | | | | | | | M | C | N | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **SECTION: 2 FINAL INSPECTION AND TESTING** | | | | | | | | | | | | | |
| 4 | Routine Test | A) Visual Check | Major | Visual | 100% | Plant Standard | Plant Standard | QC Record | √ | P | V | V | VERIFICATION OF RECORD AT THE TIME OF FINAL INSPECTION |
| | | B) Verification Of Component Rating | Major | Visual | 100% | Plant Standard | As Per Approved Drawing And Nescl Spec | QC Record | √ | P | V | V | DO |
| **C) OTHER CHECK** | | | | | | | | | | | | | |
| | | I) Easy Accessibility And Maintenance | Major | Visual | 100% | Plant Standard | Plant Standard | QC Record | √ | P | V | V | DO |
| | | Ii) Colour Coding Provided By Coloured Tapes | Major | Visual | 100% | Plant Standard | Plant Standard | QC Record | √ | P | V | V | DO |
| | | Iii) Bus Bar Dimensions | Major | Measurement | 100% | Plant Standard | As Per Approved Drawing And Nescl Spec | QC Record | √ | P | V | V | DO |
| | | Iv) Degree Of Protection Check By Paper | Major | Test | 100% | Plant Standard | NESCL Spec | QC Record | √ | P | V | V | |
| | | D) Dimension Check | Major | Measurement | 100% | Plant Standard | Approved NESCL Drawing | QC Record | √ | P | V | V | DO |
| | | E) Insulation Resistance Tests | Major | Electrical Test | 100% | Plant Standard | Plant Standard | QC Record | √ | P | V | V | DO |
| | | F) Mechanical Operation Tests | Major | Mechanical Test | 100% | Plant Standard | Plant Standard | QC Record | √ | P | V | V | DO |
| | | G) Bus Bar Support And Clearance | Major | Measurement | 100% | Plant Standard | Approved Nescl Drawing | QC Record | √ | P | V | V | DO |

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | H) Continuity Of Circuits And Function | Major | Electrical And Mechanical Test | 100% | Plant Standard | Plant Standard | QC Record | √ | P | V | V | DO |
| | | I) Painting | Major | Measurement | 100% | Plant Standard | Dry Film Thickness 40-60 Micron | QC Record | √ | P | V | V | DO |
| | | J) Overload Release Setting Of The Mccb | Major | Electrical Test | 100% | Suplier Tc | Suplier Tc | QC Record | √ | V | V | V | DO |
| 5 | Type Test* | All Type Test As Per Is: 13947 & Is:8623 | Critical | Visual / Measurement/ Electrical/ Mechanical | Plant Standard | Is: 13947 & Is:8623 | Nescl Spec | TYPE TEST REPORTS | √ | P | V | V | TYPE TEST CLEARANCE FROM NECSL ENGINEERING DEPARTMENT |
| 6 | Acceptance Test | A) Visual Check | Major | Visual | Sample As Per Is: 2500 | Plant Standard | Plant Standard | QC Record | | P | W | W | |
| | | B) Verification Of Component Rating | Major | Visual | Sample As Per Is: 2500 | Plant Standard | As Per Approved Drawing And Nescl Spec | QC Record | | P | W | W | |
| | | C) Other Check | | | | | | | | | | | |
| | | I) Colour Coding Provided By Coloured Tapes | Major | Visual | Sample As Per Is: 2500 | Plant Standard | Plant Standard | QC Record | | P | W | W | |
| | | Ii) Bus Bar Dimensions | Major | Measurement | Sample As Per Is: 2500 | Plant Standard | As Per Approved Drawing And Nescl Spec | QC Record | | P | W | W | |
| | | Iii) Degree Of Protection Check By Paper | Major | Test | Sample As Per Is: 2500 | Plant Standard | Nescl Spec | QC Record | | P | W | W | |

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Iv) Easy Accessibility And Mainatenance | Major | Test | Sample As Per Is: 2500 | Plant Standard | Nescl Spec | QC Record | | P | W | W | |
| | | D) Dimension Check | Major | Measurement | Sample As Per Is: 2500 | Plant Standard | Approved Nescl Drawing | QC Record | | P | W | W | |
| | | E) Insulation Resistance Tests | Major | Electrical Test | Sample As Per Is: 2500 | Plant Standard | Plant Standard | QC Record | | P | W | W | |
| | | F) Mechanical Operation Tests | Major | Mechanical Test | Sample As Per Is: 2500 | Plant Standard | Plant Standard | QC Record | | P | W | W | |
| | | G) Bus Bar Support And Clearance | Major | Measurement | Sample As Per Is: 2500 | Plant Standard | Approved Nescl Drawing | QC Record | | P | W | W | |
| | | H) Continuity Of Circuits And Function | Major | Electrical And Mechanical Test | Sample As Per Is: 2500 | Plant Standard | Plant Standard | QC Record | | P | W | W | |
| | | I) Painting | Major | Measurement | Sample As Per Is: 2500 | Plant Standard | Dry Film Thickness 40-60 Micron | QC Record | | P | W | W | |
| | | J) Overload Release Setting Of The Mccb | Major | Measurement | Sample As Per Is: 2500 | Plant Standard | Dry Film Thickness 40-60 Micron | QC Record | | P | W | W | |

*-All Type Tests To Be Carried Out As Per Nescl Specification, Contract Agreement And As Per Minutes Of The Meeting Between Nescl And Main Contractor. Approval Of Type Tests By Engineering Department Of Nescl Or Waival Thereof To Be Shown At The Time Final Inspection To Enable Nescl Issue Mdcc.
√ - Record Identified'√' ""Tick Mark"" Shall Be Essentially Included By Supplier In Qa Documentations.

| | | |
|---|---|---|
| Legend : | M - Manufacturer<br>C - Contractor<br>N - Customer-Nescl | P - Perform<br>V - Verification<br>W - Witnessing |
| | Signature Of The Contractor | Qc - Quality Control<br><br>Signature Of The Manufacturer |

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| **ITEM** | **DISTRIBUTION TRANSFORMER** | **MQP NO.** | **TXM 211** |
| **CUSTOMER NAME** | **POWER GRID** | **VALID UPTO** | **31.07.2010** |
| **UNIQUE CODE NO.** | **24290 C** | | |

| | |
|---|---|
| **Code 1 –**<br>**Indicates place where testing is planned to be performed**<br>A- At equipment's manufacturer itself<br>B- At component manufacturer's work<br>C- At authorized distributor's place<br>D- At independent lab<br>E- At turnkey contractors location<br>F- Not specified | **Code 2 –**<br>**Indicates who has to perform the Test i.e. Testing agency.**<br>J – The equipment manufacturer<br>K – The component manufacturer<br>L - The third party<br>M – The turnkey contractor |
| **Code 3 –**<br>**Indicates who shall witness the tests i.e. witnessing agency**<br>P – Component manufacturer itself<br>Q – Component manufacturer and equipment Manufacturer<br>R- Component manufacturer , Equipment Manufacturer and contractor<br>S - Equipment manufacturer itself<br>T – Equipment manufacturer and contractor<br>U – Equipment manufacturer , Contractor And powergrid<br>V – Third party itself | **Code 4 -**<br>**Review of test Reports/ certificates**<br>W –By equipment manufacturer during raw material /bought out component inspection.<br>X- By contractor during product/process Inspection.<br>Y – By POWERGRID during product/process inspection.<br>Z - By contractor and / or POWERGRID During product/process inspection |
| **Code 5**<br>**Whether specific approval of sub-vendor / component make is envisaged.**<br>E – Envisaged<br>N – Not envisaged | **Code 6**<br>**Whether test records is required to be Submitted after final inspection for issuance Of CIP/MICC**<br>Y - Yes , N- No<br>**EMTC**:- Equipment Manufacturer Testing Certificate<br>**CMTC**:- Component Manufacturer Testing Certificate<br>**TPLC:-** Third party Lab Testing Certificate |



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| **ITEM** | **DISTRIBUTION TRANSFORMER** | **MQP NO.** | **TXM 211** |
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| **UNIQUE CODE NO.** | **24290 C** | | |

**Section-1-RAW MATERIAL INSPECTION**

| SR. NO. | COMPONENT OPERATIONS & DISCRIPTION TEST | TYPE OF CHECK | QUANT UM OF CHECK/ SAMPLING WITH BASIS | REFERENCE DOCUMENT FOR TESTING | ACCEPTANCE NORMS | FORMAT OF RECORD | APPLICABLE CODES | | | | | | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | 1 | 2 | 3 | 4 | 5 | 6 | |
| **1.01** | **M.S.MATERIAL FOR TANK** | | IS:2062 | IS:2062/ POWERGRID Spec. | IS:2062/ POWERGRID Spec. | CMTC | | | | | **E** | | Review of Marson's test record/ mfr's. TC on surveillance basis |
| a) | Visual | Visual | | | | | **A/B** | **J/K** | **P/S** | **W/Z** | | **N** | |
| b) | Dimensional | Meas. | | | | | **B** | **K** | **P** | **W/Z** | | **N** | |
| c) | Mechanical Prop. | Meas. | | | | | **B** | **K** | **P** | **W/Z** | | **N** | |
| d) | Chemical Composition | Meas. | | | | | **B** | **K** | **P** | **W/Z** | | **N** | |

| ITEM | DISTRIBUTION TRANSFORMER | MQP NO. | TXM 211 |
|---|---|---|---|
| CUSTOMER NAME | POWER GRID | VALID UPTO | 31.07.2010 |
| UNIQUE CODE NO. | 24290 C | | |

## Section-1-RAW MATERIAL INSPECTION

| SR. NO. | COMPONENT OPERATIONS & DISCRIPTION TEST | TYPE OF CHECK | QUANT UM OF CHECK/SAMPLING WITH BASIS | REFERENCE DOCUMENT FOR TESTING | ACCEPTANCE NORMS | FORMAT OF RECORD | APPLICABLE CODES | | | | | | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | 1 | 2 | 3 | 4 | 5 | 6 | |
| **1.02** | **BOLTS & NUTS** | | IS 2500 Pt I Insp Level I AQL 4.0 | IS:1367/ Powergrid Spec/ Marson's spec. MEI/QP/QC (Rev: R2) | IS:1367/ Powergrid Spec/ Marson's spec. MEI/QP/QC (Rev: R2) | CMTC | | | | | **E** | | Review of Marson's test record/ mfr. TC on surveillance basis |
| a) | Visual | Visual | | | | | **A/B** | **J/K** | **P/S** | **W/Z** | | **N** | |
| b) | Dimensional | Meas. | IS 2500 Pt I Insp Level I AQL 4.0 | | | | **B** | **K** | **P** | **W/Z** | | **N** | |
| c) | Mechanical Prop. & Hardness | Meas. | One Sample per lot | | | | **B** | **K** | **P** | **W/Z** | | **N** | |
| d) | Chemical Composition | Meas. | One Sample per lot | | | | **B** | **K** | **P** | **W/Z** | | **N** | |
| e) | Galvanization | Meas. | One Sample per lot | | | | **B** | **K** | **P** | **W/Z** | | **N** | |



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| **ITEM** | **DISTRIBUTION TRANSFORMER** | **MQP NO.** | **TXM 211** |
| **CUSTOMER NAME** | **POWER GRID** | **VALID UPTO** | **31.07.2010** |
| **UNIQUE CODE NO.** | **24290 C** | | |

**Section-1-RAW MATERIAL INSPECTION**

| SR. NO. | COMPONENT OPERATIONS & DISCRIPTION 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 | |
| **1.03** | **GASKETS (Rubber Bonded Cork Sheet)** | | IS:4253 | Power grid Specification /IS:4253 | Power grid Specification/ IS:4253 | CMTC | | | | | **E** | | Review of Marson's test record/ mfr's. TC on surveillance basis |
| a) | Visual & Check for Expiry date | Visual | | | | | **A/B** | **J/K** | **P/S** | **W/Z** | | **N** | |
| b) | Dimensional | Meas. | | | | | **B** | **K** | **P** | **W/Z** | | **N** | |
| c) | Hardness, Compressibilty, recovery factor compression set & tensile strength | Meas. | | | | | **B** | **K** | **P** | **W/Z** | | **N** | |
| d) | Flexibility & Chemical test (PH, Chloride & Sulphate content) | Meas. | | | | | **B** | **K** | **P** | **W/Z** | | **N** | |

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| ITEM | DISTRIBUTION TRANSFORMER | MQP NO. | TXM 211 |
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| CUSTOMER NAME | POWER GRID | VALID UPTO | 31.07.2010 |
| UNIQUE CODE NO. | 24290 C | | |

## Section – 1 – RAW MATERIAL INSPECTION

| SR. NO. | COMPONENT OPERATIONS & DISCRIPTION TEST | TYPE OF CHECK | QUANT UM OF CHECK/SAMPLING WITH BASIS | REFERENCE DOCUMENT FOR TESTING | ACCEPTANCE NORMS | FORMAT OF RECORD | APPLICABLE CODES | | | | | | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | 1 | 2 | 3 | 4 | 5 | 6 | |
| **1.04** | **BUSHING WITH METAL PARTS** | | | POWERGRID Spec/ IS2099/ powergrid Approved drawings | POWERGRID Spec/IS2099/ Powergrid Approved drawings | CMTC | | | | | **E** | | Review of mfr.'s TC on surveillance basis |
| a) | Visual | Visual | 100% | | | | **A/B** | **J/K** | **P/S** | **W/Z** | | **N** | |
| b) | Dimensional | Meas. | 100% | | | | **B** | **K** | **P** | **W/Z** | | **N** | |
| c) | Oil Leakage Test | Meas. | 100% | | | | **B** | **K** | **P** | **W/Z** | | **N** | |
| d) | Routine Test | Meas. | 100% | | | | **B** | **K** | **P** | **W/Z** | | **N** | |
| e) | Type Test (as Per the Contract in question need to be conducted/approval from POWERGRID Engg. To be obtained) | Meas. | As agreed with Power grid Engg | As agreed With Power grid Engg | As agreed With Power grid Engg | | **B/D** | **K/L** | **U/V** | **W/Z** | | **Y** | CIP (to be witnessed /approved by POWERGRID) |



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| SR. NO. | COMPONENT OPERATIONS & DISCRIPTION 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 | |
| **1.05** | **TEMPERATURE INDICATOR(if Applicable)** | | | Powergrid Spec/ Marson's drawing/ Marson's spec.- MEI/QP/QC (Rev: R2) | Powergrid Spec./ Marson's drawings Marson's spec MEI/QP/QC (Rev: R2) | CMTC | | | | | **E** | | Review of Marson's test record/ mfr's. TC on surveillance basis |
| a) | Visual | Visual | 100% | | | | **A/B** | **J/K** | **P/S** | **W/Z** | | **N** | |
| b) | Dimensional | Meas. | 100% | | | | **B** | **K** | **P** | **W/Z** | | **N** | |
| c) | HV Test (2 KV for 1 Minute) IR Test | Meas. | 100% | | | | **B** | **K** | **P** | **W/Z** | | **N** | |
| d) | Calibration & Operation (Alarm, Trip) | Meas. | 100% | | | | **B** | **K** | **P** | **W/Z** | | **N** | |

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| SR. NO. | COMPONENT OPERATIONS & DISCRIPTION 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 | |
| **1.06** | **TAP SWITCH (if applicable)** | | | Powergrid Specifications/ Marson's spec. MEI/QP/QC (Rev: R2) | Powergrid Specifications/ Marson's spec. MEI/QP/QC (Rev: R2) | CMTC | | | | | **E** | | Review of Marson's test record/ mfr's. TC on surveillance basis |
| a) | Visual | Visual | 100% | | | | **A/B** | **J/K** | **P/S** | **W/Z** | | **N** | |
| b) | Dimensional | Meas. | 100% | | | | **B** | **K** | **P** | **W/Z** | | **N** | |
| c) | Operational test | Visual | 100% | | | | **B** | **K** | **P** | **W/Z** | | **N** | |



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| **UNIQUE CODE NO.** | **24290 C** | | |

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| SR. NO. | COMPONENT OPERATIONS & DISCRIPTION TEST | TYPE OF CHECK | QUANT UM OF CHECK/SAMPLING WITH BASIS | REFERENCE DOCUMENT FOR TESTING | ACCEPTANCE NORMS | FORMAT OF RECORD | APPLICABLE CODES | | | | | | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | 1 | 2 | 3 | 4 | 5 | 6 | |
| **1.07** | **BUCHHOLZ RELAY (if applicable)** | | | Powergrid Spec./IS: 3637 | Powergrid Spec./IS:3637 | CMTC/ TPLC | | | | | **E** | | Review of Marson's test record/ mfr's. TC on surveillance basis |
| a) | Visual | Visual | 100% | | | | **A/B** | **J/K** | **P/S** | **W/Z** | | **N** | |
| b) | Dimensional | Meas. | 100% | | | | **B** | **K** | **P** | **W/Z** | | **N** | |
| c) | Routine test including Float Operation, Porosity, Gas Volume, loss of oil, surge test & element test | Meas. | 100% | | | | **B** | **K** | **P** | **W/Z** | | **N** | |
| d) | H.V.Test (2 KV for 1 Minute) with IR test | Meas. | 100% | | | | **B** | **K** | **P** | **W/Z** | | **N** | |
| e) | Type tests | Meas. | IS:3637 | | | | **B/D** | **K/L** | **P/V** | **W/Z** | | **N** | |

| ITEM | DISTRIBUTION TRANSFORMER | MQP NO. | TXM 211 |
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## Section – 1 – RAW MATERIAL INSPECTION

| SR. NO. | COMPONENT OPERATIONS & DISCRIPTION 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 | |
| **1.08** | **SILICA GEL BREATHER FILLED WITH SILICA GEL (if Applicable)** | | | Powergrid Spec./ Marson's spec. MEI/QP/QC (Rev: R2) | Powergrid Spec./Marson's spec./ MEI/QP/QC (Rev: R2) | CMTC | | | | | **E** | | Review of Marson's test record/ mfr's. TC on surveillance basis |
| a) | Visual | Visual | 100% | | | | **A/B** | **J/K** | **P/S** | **W/Z** | | **N** | |
| b) | Dimensional | Meas. | Marson's spec. MEI/QP/QC (Rev: R2) | | | | **B** | **K** | **P** | **W/Z** | | **N** | |
| c) | Oil Leakage / Pressure Test | Meas. | | | | | **B** | **K** | **P** | **W/Z** | | **N** | |



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| **UNIQUE CODE NO.** | **24290 C** | | |

**Section – 1 – RAW MATERIAL INSPECTION**

| SR. NO. | COMPONENT OPERATIONS & DISCRIPTION TEST | TYPE OF CHECK | QUANT UM OF CHECK/SAMPLING WITH BASIS | REFERENCE DOCUMENT FOR TESTING | ACCEPTANCE NORMS | FORMAT OF RECORD | APPLICABLE CODES | | | | | | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | 1 | 2 | 3 | 4 | 5 | 6 | |
| **1.09** | **CRGO LAMINATION** | | POWERGRID appd "Check list for Inspection of Prime CRGO for Transformers" vide ref no: C/QA&I/CRGO/fin_check_list dtd.17.07.05/ POWERGRID Technical Specifications/ IS 3024/ Marson's spec | POWERGRID appd "Check list for Inspection of Prime CRGO for Transformers" vide ref no: C/QA&I/CRGO/fin_check_list dtd.17.07.05/ POWERGRID Technical Specifications/ IS 3024/ Marson's spec | POWERGRID appd. "Check list for Inspection of Prime CRGO for Transformers" vide ref no: C/QA&I/CRGO/fin_check_list dtd.17.07.05/ POWERGRID Technical Specifications/ IS 3024/ Marson's spec | CMTC/ TPLC | | | | | **E** | | CIP as per POWERGRID appd. "Check list for Inspection of Prime CRGO for Transformers" vide ref no: C/QA&I/CRGO/fin_check_list dtd.17.07.05 |
| a) | Visual | Visual | | | | | **A/B** | **J/K** | **U** | **W/Z** | | **Y** | |
| b) | Thickness | Meas. | | | | | **A/B** | **J/K** | **U** | **W/Z** | | **Y** | |
| c) | Burr Level & bend Properties | Meas. | | | | | **D** | **L** | **V** | **W/Z** | | **Y** | |
| d) | Specific Loss | Meas. | | | | | **D** | **L** | **V** | **W/Z** | | **Y** | |
| e) | Magnetization Characteristics/ Permeability | Meas. | | | | | **D** | **L** | **V** | **W/Z** | | **Y** | |
| f) | Stacking factor | Meas. | | | | | **D** | **L** | **V** | **W/Z** | | **Y** | |
| g) | Ageing test | Meas. | | | | | **D** | **L** | **V** | **W/Z** | | **Y** | |

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## Section – 1 – RAW MATERIAL INSPECTION

| SR. NO. | COMPONENT OPERATIONS & DISCRIPTION TEST | TYPE OF CHECK | QUANT UM OF CHECK/SAMPLING WITH BASIS | REFERENCE DOCUMENT FOR TESTING | ACCEPTANCE NORMS | FORMAT OF RECORD | APPLICABLE CODES | | | | | | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | 1 | 2 | 3 | 4 | 5 | 6 | |
| **1.10** | **PAPER COVER/INSULATED COPPER CONDUCTOR (PICC)** | | IS 2500 Pt I Insp Level I AQL 4.0 | IS:13730/ Powergrid Spec | IS:13730/Power grid Spec | CMTC | | | | | **E** | | Review of Marson's test record/ mfr's. TC on surveillance basis |
| a) | Visual | Visual | | | | | **A/B** | **J/K** | **P/S** | **W/Z** | | **N** | |
| b) | Dimensional (Conductor/Overall/Covering Overlap) | Meas. | | | | | **A/B** | **J/K** | **P/S** | **W/Z** | | **N** | |
| c) | Resistivity/ Conductivity | Meas. | | | | | **B** | **K** | **P** | **W/Z** | | **N** | |
| d) | Mechanical Properties (Tensile Strength, elongation etc.) | Meas. | | | | | **B** | **K** | **P** | **W/Z** | | **N** | |



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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | 1 | 2 | 3 | 4 | 5 | 6 | |
| **1.10B** | **PAPER COVER/INSULATED ALUMINIUM CONDUCTOR (PIAC)** | | IS 2500 Pt I Insp Level I AQL 4.0 | IS:13730/ Powergrid Spec/ IS6162 | IS:13730/ Powergrid Spec/ IS 6162 | CMTC | | | | | **E** | | Review of Marson's test record/ mfr's. TC on surveillance basis |
| a) | Visual | Visual | | | | | **A/B** | **J/K** | **P/S** | **W/Z** | | **N** | |
| b) | Dimensional (Conductor/Overall/Covering Overlap) | Meas. | | | | | **A/B** | **J/K** | **P/S** | **W/Z** | | **N** | |
| c) | Resistivity/ Conductivity | Meas. | | | | | **B** | **K** | **P** | **W/Z** | | **N** | |
| d) | Mechanical Properties (Tensile Strength, elongation etc.) | Meas. | | | | | **B** | **K** | **P** | **W/Z** | | **N** | |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | 1 | 2 | 3 | 4 | 5 | 6 | |
| **1.10C** | **ENAMEL COVER/INSULATED COPPER/ALUMINUM CONDUCTOR (EICC/EIAC)** | | IS 2500 Pt I Insp Level I AQL 4.0 | IS:13730/ Powergrid Spec/ IS6162 | IS:13730/ Powergrid Spec/ IS6162 | CMTC | | | | | **E** | | Review of Marson's test record/ mfr's. TC on surveillance basis |
| a) | Visual | Visual | | | | | **A/B** | **J/K** | **P/S** | **W/Z** | | **N** | |
| b) | Dimensional (Bare Size/Covered Size) | Meas. | | | | | **A/B** | **J/K** | **P/S** | **W/Z** | | **N** | |
| c) | Resistivity/ Conductivity | Meas. | | | | | **B** | **K** | **P** | **W/Z** | | **N** | |
| d) | Mechanical Properties (Tensile strength/ Elongation etc) | Meas. | | | | | **B** | **K** | **P** | **W/Z** | | **N** | |



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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | 1 | 2 | 3 | 4 | 5 | 6 | |
| e) | Springness | Meas | | | | | **B** | **K** | **P** | **W/Z** | | **N** | |
| f) | Flexibility & Adherence | Meas. | | | | | **B** | **K** | **P** | **W/Z** | | **N** | |
| g) | Heat Shock | Meas. | | | | | **B** | **K** | **P** | **W/Z** | | **N** | |
| h) | Break down Voltage | Meas. | | | | | **B** | **K** | **P** | **W/Z** | | **N** | |
| i) | Temperature Index | Meas. | | | | | **B/D** | **K/L** | **P/V** | **W/Z** | | **N** | |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | 1 | 2 | 3 | 4 | 5 | 6 | |
| **1.11** | **KRAFT INSULATING PAPER** | | IS 2500 Pt I Insp Level I AQL 4.0 | IS:9335/ Powergrid | IS:9335/ Powergrid | CMTC | | | | | **E** | | Review of Marson's test record/ mfr's. TC on surveillance basis/Third party lab report on surveillance ba**sis** |
| a) | Dimensional/Thickness, density, air resistance, moisture content & ash content | Meas. | | | | | **B** | **K** | **P** | **W / Z** | | **N** | |
| b) | PH Value & aqueous extract conductivity | Meas. | | | | | **B** | **K** | **P** | **W / Z** | | **N** | |
| c) | Bursting Strength | Meas. | | | | | **B** | **K** | **P** | **W / Z** | | **N** | |
| d) | Elongation & Tensile Strength | Meas. | | | | | **B** | **K** | **P** | **W / Z** | | **N** | |



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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| e) | Di electric Strength | Meas. | | | | | **B** | **K** | **P** | **W /Z** | | **N** | |
| f) | Heat Stability (Type Test) | Meas. | | | | | **B** | **K** | **P** | **W /Z** | | **N** | |
| **1.12** | **VALVES** | | | Powergrid spec./ Marson's spec. no. MEI/QP/ QC (Rev: 02)/ IS778 | Powergrid spec./ Marson's spec. no. MEI/QP/ QC (Rev: 02)/ IS778 | CMTC | | | | | **E** | | Review of Marson's test record/ mfr's. TC on surveillance basis |
| a) | Visual | Visual. | 100% | | | | **A/ B** | **J/ K** | **P/ S** | **W /Z** | | **N** | |
| b) | Dimension | Meas. | 100% | | | | **B** | **K** | **P** | **W /Z** | | **N** | |
| c) | Body leakage test | Meas. | IS:778 | | | | **B** | **K** | **P** | **W /Z** | | **N** | |
| d) | Flap/Seat & Lever operation/spindle operation (if applicable) | Visual | IS:778 | | | | **B** | **K** | **P** | **W /Z** | | **N** | |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **1.13** | **TRANSFORMER OIL** | | IS:6855 | Powergrid spec./ IS:335 | Powergrid spec./ IS:335 | CMTC/ TPLC | | | | | **E** | | Review of Marson's test record/ mfr's. TC on surveillances basis |
| a) | Appearance | Visual | | | | | **A/B** | **J/K** | **P/S** | **W/Z** | | **N** | |
| b) | Density at 29.5 deg C | Meas. | | | | | **B** | **K** | **P** | **W/Z** | | **N** | |
| c) | Viscosity, Kinematics at 27 deg C | Meas. | | | | | **B** | **K** | **P** | **W/Z** | | **N** | |
| d) | Interfacial Tension at 27 deg C | Meas. | | | | | **B** | **K** | **P** | **W/Z** | | **N** | |
| e) | Flash Point | Meas. | | | | | **B** | **K** | **P** | **W/Z** | | **N** | |



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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | 1 | 2 | 3 | 4 | 5 | 6 | |
| f) | Pour Point | Meas. | | Powergrid spec./ IS:335 | Powergrid spec./IS:335 | | **B** | **K** | **P** | **W / Z** | | **N** | |
| g) | Neutralisation Value (i) Total Acidity (ii)Inorganic Acidity/Alkalinity | Meas. | | | | | **B** | **K** | **P** | **W / Z** | | **N** | |
| h) | Corrosive Sulpher Copper Strip corrosion at 140 deg C for 19hrs | Meas. | | | | | **B** | **K** | **P** | **W / Z** | | **N** | |
| i) | Electric Strength (B.D.Voltage) | Meas. | | | | | **B** | **K** | **P** | **W / Z** | | **N** | |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | 1 | 2 | 3 | 4 | 5 | 6 | |
| j) | Dielectric dissipation Factor at 90 deg C (Tan Delta) | Meas. | IS:6855 | Powergrid spec./ IS:335 | Powergrid spec./IS:335 | | B/D | K/L | P/V | W/Z | | N | Review of Marson's test record/ mfr's. TC on surveillance basis |
| k) | Resistivity at 90 deg C | Meas. | | | | | B/D | K/L | P/V | W/Z | | N | |
| l) | Resistivity at 27 deg C | Meas. | | | | | B/D | K/L | P/V | W/Z | | N | |
| m) | Oxidation Stability (i) Neutralization Value (ii) Total Sludge | Meas. | | | | | B/D | K/L | P/V | W/Z | | N | |
| n) | Presence of oxidation inhibitor | Meas. | | | | | B/D | K/L | P/V | W/Z | | N | |



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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | 1 | 2 | 3 | 4 | 5 | 6 | |
| o) | Water Content (PPM) | Meas. | IS:6855 | Powergrid spec./ IS:335 | Powergrid spec./IS:335 | | **B** | **K** | **P** | **W /Z** | | **N** | Review of Marson's test record/ mfr's. TC on surveillance basis |
| p) | Accelerated ageing at 115deg C for 96 hrs.. | Meas. | | | | | **B** | **K** | **P** | **W /Z** | | **N** | |
| **1.14)** | **INSULATING PRESS BOARD** | | IS:1576 | Powergrid Spec./ IS:1576/ Marson's Spec. MEI/QP/ QC (Rev: 02) | Powergrid Spec./IS:1576/ Marson's Spec. MEI/QP/ QC (Rev: 02) | CMTC | | | | | **E** | | Review of Marson's test record/ mfr's. TC on surveillance basis |
| a) | Visual | Visual | | | | | **A/ B** | **J/ K** | **P/ S** | **W /Z** | | **N** | |
| b) | Dimension/Thickness | Meas. | | | | | **B** | **K** | **P** | **W /Z** | | **N** | |
| c) | Density | Meas. | | | | | **B** | **K** | **P** | **W /Z** | | **N** | |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | 1 | 2 | 3 | 4 | 5 | 6 | |
| d) | Shrinkage in air | Meas. | IS:1576 | Powergrid Spec./ IS:1576/ Marson's Spec. MEI/QP/ QC (Rev: 02) | Powergrid Spec./ IS:1576/ Marson's Spec. MEI/QP/ QC (Rev: 02) | | B | K | P | W/Z | | N | Review of Marson's test record/ mfr. TC on surveillances basis |
| e) | Tensile Strength/Compressibilty | Meas. | | | | | B | K | P | W/Z | | N | |
| f) | Elongation | Meas. | | | | | B | K | P | W/Z | | N | |
| g) | Dielectric Strength/Electrical Strength | Meas. | | | | | B | K | P | W/Z | | N | |
| h) | Ash Content | Meas. | | | | | B | K | P | W/Z | | N | |
| i) | Moisture Content | Meas. | | | | | B | K | P | W/Z | | N | |
| j) | Conductivity of aqueous extracts PH Value. | Meas. | | | | | B | K | P | W/Z | | N | |



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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | 1 | 2 | 3 | 4 | 5 | 6 | |
| k) | Reaction with Hot oil/oil absorption | Meas. | IS:1576 | Powergrid Spec./ IS:1576/ Marson's Spec. MEI/QP/ QC (Rev: 02) | Powergrid Spec./ IS:1576/ Marson's Spec. MEI/QP/ QC (Rev: 02) | | **B** | **K** | **P** | **W /Z** | | **N** | |
| l) | Cohesion with Piles | Meas. | | | | | **B** | **K** | **P** | **W /Z** | | **N** | |
| **1.15** | **VARNISH (If applicable)** | | Marson's Spec. MEI/QP/ QC (Rev: 02) | POWERGRID spec./ Marson's Spec. MEI/QP/ QC (Rev: 02) | POWERGRID spec./ Marson's Spec. MEI/QP/ QC (Rev: 02) | CMTC | | | | | **N** | | Review of Marson's test record/ mfr's. TC on surveillance basis |
| a) | Visual | Visual | | | | | **A/ B** | **J/ K** | **P/ S** | **W /Z** | | **N** | |
| b) | Viscosity | Meas. | | | | | **B** | **K** | **P** | **W /Z** | | **N** | |
| **1.16** | **PRIMER** | | Marson's Spec. MEI/QP/ QC (Rev: 02) | POWERGRID spec./ Marson's Spec. MEI/QP/ QC (Rev: 02) | POWERGRID spec./ Marson's Spec. MEI/QP/ QC (Rev: 02) | CMTC | | | | | **N** | | Review of Marson's test record/ mfr's. TC on surveillance basis |
| a) | Visual | Visual | | | | | **A/ B** | **J/ K** | **P/ S** | **W /Z** | | **N** | |
| b) | Shade | Visual. | | | | | **A/ B** | **J/ K** | **P/ S** | **W /Z** | | **N** | |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | 1 | 2 | 3 | 4 | 5 | 6 | |
| **1.17** | **PAINT** | | Marson's Spec. MEI/QP/QC (Rev: 02) | POWERGRID spec./ Marson's Spec. MEI/QP/QC (Rev: 02) Powergrid appd. Painting procedures | POWERGRID spec./ Marson's Spec. MEI/QP/QC (Rev: 02) Powergrid appd. Painting procedures | CMTC | | | | | **N** | | Review of Marson's test record/ mfr's. TC on surveillance basis |
| a) | Visual | Visual | | | | | **A/B** | **J/K** | **P/S** | **W/Z** | | **N** | |
| b) | Shade | Visual | | | | | **B** | **K** | **P** | **W/Z** | | **N** | |
| c) | Viscosity | Meas. | | | | | **B** | **K** | **P** | **W/Z** | | **N** | |
| **1.18** | **INSULATING MATERIAL WOOD (IF APPLICABLE)** | | Marson's Spec. MEI/QP/QC (Rev: 02) | POWERGRID spec./ Marson's Spec. MEI/QP/QC (Rev: 02) | POWERGRID spec./ Marson's Spec. MEI/QP/QC (Rev: 02) | CMTC | | | | | **E** | | Review of Marson's test record/ mfr's. TC on surveillance basis |
| a) | Visual & dimensional | Visual, Meas. | | | | | **A/B** | **J/K** | **P/S** | **W/Z** | | **N** | |
| b) | Dielectric Strength | Meas. | | | | | **B** | **K** | **P** | **W/Z** | | **N** | |
| c) | Reaction of hot oil | Meas. | | | | | **B** | **K** | **P** | **W/Z** | | **N** | |



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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | 1 | 2 | 3 | 4 | 5 | 6 | |
| **1.19** | **BIMETALIC TERMINAL CONNECTOR (if applicable)** | | IS:5561 | POWERGRID spec./ IS:5561 Marson's Spec. MEI/QP/QC (Rev: 02) | POWERGRIDspec./IS:5561 Marson's Spec. MEI/QP/QC (Rev: 02) | CMTC | | | | | **E** | | Review of Marson's test record/ mfr's. TC on surveillance basis |
| a) | Visual & dimensional | Visual/ Meas. | | | | | **A/B** | **J/K** | **P/S** | **W/Z** | | **N** | |
| b) | Acceptance Test | Meas. | | | | | **B** | **K** | **P** | **W/Z** | | **N** | |
| c) | Type test (All type tests as Per the Contract in question need to be Conducted/approval from POWERGRID Engg. To be Obtained) | Meas. | As agreed By Powergrid engg. | As agreed by Powergrid engg. | As agreed by Powergrid engg. | CMTC/ TPLC | **B/D** | **K/L** | **U/V** | **W/Z** | | **N** | CIP (To be witnessed/ appd by POWERGRID Engg) |

| ITEM | DISTRIBUTION TRANSFORMER | MQP NO. | TXM 211 |
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## Section – 1 – RAW MATERIAL INSPECTION

| SR. NO. | COMPONENT OPERATIONS & DISCRIPTION TEST | TYPE OF CHECK | QUANT UM OF CHECK/SAMPLING WITH BASIS | REFERENCE DOCUMENT FOR TESTING | ACCEPTANCE NORMS | FORMAT OF RECORD | APPLICABLE CODES | | | | | | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | 1 | 2 | 3 | 4 | 5 | 6 | |
| **1.20** | **CABLE BOX (if applicable)** | | | POWER GRIDspec./ Marson's Spec. MEI/QP/QC (Rev: 02) | POWERGRID spec./Marson's Spec. MEI/QP/QC (Rev: 02) | CMTC/ EMTC/ | | | | | **E** | | Review of Marson's test record/ mfr's. TC on surveillance basis |
| a) | Visual | Visual | 100% | | | | **A/B** | **J/K** | **P/S** | **W/Z** | | **N** | |
| b) | Dimensions | Meas. | 100% | | | | **A/B** | **J/K** | **P/S** | **W/Z** | | **N** | |
| **1.21** | **PRESSURE RELIEF DEVICE (If applicable)** | | | POWER GRIDspec./ Marson's Spec. MEI/QP/QC (Rev: 02) | POWER GRIDspec./ Marson's Spec. MEI/QP/QC (Rev: 02) | CMTC | | | | | **E** | | |
| a) | Visual check | Visual | 100% | | | | **A/B** | **J/K** | **P/S** | **W/Z** | | **N** | Review of Marson's test record/ mfr's TC on surveillance basis |
| b) | Dimensions | Meas. | 100% | | | | **B** | **K** | **P** | **W/Z** | | **N** | |
| c) | Leakage test | Visual | 100% | | | | **B** | **K** | **P** | **W/Z** | | **N** | |



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| **CUSTOMER NAME** | **POWER GRID** | **VALID UPTO** | **31.07.2010** |
| **UNIQUE CODE NO.** | **24290 C** | | |

**Section – 1 – RAW MATERIAL INSPECTION**

| SR. NO. | COMPONENT OPERATIONS & DISCRIPTION TEST | TYPE OF CHECK | QUANT UM OF CHECK/SAMPLING WITH BASIS | REFERENCE DOCUMENT FOR TESTING | ACCEPTANCE NORMS | FORMAT OF RECORD | APPLICABLE CODES 1 | 2 | 3 | 4 | 5 | 6 | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| d) | Bursting pressure | Meas. | 1 No. | POWER GRIDspec./ Marson's Spec. MEI/QP/QC (Rev: 02) | POWER GRIDspec./ Marson's Spec. MEI/QP/QC (Rev: 02) | | **B** | **K** | **P** | **W/Z** | | **N** | |
| **1.22** | **EARTHING TERMINAL (if applicable)** | | | POWER GRIDspec./ Marson's Spec. MEI/QP/QC (Rev: 02) | POWER GRIDspec./ Marson's Spec. MEI/QP/QC (Rev: 02) | CMTC | | | | | **N** | | Review of Marson's test record/ mfr's. TC on surveillance basis |
| a) | Visual | Visual | 100% | | | | **A/B** | **J/K** | **P/S** | **W/Z** | | **N** | |
| b) | Dimension | Meas. | 100% | | | | **A/B** | **J/K** | **P/S** | **W/Z** | | **N** | |
| **1.23** | **RATING AND TERMINAL MARKING PLATE** | | | POWER GRIDspec./ Marson's Spec. MEI/QP/QC (Rev: 02)/Approved Drawings. | POWER GRIDspec./ Marson's Spec. MEI/QP/QC (Rev: 02)/Approved Drawings. | CMTC | | | | | **N** | | Review of Marson's test record/ mfr's. TC on surveillance basis |
| a) | Visual | Visual | 100% | | | | **A/B** | **J/K** | **P/S** | **W/Z** | | **N** | |
| b) | Dimension | Meas. | 100% | | | | **A/B** | **J/K** | **P/S** | **W/Z** | | **N** | |

| ITEM | DISTRIBUTION TRANSFORMER | MQP NO. | TXM 211 |
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| SR. NO. | COMPONENT OPERATIONS & DISCRIPTION TEST | TYPE OF CHECK | QUANTUM OF CHECK/SAMPLING WITH BASIS | REFERENCE DOCUMENT FOR TESTING | ACCEPTANCE NORMS | FORMAT OF RECORD | APPLICABLE CODES 1 | 2 | 3 | 4 | 5 | 6 | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **1.24** | **LIFTING LUGS** | | | POWER GRID spec./ Marson's Spec. MEI/QP/QC (Rev: 02) | POWER GRID spec./ Marson's Spec. MEI/QP/QC (Rev: 02) | CMTC | | | | | **E** | | Review of Marson's test record/ mfr's. TC on surveillance basis |
| a) | Visual | Visual | 100% | | | | **A/B** | **J/K** | **P/S** | **W** | | **N** | |
| b) | Dimension | Meas. | 100% | | | | **A/B** | **J/K** | **P/S** | **W** | | **N** | |
| c) | DP Test | Meas. | 100% | | | | **A/B** | **J/K** | **P/S** | **W** | | **N** | |
| **1.25** | **PLAIN ROLLER (if applicable)** | | | POWER GRID spec./ Marson's Spec. MEI/QP/QC (Rev: 02) | POWER GRID spec./ Marson's Spec. MEI/QP/QC (Rev: 02) | CMTC | | | | | **E** | | Review of Marson's test record/ mfr's. TC on surveillance basis |
| a) | Visual | Visual | 100% | | | | **A/B** | **J/K** | **P/S** | **W** | | **N** | |
| b) | Dimensions | Meas. | 100% | | | | **A/B** | **J/K** | **P/S** | **W** | | **N** | |
| **1.26** | **AIR RELEASE PLUG (If applicable)** | | | POWER GRID spec./ Marson's Spec. MEI/QP/QC (Rev: 02) | POWER GRID spec./ Marson's Spec. MEI/QP/QC (Rev: 02) | CMTC | | | | | **E** | | Review of Marson's test record/ mfr.'s TC on surveillance basis |
| a) | Visual | Visual | 100% | | | | **A/B** | **J/K** | **P/S** | **W** | | **N** | |
| b) | Dimensions | Meas. | 100% | | | | **A/B** | **J/K** | **P/S** | **W** | | **N** | |
| c) | Oil Leakage | Meas. | 100% | | | | **A/B** | **J/K** | **P/S** | **W** | | **N** | |
| d) | Air release check | Visual | 100% | | | | **A/B** | **J/K** | **P/S** | **W** | | **N** | |



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| **CUSTOMER NAME** | **POWER GRID** | **VALID UPTO** | **31.07.2010** |
| **UNIQUE CODE NO.** | **24290 C** | | |

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| SR. NO. | COMPONENT OPERATIONS & DISCRIPTION TEST | TYPE OF CHECK | QUANT UM OF CHECK/SAMPLING WITH BASIS | REFERENCE DOCUMENT FOR TESTING | ACCEPTANCE NORMS | FORMAT OF RECORD | APPLICABLE CODES | | | | | | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | 1 | 2 | 3 | 4 | 5 | 6 | |
| **1.27** | **MAGNETIC OIL LEVEL GAUGE (if applicable)** | | | POWER GRID spec./ Marson's Spec. MEI/QP/QC (Rev: 02) | POWER GRID spec./ Marson's Spec. MEI/QP/QC (Rev: 02) | CMTC | | | | | **E** | | Review of Marson's test record/ mfr's. TC on surveillance basis |
| a) | Visual | Visual | 100% | | | | **B** | **K** | **P** | **W/Z** | | **N** | |
| b) | Operation (alarm) | Meas. | 100% | | | | **B** | **K** | **P** | **W/Z** | | **N** | |
| c) | HV Test | Visual & Meas. | 100% | | | | **B** | **K** | **P** | **W/Z** | | **N** | |
| d) | IR | Meas. | 100% | | | | **B** | **K** | **P** | **W/Z** | | **N** | |
| e) | Leak Test | Meas. | 100% | | | | **B** | **K** | **P** | **W/Z** | | **N** | |

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| SR. NO. | COMPONENT OPERATIONS & DISCRIPTION TEST | TYPE OF CHECK | QUANT UM OF CHECK/SAMPLING WITH BASIS | REFERENCE DOCUMENT FOR TESTING | ACCEPTANCE NORMS | FORMAT OF RECORD | APPLICABLE CODES | | | | | | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | 1 | 2 | 3 | 4 | 5 | 6 | |
| **1.28** | **RADIATORS** | | | POWER GRID spec./Marson's Spec. MEI/QP/QC (Rev: 02)/ Powrgrid appd. Painting. procedures | POWER GRID spec./ Marson's Spec. MEI/QP/QC (Rev: 02)/ Powrgrid appd. Painting. procedures | CMTC | | | | | **E** | | Review of Marson's test record/ mfr. TC on surveillance basis |
| a) | Visual | Visual | 100% | | | | **A/B** | **J/K** | **P/S** | **W/Z** | | **N** | |
| b) | Dimensions | Meas. | 100% | | | | **B** | **K** | **P** | **W/Z** | | **N** | |
| c) | Leak Test | Meas. | 100% | | | | **B** | **K** | **P** | **W/Z** | | **N** | |
| d) | Painting checks shade, thickness & Adhesion | Meas. Visual | 100% | | | | **B** | **K** | **P** | **W/Z** | | **N** | |

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## Section – 2 – IN PROCESS INSPECTION

| SR. NO. | COMPONENT OPERATIONS & DISCRIPTION TEST | TYPE OF CHECK | QUANT UM OF CHECK/SAMPLING WITH BASIS | REFERENCE DOCUMENT FOR TESTING | ACCEPTANCE NORMS | FORMAT OF RECORD | 1 | 2 | 3 | 4 | 5 | 6 | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **2.01** | **TRANSFORMERTANK CONSERVATOR & ACCESSORIES INCLUDING PIPE WORK** | | | POWER GRID Specs./ POWER GRID appd. Welding procedures/ASME section IX | POWERGRID specs./POWER GRID appd. Welding procedures/ ASME section IX | CMTC | | | | | **E** | | Review of POWERGRID approvals. |
| a) | Welder Qualification & welding procedure specification. | Review | 100 % | | | | **D** | **L** | **V** | **W /Z** | | **N** | |
| b) | Visual & Dimensions | Visual/ Meas. | 100% | POWER GRID spec./ Appd drg/ Appd Painting Procedures/ Marson's Spec. MEI/QP/QC (Rev: 02) | POWER GRID spec./ Appd. .drg../ Appd. Painting. Procedures/ Marson's Spec. MEI/QP/QC (Rev: 02) | | **A** | **J** | **S** | **W /Z** | | **N** | Review of Marson's test record/ mfr's. TC on surveillance basis |
| c) | DP test | Visual/ Meas. | 100% | POWER GRID spec./ Appd drg./ Marson's Spec. MEI/QP/QC (Rev: 02) | POWER GRID spec./ Appd drg./ Marson's Spec. MEI/QP/QC (Rev: 02) | | **A** | **J** | **S** | **W /Z** | | **N** | |

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| ITEM | DISTRIBUTION TRANSFORMER | MQP NO. | TXM 211 |
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## Section – 2 – IN PROCESS INSPECTION

| SR. NO. | COMPONENT OPERATIONS & DISCRIPTION TEST | TYPE OF CHECK | QUANT UM OF CHECK/SAMPLING WITH BASIS | REFERENCE DOCUMENT FOR TESTING | ACCEPTANCE NORMS | FORMAT OF RECORD | APPLICABLE CODES | | | | | | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | 1 | 2 | 3 | 4 | 5 | 6 | |
| d) | Air pressure test/ Leakage test | Visual. | 100% | POWER GRID spec./ Appd. .drg./ Marson's Spec. MEI/QP/QC (Rev: 02) / Appd Pressure test Procedure. | POWER GRID spec./ Appd. .drg./ Marson's Spec. MEI/QP/QC (Rev: 02) / Appd Pressure test Procedure | | A | J | P | W / Z | | N | Review of Marson's test record/ mfr's. TC on surveillance basis |
| e) | Type test (All type tests on tank as per the contract in question need to be conducted /approval from Powergrid engg. To be obtained. | Meas. | AS agreed with POWERGRID Engg. | As agreed with POWER GRID Engg. | As agreed with POWERGRID Engg. | | A | J | U | W / Z | | Y | CIP (to be witnessed/appd. by POWERGRID Engg.) |



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**Section – 2 – IN PROCESS INSPECTION**

| SR. NO. | COMPONENT OPERATIONS & DISCRIPTION TEST | TYPE OF CHECK | QUANT UM OF CHECK/SAMPLING WITH BASIS | REFERENCE DOCUMENT FOR TESTING | ACCEPTANCE NORMS | FORMAT OF RECORD | APPLICABLE CODES | | | | | | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | 1 | 2 | 3 | 4 | 5 | 6 | |
| **f)** | Painting Checks - shade, thickness & adhesion | Visual Meas. | 100% | POWER GRID spec./ Appd. .drg../ Appd. Painting. Procedures/ Marson's Spec. MEI/QP/QC (Rev: 02) | POWER GRID spec./ Appd. .drg../ Appd. Painting. Procedures/ Marson's Spec. MEI/QP/QC (Rev: 02) | EMTC | **A** | **J** | **S** | **W / Z** | | **N** | Review of Marson's test record/ mfr's. TC on surveillance basis |
| **2.02** | **FRAME PARTS** | | | | | | | | | | | | |
| a) | Visual & Dimensions | Visual Meas. | 100% | POWER GRID spec./ Appd. .drg../ Appd. Painting. Procedures/ Marson's Spec. MEI/QP/QC (Rev: 02) | POWER GRID spec./ Appd. .drg../ Appd. Painting. Procedures/ Marson's Spec. MEI/QP/QC (Rev: 02) | | **A** | **J** | **S** | **W / Z** | | **N** | Review of Marson's test record/ mfr's. TC on surveillance basis |
| b) | Painting check – shade thickness & adhesion | Meas. Visual | 100% | | | | **A** | **J** | **S** | **W / Z** | | **N** | |

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| SR. NO. | COMPONENT OPERATIONS & DISCRIPTION 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 | |
| **2.03** | **MARSHALLING BOX (Surface cleaning by 7 tank chemical process as per Powergrid approved painting procedure) If applicable** | | | POWER GRID spec/ Appd drg/ Appd Painting Procedures/ Marson's Spec MEI/QP/QC (Rev: 02) | POWER GRID spec./ Appd drg/ Appd Painting Procedures/ Marson's Spec MEI/QP/QC (Rev: 02) | CMTC | | | | | | | Review of Marson's test record/ mfr's. TC on surveillance basis |
| a) | Visual check (including workmanship of internal arrangements, ferruling, labeling, access etc. dimensions, paint shade thickness and adhesion test) | Visual | 100% | | | | **A/B** | **J/K** | **P/S** | **W/Z** | | **N** | |
| b) | Dimensions | Meas | 100% | | | | **A/B** | **J/K** | **P/S** | **W/Z** | | **N** | |



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| SR. NO. | COMPONENT OPERATIONS & DISCRIPTION TEST | TYPE OF CHECK | QUANT UM OF CHECK/SAM PLING WITH BASIS | REFERENCE DOCUMENT FOR TESTING | ACCEPTANCE NORMS | FORMAT OF RECORD | APPLICABLE CODES | | | | | | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | 1 | 2 | 3 | 4 | 5 | 6 | |
| c) | Terminal arrangement/ferruling /labeling | Meas. | 100% | | | | A/B | J/K | P/S | W/Z | | N | |
| d) | Paint thickness, shade & paint adhesion | Visual | 100% | | | | A/B | J/K | P/S | W/Z | | N | |
| e) | Routine test (H.V. tests, IR test, wiring & Functional check, interlock, make & type of components.) | Meas. | 100% | | | | A/B | J/K | P/S | W/Z | | N | |

| ITEM | DISTRIBUTION TRANSFORMER | MQP NO. | TXM 211 |
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| SR. NO. | COMPONENT OPERATIONS & DISCRIPTION TEST | TYPE OF CHECK | QUANT UM OF CHECK/SAMPLING WITH BASIS | REFERENCE DOCUMENT FOR TESTING | ACCEPTANCE NORMS | FORMAT OF RECORD | APPLICABLE CODES | | | | | | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | 1 | 2 | 3 | 4 | 5 | 6 | |
| g) | Type test (All type tests as per the contract in question need to be conducted/approval from POWERGRID Engg. to be obtained.) | Meas. | As agreed With POWER GRID Engg. | As agreed With POWER GRID Engg | As per contract/ Approved spec. | | **B/D** | **K/L** | **U/V** | **W/Z** | | **Y** | CIP (to be witnessed/ approved by POWERGRID Engg. |
| **2.04** | **CORE & FRAME ASSEMBLY** | | POWERGRID appd "Check list for Inspection of Prime CRGO for Transformers" vide ref no: C/QA&I/CRGO/fin_check_list dtd.17.07.05 | POWER GRID spec./ Appd drg/ Marson's Spec. MEI/QP/QC (Rev: 02)/ POWERGRID appd "Check list for Inspection of Prime CRGO for Transformers" vide ref no: C/QA&I/ CRGO/fin_check_list dtd.17.07.05 | POWER GRID spec/Appd drg/ Marson's Spec. MEI/QP/ QC(Rev:02)/ POWERGRID appd "Check list for Inspection of Prime CRGO for Transformers" vide ref no: C/QA&I/CRGO/ fin_check_list dtd.17.07.05 | EMTC | | | | | | | |
| a) | (i) Visual, Dimension<br>(ii) Check of quality of Varnish Used (if applicable) | Visual<br>Meas. | | | | | **A**<br>**A** | **J**<br>**J** | **U**<br>**S** | **W/Z**<br>**W/Z** | | **Y**<br>**N** | CIP for the tests/checks as per Ref: C/QA&I/ CRGO/ Fin_check_list dtd.17.07.05/ at the time of core building |



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| SR. NO. | COMPONENT OPERATIONS & DISCRIPTION TEST | TYPE OF CHECK | QUANT UM OF CHECK/SAMPLING WITH BASIS | REFERENCE DOCUMENT FOR TESTING | ACCEPTANCE NORMS | FORMAT OF RECORD | APPLICABLE CODES | | | | | | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | 1 | 2 | 3 | 4 | 5 | 6 | |
| b) | Core Loss/Iron loss & check for any hot spot as Per POWERGRID Tech.Spec. | Meas. | 100% | POWER GRID spec./ Appd. .drg../ Marson's Spec. MEI/QP/QC (Rev: 02) | POWER GRID spec./ Appd. .drg../ Marson's Spec. MEI/QP/QC (Rev: 02) | | **A** | **J** | **S** | **W /Z** | | **N** | |
| c) | H.V.Test (Flash Test) (if applicable) | Meas. | | | | | **A** | **J** | **S** | **W /Z** | | **N** | |
| **2.05** | **WINDING** | | | POWER GRID spec./ Marson's Spec. MEI/QP/QC (Rev: 02) | POWER GRID spec./ Marson's Spec. MEI/QP/QC (Rev: 02) | EMTC | | | | | | | |
| a) | Inside & Outside Diameter | Meas. | 100% | | | | **A** | **J** | **S** | **W /Z** | | **N** | Review of Marson's test record on surveillance basis |
| b) | Dimension of Coil | Meas. | 100% | | | | **A** | **J** | **S** | **W /Z** | | **N** | |
| c) | Insulation Arrangements | Visual | 100% | | | | **A** | **J** | **S** | **W /Z** | | **N** | |

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|---|---|---|---|
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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | 1 | 2 | 3 | 4 | 5 | 6 | |
| d) | Transposition (if applicable) | Visual | 100% | POWER GRID spec./ Marson's Spec. MEI/QP/QC (Rev: 02) | POWER GRID spec./ Marson's Spec. MEI/QP/QC (Rev: 02) | | A | J | S | W /Z | | N | |
| e) | Joints Checks | Visual | 100% | | | | A | J | S | W /Z | | N | |
| f) | Brazing Procedure & Brazer's qualification | Visual | 100% | ASME IX Spec/ POWERGRID appd brazing procedure | ASME IX Spec / POWERGRID appd brazing procedure | | A | J | S | W /Z | | N | Review of POWERGRID approval for brazing procedure specn & Brazing qualification |
| **2.06)** | **CORE & COIL ASSEMBLY** | | | | | EMTC | | | | | | | |
| a) | Axial & Radial Insulating arrangement/ Clearance | Meas. | 100% | POWER GRID spec./ Marson's Spec. MEI/QP/QC (Rev: 02) | POWER GRID spec./ Marson's Spec. MEI/QP/QC (Rev: 02) | | A | J | S | W /Z | | N | Review of MARSON'S Test record on surveillance basis |



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| **ITEM** | **DISTRIBUTION TRANSFORMER** | **MQP NO.** | **TXM 211** |
| **CUSTOMER NAME** | **POWER GRID** | **VALID UPTO** | **31.07.2010** |
| **UNIQUE CODE NO.** | **24290 C** | | |

**Section – 2 – IN PROCESS INSPECTION**

| SR. NO. | COMPONENT OPERATIONS & DISCRIPTION TEST | TYPE OF CHECK | QUANT UM OF CHECK/SAMPLING WITH BASIS | REFERENCE DOCUMENT FOR TESTING | ACCEPTANCE NORMS | FORMAT OF RECORD | APPLICABLE CODES | | | | | | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | 1 | 2 | 3 | 4 | 5 | 6 | |
| b) | Position of lead out | Visual | 100% | POWER GRID spec./ Marson's Spec. MEI/QP/QC (Rev: 02) | POWER GRID spec./ Marson's Spec. MEI/QP/QC (Rev: 02) | | **A** | **J** | **S** | **W /Z** | | **N** | |
| c) | HV & LV Connection to the Bushing/tightness of Joints | Visual | 100% | | | | **A** | **J** | **S** | **W /Z** | | **N** | |
| d) | Assembly of Tap Switch (if applicable) | Visual | 100% | | | | **A** | **J** | **S** | **W /Z** | | **N** | |
| e) | Visual/Finishing of Insulation on brazed joints. | Visual | 100% | | | | **A** | **J** | **S** | **W /Z** | | **N** | |
| f) | Clamping of Lead | Visual | 100% | | | | **A** | **J** | **S** | **W /Z** | | **N** | |

| ITEM | DISTRIBUTION TRANSFORMER | MQP NO. | TXM 211 |
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| CUSTOMER NAME | POWER GRID | VALID UPTO | 31.07.2010 |
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**Section – 2 – IN PROCESS INSPECTION**

| SR. NO. | COMPONENT OPERATIONS & DISCRIPTION TEST | TYPE OF CHECK | QUANT UM OF CHECK/SAMPLING WITH BASIS | REFERENCE DOCUMENT FOR TESTING | ACCEPTANCE NORMS | FORMAT OF RECORD | APPLICABLE CODES | | | | | | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | 1 | 2 | 3 | 4 | 5 | 6 | |
| g) | Flash Test (HV Test) for Core Clamp/Core Bolt & Frame (If applicable as per Design) | Meas. | 100% | POWER GRID spec./ Marson's Spec. MEI/QP/QC (Rev: 02) | POWER GRID spec./ Marson's Spec. MEI/QP/QC (Rev: 02) | | **A** | **J** | **S** | **W /Z** | | **N** | |
| h) | Ratio test | Meas. | 100% | | | | **A** | **J** | **S** | **W /Z** | | **N** | |
| i) | Polarity & Vector Group | Meas. | 100% | | | | **A** | **J** | **S** | **W /Z** | | **N** | |
| j) | No Load currents | Meas. | 100% | | | | **A** | **J** | **S** | **W /Z** | | **N** | |
| **2.07** | **DRYING OF CORE & COIL ASSEMBLY** | | | POWER GRID spec./ Marson's Spec. MEI/QP/QC (Rev: 02) | POWER GRID spec./ Marson's Spec. MEI/QP/QC (Rev: 02) | EMTC | | | | | | | Review of MARSON'S Test record on surveillance basis |
| a) | Temperature of oven | Meas. | 100% | | | | **A** | **J** | **S** | **W /Z** | | **N** | |



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**Section – 2 – IN PROCESS INSPECTION**

| SR. NO. | COMPONENT OPERATIONS & DISCRIPTION TEST | TYPE OF CHECK | QUANTUM OF CHECK/SAMPLING WITH BASIS | REFERENCE DOCUMENT FOR TESTING | ACCEPTANCE NORMS | FORMAT OF RECORD | APPLICABLE CODES 1 | 2 | 3 | 4 | 5 | 6 | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| b) | Time duration of Drying | Meas. | 100% | | | | A | J | S | W/Z | | N | |
| c) | IR Check of winding for end of Drying Cycle | Meas. | 100% | | | | A | J | S | W/Z | | N | |
| **2.08** | **TANKING INCLUDING OIL IMPREGNATION** | | | POWER GRID spec./ Marson's Spec. MEI/QP/QC (Rev: 02) | POWER GRID spec./ Marson's Spec. MEI/QP/QC (Rev: 02) | EMTC | | | | | | | Review of MARSON'S Test record on surveillance basis |
| a) | Clamping of winding | Visual | 100% | | | | A | J | S | W/Z | | N | |
| b) | Job locking | Visual | 100% | | | | A | J | S | W/Z | | N | |
| c) | Visual | Visual | 100% | | | | A | J | S | W/Z | | N | |

| ITEM | DISTRIBUTION TRANSFORMER | MQP NO. | TXM 211 |
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## Section – 2 – IN PROCESS INSPECTION

| SR. NO. | COMPONENT OPERATIONS & DISCRIPTION TEST | TYPE OF CHECK | QUANT UM OF CHECK/SAMPLING WITH BASIS | REFERENCE DOCUMENT FOR TESTING | ACCEPTANCE NORMS | FORMAT OF RECORD | APPLICABLE CODES | | | | | | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | 1 | 2 | 3 | 4 | 5 | 6 | |
| d) | Dimensions | Meas. | 100% | | | | A | J | S | W/Z | | N | |
| e) | Level of Vacuum | Meas. | 100% | | | | A | J | S | W/Z | | N | |
| f) | Start & end of Oil Filling under Vacuum | Visual | 100% | | | | A | J | S | W/Z | | N | |
| **2.09** | **COMPLETE TRANSFORMER ASSEMBLY** | | | POWER GRID spec/Appd Drawing/ Marson's Spec. MEI/QP/QC (Rev: 02) | POWER GRID spec/Appd Drawing/ Marson's Spec. MEI/QP/QC (Rev: 02) | EMTC | | | | | | | Review of MARSON'S Test record on surveillance basis |
| a) | Dimension Measurement of Air clearance & completeness | Meas. | 100% | | | | A | J | S | W/Z | | N | |



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| **ITEM** | **DISTRIBUTION TRANSFORMER** | **MQP NO.** | **TXM 211** |
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**Section – 2 – IN PROCESS INSPECTION**

| SR. NO. | COMPONENT OPERATIONS & DISCRIPTION TEST | TYPE OF CHECK | QUANT UM OF CHECK/SAMPLING WITH BASIS | REFERENCE DOCUMENT FOR TESTING | ACCEPTANCE NORMS | FORMAT OF RECORD | APPLICABLE CODES | | | | | | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | 1 | 2 | 3 | 4 | 5 | 6 | |
| b) | Mounting of Fitting & accessories | Meas. | 100% | POWER GRID spec./Appr. Drawing/ Marson's Spec. MEI/QP/QC (Rev: 02)/Power grid appd. painting procedure | POWER GRID spec./Appr. Drawing/ Marson's Spec. MEI/QP/QC (Rev: 02) /POWERGRID Appd. painting procedure | | **A** | **J** | **S** | **W /Z** | | **N** | |
| c) | Earth Continuity connection | Visual | 100% | | | | **A** | **J** | **S** | **W /Z** | | **N** | |
| d) | Painting Checks, Shade, thickness & adhesion | Meas. Visual | 100% | | | | **A** | **J** | **S** | **W /Z** | | **N** | |

| ITEM | DISTRIBUTION TRANSFORMER | MQP NO. | TXM 211 |
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| CUSTOMER NAME | POWER GRID | VALID UPTO | 31.07.2010 |
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## Section – 3 – FINAL INSPECTION & TESTING

| SR. NO. | COMPONENT OPERATIONS & DISCRIPTION TEST | TYPE OF CHECK | QUANT UM OF CHECK/SAMPLING WITH BASIS | REFERENCE DOCUMENT FOR TESTING | ACCEPTANCE NORMS | FORMAT OF RECORD | APPLICABLE CODES | | | | | | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | 1 | 2 | 3 | 4 | 5 | 6 | |
| **3.1** | **ROUTINE TESTS** | | | | | | | | | | | | |
| a) | Ratio Test | Meas. | 100% | IS:2026/ Powergrid Spec./ power grid Appd drawing /powergrid Appd technical data sheet | IS:2026/ Powergrid Spec./ Powergrid Appd drawings/ powergrid Appd technical data sheet | EMTC | **A** | **J** | **U** | **Y** | | **Y** | CIP |
| b) | Vector Group test/ Polarity | Meas. | 100% | | | | **A** | **J** | **U** | **Y** | | **Y** | CIP |
| c) | Winding Resistance test | Meas. | 100% | | | | **A** | **J** | **U** | **Y** | | **Y** | CIP |



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**Section – 3 – FINAL INSPECTION & TESTING**

| SR. NO. | COMPONENT OPERATIONS & DISCRIPTION TEST | TYPE OF CHECK | QUANT UM OF CHECK/SAMPLING WITH BASIS | REFERENCE DOCUMENT FOR TESTING | ACCEPTANCE NORMS | FORMAT OF RECORD | APPLICABLE CODES | | | | | | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | 1 | 2 | 3 | 4 | 5 | 6 | |
| d) | Insulation resistance/Meggar test | Meas. | 100% | IS:2026/ Powergrid Spec./ power grid Appd. drawing /powergrid Appd. technical data sheet | IS:2026/ Powergrid Spec./ power grid Appd. drawing /powergrid Appd. technical data sheet | EMTC | **A** | **J** | **U** | **Y** | | **Y** | CIP |
| e) | Impedance voltage/Load loss | Meas. | 100% | | | | **A** | **J** | **U** | **Y** | | **Y** | CIP |
| f) | Measurement of No-load loss and exciting current | Meas. | 100% | | | | **A** | **J** | **U** | **Y** | | **Y** | CIP |
| g) | High Voltage test | Meas. | 100% | | | | **A** | **J** | **U** | **Y** | | **Y** | CIP |
| h) | Measurement of magnetizing current | Meas. | 100% | | | | **A** | **J** | **U** | **Y** | | **Y** | CIP |

| ITEM | DISTRIBUTION TRANSFORMER | MQP NO. | TXM 211 |
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## Section – 3 – FINAL INSPECTION & TESTING

| SR. NO. | COMPONENT OPERATIONS & DISCRIPTION TEST | TYPE OF CHECK | QUANT UM OF CHECK/SAMPLING WITH BASIS | REFERENCE DOCUMENT FOR TESTING | ACCEPTANCE NORMS | FORMAT OF RECORD | APPLICABLE CODES | | | | | | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | 1 | 2 | 3 | 4 | 5 | 6 | |
| i) | Magnetic balance test | Meas. | 100% | IS:2026/ Powergrid Spec/ power grid Appd. drawing /powergrid Appd. technical data sheet | IS:2026/ Powergrid Spec/ power grid Appd drawing /powergrid Appd. technical data sheet | EMTC | A | J | U | Y | | Y | CIP |
| j) | Repeat no-load loss measurement | Meas. | 100% | | | | A | J | U | Y | | Y | CIP |
| k) | Di-Electric test, as applicable (Induced over voltage test, separate source voltage test etc.) | Meas. | 100% | | | | A | J | U | Y | | Y | CIP |
| l) | Test on Transformer Oil | Meas. | 100% | POWERGRID spec/ IS1866/ POWERGRID appd oil test procedure | POWERGRID spec/ IS1866/ POWERGRID appd oil test procedure | | A / D | J/ L | S/ V | W /Z | | Y | CIP as per Powergrid approved procedure for inspection of oil |
| m) | Dye Penetration test, Jacking test & Leakage test on complete transformer assembly. | Meas. | 100% | IS:2026/ Powergrid Spec/ Appd drawing / Appd technical data sheet | IS:2026/ Powergrid Spec/ power grid Appd drawing / powergrid Appd. technical data sheet | | A | J | U | Y | | Y | CIP |



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**Section – 3 – FINAL INSPECTION & TESTING**

| SR. NO. | COMPONENT OPERATIONS & DISCRIPTION TEST | TYPE OF CHECK | QUANT UM OF CHECK/SAMPLING WITH BASIS | REFERENCE DOCUMENT FOR TESTING | ACCEPTANCE NORMS | FORMAT OF RECORD | APPLICABLE CODES | | | | | | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | 1 | 2 | 3 | 4 | 5 | 6 | |
| n) | Visual, Dimensional checks, air clearance & Paint checks on complete Transformer assembly (paint checks, shade, thickness & adhesion) | Visual Meas. | 100% | IS:2026/ Powergrid Spec/ power grid Appd drawing/ powergrid Appd technical data sheet and painting procedure | IS:2026/ Powergrid Spec/ power grid Appd drawing / powergrid Appd technical data sheet and painting procedure | EMTC | **A** | **J** | **U** | **Y** | | **Y** | CIP |
| o) | Marshalling Box (if applicable | Meas. | | | | | | | | | | | |
| i) | Visual Check & Paint Check-Shade Thickness & Adhesion | Meas. Visual | 100% | | | | **A** | **J** | **U** | **Y** | | **Y** | CIP |

| ITEM | DISTRIBUTION TRANSFORMER | MQP NO. | TXM 211 |
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## Section – 3 – FINAL INSPECTION & TESTING

| SR. NO. | COMPONENT OPERATIONS & DISCRIPTION TEST | TYPE OF CHECK | QUANT UM OF CHECK/SAMPLING WITH BASIS | REFERENCE DOCUMENT FOR TESTING | ACCEPTANCE NORMS | FORMAT OF RECORD | APPLICABLE CODES | | | | | | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | 1 | 2 | 3 | 4 | 5 | 6 | |
| ii) | Dimensions | Meas. | 100% | Powergrid Spec./ power grid Appd. drawing /powergrid Appd. technical data sheet | Powergrid Spec./ power grid Appd. drawing /powergrid Appd. technical data sheet | EMTC | **A** | **J** | **U** | **Y** | | **Y** | CIP |
| iii) | H.V. Test, IR Test, Wiring & functional checks, interlock, make & type of components. | Meas. | 100% | | | EMTC | **A** | **J** | **U** | **Y** | | **Y** | CIP |
| **3.02** | **TYPE TEST & SPECIAL TESTS** | | | | | EMTC/ TPLC | | | | | | | |
| | (All Type tests & Special tests required as per the contract in question need to be conducted/approval from POWERGRID Engg. to be obtained ) | Meas. | As agreed with POWERGRID Engg. | As agreed with POWERGRID Engg | As agreed with POWERGRID Engg | | **A/D** | **J/L** | **U** | **Y** | | **Y** | CIP (to be witnessed/approved by POWERGRID Engg.) |

| | | |
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| **CUSTOMER NAME** | **POWER GRID** | **VALID UPTO** | **31.07.2010** |
| **UNIQUE CODE NO.** | **24290 C** | | |

**Section – 4 – PACKING AND DESPATCH**

| SR. NO. | COMPONENT OPERATIONS & DISCRIPTION TEST | TYPE OF CHECK | QUANT UM OF CHECK/SAMPLING WITH BASIS | REFERENCE DOCUMENT FOR TESTING | ACCEPTANCE NO | FORMAT OF RECORD | APPLICABLE CODES | | | | | | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | 1 | 2 | 3 | 4 | 5 | 6 | |
| 4.01 | Pre-shipment check interchangeability of components of similar transformers & for mounting dimensions | Visual | On each Transformer | POWERGRID spec. | POWERGRID spec. | EMTC | **A** | **J** | **S** | **W** | | **N** | |
| 4.02 | Verification of completeness of accessories | Visual | 100% | POWERGRID spec./ Approved drawing/ Marson's dispatch instruction | POWERGRID spec./Approved drawing/ Marson's dispatch instruction | | **A** | **J** | **S** | **W** | | **N** | |

| ITEM | DISTRIBUTION TRANSFORMER | MQP NO. | TXM 211 |
|---|---|---|---|
| CUSTOMER NAME | POWER GRID | VALID UPTO | 31.07.2010 |
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## Section – 4 – PACKING & DESPATCH

| SR. NO. | COMPONENT OPERATIONS & DISCRIPTION TEST | TYPE OF CHECK | QUANT UM OF CHECK/SAMPLING WITH BASIS | REFERENCE DOCUMENT FOR TESTING | ACCEPTANCE NORMS | FORMAT OF RECORD | APPLICABLE CODES | | | | | | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | 1 | 2 | 3 | 4 | 5 | 6 | |
| 4.03 | Check for soundness of packing of accessories and fitting like radiators, bushing s, explosion vent, dehydration breather, buchholz relay, conservator etc. | Visual | On each Transformer | POWERGRID spec/ Approved drawing/ Marson's dispatch instruction/ Marson's packing list. | POWERGRID spec./ Approved drawing/ Marson's dispatch instruction/ Marson's packing list. | | A | J | S | W | | N | |
| 4.04 | Verification of CIP/MICC reference on packing cases | Visual | 100% | | | | A | J | S | W | | N | |



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| **ITEM** | **DISTRIBUTION TRANSFORMER** | **MQP NO.** | **TXM 211** |
| **CUSTOMER NAME** | **POWER GRID** | **VALID UPTO** | **31.07.2010** |
| **UNIQUE CODE NO.** | **24290 C** | | |

1. This MQP should be read in conjunction with POWERGRID specification and shall deem to include additional tests if any required as per the contract.

2. POWERGRID specification shall include provision of letter of Award (LOA) , POWERGRID approved drawings / technical data sheet / BOM / Test schedule / test procedure applicable to the specific contract.

3. In case of any contradiction between MARSON's, Agra plant standards and POWERGRID specification , the latter shall prevail.

4. Wherever Indian / International technical Standards are referred their latest amendments shall be include. The same is applicable in case of MARSON's Agra specification also, so long as these changes are made with the approval of competent authority of MARSON's, Agra.

5. It is the responsibility of the MARSON's, Agra to ensure that this document is readily available at their works as well as at the works of sub-vendor in order to avoid any delay at the time of inspection.

6. MARSON'S, Agra shall ensure that their as well as their sub-vendor's Control , Metering and Testing instruments are duly calibrated and should have ' Calibration certificates traceable to Indian / International standards . Calibration records should be made available during inspection by POWERGRID. Key instruments will be calibrated only by NABL accredited laboratories.

7. In case of any test is being carried out at the Third Party recognized Lab such lab / facility should be NABL accredited / approved by POWERGRID.

8. All raw material / bought-out items/ out source services should be from POWERGRID approved sources only.

9. MARSON's, Agra shall maintain the proper co-ordination of test certificates from raw material stage to finished stage and records should be available during inspection by POWERGRID.

10. MARSON's, Agra shall show the approval of POWERGRID Engineering for all contract specific Type Tests including special tests if any as per the POWERGRID specification , at the time of Final inspection.

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| **ITEM** | **DISTRIBUTION TRANSFORMER** | **MQP NO.** | **TXM 211** |
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11. All the packing cases should be marked with POWERGRID LOA details , name of the Project , Item description and CIP / MICC number ( by which material has been cleared for dispatch )

12. One copy of test report, CIP & MICC shall also be sent along with the consignment.

13. Inspection of spare items ordered by POWERGRID shall be governed by the provisions of this MQP. Items if not covered under MQP shall be offered for inspection as per POWERGRID specifications / Relevant Indian / International Specification.

14. Surveillance checks wherever applicable in the MQP, shall be carried out by POWERGRID as and when deemed necessary. No inspection call is required to be given for surveillance checks.

15.Any material rejected during POWERGRID inspection shall be disposed off with the approval of POWERGRID. For destructive disposal POWERGRID may depute its representative for witnessing. In case Material is to be returned to sub-vendor, all such items shall be indelibly marked (to prevent mixing) at the works of the MARSON's, Agra and offered to POWERGRID for verification of marking.

16. MARSON's, Agra shall align their Quality System and that of their sub-vendors to the requirements of latest series of ISO 9000Quality Standards in a time bound manner.

17. Painting shall be carried out as per POWERGRID approved painting procedure. Welding and Brazing shall be carried out as per POWERGRID approved welding/brazing procedures which shall be submitted for approval of POWERGRID, if not submitted earlier.

18. Type test reports of major items such as Buchholz Relay, Oil & Winding Temperature Indicator (Local & Remote) etc shall be submitted to POWERGRID Engg. for their review / Approval as per Contract Technical Specification

19. This MQP is a standard MQP for DISTRIBUTION TRANSFORMER for POWERGRID to be manufactured at the works **MARSON'S ELECRICAL INDUSTRIES, AGRA**.

**HBL POWER SYSTEMS LIMITED**
**RECTIFIER DIVISION**
**QUALITY ASSURANCE PLAN OF BATTERY CHARGERS**

Customer :
Contractor :
Project :
P.O. No :
PE Job No. :
Type of Unit :

Ref. No : PSQ / P119C
Date : 20.10.06
Sheet : 1 of 12

1. INWARD MATERIAL INSPECTION:

1. Console
2. Transformer
3. Choke
4. Thyristor
5. Power Diode
6. MCCB/MCB
7. Capacitor
8. Meters
9. Contactor
10. Rotary Switch
11. Fuses

2. SUB ASSEMBLY:

1. Magnetics
2. Rectifier
3. Capacitor Bank
4. Mounting Plates & Cutout Plates
5. Populated PCB
6. Wiring

3. PERFORMANCE TESTS:

4. PACKING / DESPATCH :

Abbreviations Used: A – Actual / Perform, S – Operation, R – Review, W – Witness of Inspection
TI – Test Instruction, MPI – Manufacturing Process Instruction, BOM – Bill of Material, PO – Purchase Order
MTR – Manufacturer Test Report, AQL – Accepted Quality Level, HPS – HBL Power Systems Ltd.,

| Prepared by : | Approved by : |
|---|---|
| Date : 20.10.2006 | Date : 20.10.2006 |

Ref. No.: PSQ / P119C

| Sl. No | Compo-nents | Quality Characteristics | Classifi-cation | Type of Check | Quantum of Check | Reference Document | Acceptance norms | Format of Records | Agency | | Rema-rks |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | HPS | Cust-omer | |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | | 11 |
| I. 1. | Console | 1. Material Conformance | Major | Visual Inspection | 100% | Engineering Drawings | Engineering Drawings | No.: PSQ/07A | A | R | |
| | | 2. Dimensional Conformance | Major | Measurement | 100% | Engineering Drawings | Engineering Drawings | No.: PSQ/ 07A | A | R | |
| | | 3. Paint shade & finish | Major | Visual Inspection | 100% | IS – 5 / RAL | IS – 5 / RAL | No.: PSQ/07A | A | R | |
| | | 4. Paint Thickness | Major | Measurement | 100% | TI --- 101 | Engineering Drawings | No.: PSQ/07A | A | R | |
| | | 5. Adhesion of Paint | Major | Tape test | 100% | TI – 101 | Paint should not peel off | No.: PSQ/07A | A | R | |
| 2. | Transformer | 1. Ratio Plate & Termination | Major | Visual | 100% | Tech. Spec, & IS-2026,(IV) IS-11171 | Tech. Spec. 89352-02 | No.: PSQ/23B /27B | A | R | |
| | | 2. Electrical Performance | Critical | a). Winding Resistance | 100% | TI – 102 | “ | “ | A, S | R | |
| | | | | b). Voltage Ratio | 100% | TI – 103 | “ | “ | A, S | R | |
| | | | | c). No load test | 100% | TI – 104 | “ | “ | A, S | R | |

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | | 11 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | d).Copper Losses | 100% | TI – 105 | “ | “ | A, S | R | |
| | | | | e).Insulation Resistance | 100% | TI – 106 | “ | “ | A, S | R | |
| | | | | f). H. V. Test | 100% | TI – 107 | “ | “ | A, S | R | |
| | | | | g).Tempe-rature rise test | Type test | TI – 108 | “ | “ | A, S | R | |
| 3. | Choke | 1. Rating Plate & Termination | Major | Visual Inspection | 100% | HNPS Tech. Spec. 89353-02 | HNPS Tech. Spec, 89353-02 | No.: PSQ/31A | A | R | |
| | | 2. Electrical Performance | Critical | a). Inducta-nce measure-ment | 100% | TI – 109 | “ | “ | A, S | R | |
| | | | | B). Insulation Resistance | 100% | TI – 106 | “ | “ | A, S | R | |
| | | | | c). H. V. Test | 100% | TI – 107 | “ | “ | A, S | R | |
| | | | | d). Temp-erature rise Test | Type test | TI – 110 | “ | “ | A, S | R | |
| 4. | Thyristor | 1. Type & rating | Major | Visual verification | 100% | BOM / P.O IS 3715(IV) Mfrs. Cata. | BOM / P.O IS 3715(IV) Mfrs. Cata. | No.: PSQ/09B | A, S | R | |
| | | 2. Electrical Performance | Critical | a). Trigging current | 100% | IS 3700 TI – 113 | Mfrs. Cata. | “ | A, S | R | |
| | | | | b). Voltage drop | 100% | TI – 113 | Mfrs. Cata. | “ | A, S | R | |
| | | | | c). Latching Current | 100% | TI – 114 | Mfrs. Cata. | “ | A, S | R | |
| | | | | d). Holding current | 100% | TI – 115 | Mfrs. Cata. | No.: PSQ/09B | A, S | R | |
| | | | | e). Insulation resistance | IS-2500-1 2.5% AQL | TI – 106 | >100 M Ω | No.: PSQ/09B | A, S | R | |

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | | 11 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 5. | Power Diode | 1. Type & Rating | Major | Visual Verification | 100% | BOM / P.O IS 3700(VII) Mfrs. Cata. | BOM / P.O | No.: PSQ/17A | A | R | |
| | | 2. Electrical Performance | Critical | a). Forward Voltage drop | 100% | TI – 112 | Mfrs. Cata. | No.: PSQ/17A | A, S | R | |
| | | | | b). Insulation resistance | IS-2500-1 2.5% AQL | TI – 106 | >/= 100M Ω | No.: PSQ/17A | A, S | R | |
| 6. | MCCB/MCB | 1. Type & Rating | Major | Marking verification | 100% | BOM / P.O Mfrs. Cata. | BOM / P.O Mfrs. Cata. | No.: PSQ/10B | A, S | R | |
| | | 2. Functional Check | Critical | Tripping Mechanism | 100% | IS 13118 / 1991, TI – 124 | IS 13118 / 1991, TI – 124 | “ | A, S | R | |
| | | 3. Electrical Performance | Critical | a). H.V.Test | 100% | TI – 107 | Should with stand | “ | A, S | R | |
| | | | | b). Insulation resistance | 100% | TI – 106 | > 100 Ω | No.: PSQ/10B | A, S | R | |
| 7. | Capacitor | 1. Rating & type | Major | Visual Verification | IS-2500-1 2.5% AQL | BOM / P.O Mfrs. Cata. | BOM / P.O IS 7305 | No.: PSQ/16A | A | R | |
| | | 2. Electrical Performance | Major | Capacitance measurement | IS-2500-2 2.5% AQL | TI – 121 | Must be with intolerance | “ | A, S | R | |
| 8. | Meters | 1. Type & Rating | Major | Marking verification | 100% | BOM / PO IS 1248 | BOM / PO IS 1248 | No.: PSQ/06A /35A | A, S | R | |

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | | 11 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 2. Accuracy & Calibration | Critical | Electrical comparison with standard meter | 100% | BOM / PO IS 1248 (I-IX) | BOM / PO IS 1248 (I-IX) | “ | A, S | R | |
| 9. | Contactor | 1. Type & Rating | Major | Visual verification | 100% | BOM / PO IS 13947 (I-V) | BOM / PO IS 13947 (I-V) | No.: PSQ/14A | A | R | |
| | | 2. Electrical Performance | Critical | a). Pickup voltage | 100% | TI – 120 | Mfrs. Cata. | “ | A, S | R | |
| | | | | b). Release voltage | 100% | TI – 120 | “ | “ | A, S | R | |
| | | | | c). H.V. Test | IS-2500-1 2.5% AQL | TI – 107 | Should withstand H.V | “ | A, S | R | |
| | | | | d). IR Test | “ | TI – 106 | > 100M Ω | “ | A, S | R | |
| 10. | Rotary Switches | 1. Type & Rating | Major | Visual verification | 100% | BOM / PO | BOM / PO BS EN 60947-3 | No.: PSQ/10A | A | R | |
| | | 2. Operation mechanism | Major | Mechanical Operation | 100% | BOM / PO | Should be smooth | “ | A, S | R | |
| | | 3. Electrical Performance | Critical | a). Contin-uity check | 100% | TI – 123 | Should have continuity in on state | “ | A, S | R | |
| | | | | b). H. V. Test | 100% | TI – 106 | Should with stand H.V | No.: PSQ/10A | A, S | R | |
| | | | | c). IR Test | 100% | TI – 107 | >100 MΩ | “ | A, S | R | |
| 11. | Fuses | 1. Type & Rating | Major | Visual verification | 100% | BOM / P.O Mfrs. Cata. | BOM / P.O Mfrs. Cata. | No.: PSQ/25A (Logbook) | A | R | |
| | | 2. Electrical Performance | Critical | Continuity test | 100% | “ | Should have continuity | “ | A, S | R | |

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | | 11 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| II.<br>1. | Sub Assembly<br>Magnetics | 1. Component specification | Major | Visual verification | 100% | BOM | BOM | No.: PSP/ P07A | A | R | |
| | | 2. Layout | Major | Visual verification | 100% | Engineering Drawing | Approved Engg. Draw. | " | A | R | |
| | | 3. Method of mounting | Major | Verification as per MPI | 100% | MPI | MPI | " | A, S | R | |
| | | 4. Firmness of fixing | Major | Check for mechanical tightness | 100% | MPI | MPI | " | A, S | R | |
| 2. | Rectifier Module | 1. Component specification | Major | Visual verification as per BOM | 100% | MPI | BOM / MPI | " | A | R | |
| | | 2. Layout | Major | Visual Inspection | 100% | Engineering Drawing | Engineering Drawing | " | A | R | |
| | | 3. Method of mounting and firmness of fixing. | Major | Verification as per MPI | 100% | MPI | MPI | " | A, S | R | |
| 3. | Capacitor Blank | 1. Component Specification | Major | Visual verification as per BOM | 100% | BOM | BOM | No.: PSP/ P07A | A | R | |
| | | 2. Method of mounting and firmness of fixing | Major | Verification as per MPI | 100% | MPI | MPI | " | A | R | |
| 4. | Mounting Plates & Cutout Plates | 1. Component Specification | Major | Visual verification as per BOM | 100% | BOM | BOM | " | A | R | |
| | | 2. Layout | Major | Visual verification | 100% | Engg. Draw. | Engg. Draw. | " | A | R | |
| | | 3. Method of mounting & firmness of fixing | Major | Verification as per MPI | 100% | MPI | MPI | " | A, S | R | |

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | | 11 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 5. | Populated PCB | 1. Correctness of Assembly | Major | a). Verifi-cation as per BOM | 100% | BOM TI – 118 | BOM / MPI | No.: PSQ/19A | A | R | |
| | | | | b). Mounting as per lege-nd printing | 100% | PCB Layout & TI-118 | PCB Layout & TI-118 | “ | A | R | |
| | | 2. Soldering quality | Major | Visual inspection with magnifier. x 5 | 100%`` | TI – 118 | BOM | No.: PSQ/ P19A | A | R | |
| | | 3. Electrical performance | Major | Functional checks | 100% | PCB Test report | PCB Test report | No.: PSQ/ P20A | A | R | |
| 6. | Wiring | 1. Cable size | Major | Verification | 100% | BOM & wiring diagram | BOM & wiring diagram | No.: PSP/ P07A | A | R | |
| | | 2. Crimping | Major | Visual inspection | IS 2500 pt.1 10% AQL | MPI | MPI | “ | A, S | R | |
| | | 3. Terminal Identification | Major | Ferrule no. check | 100% | Wiring diagram | Wiring diagram | “ | A, S | R | |
| | | 4. Correctness of routing | Major | Visual inspection | 100% | MPI | MPI | “ | A, S | R | |
| III. | Perfor-mance Tests | 1. Physical verification | Major | Visual | 100% | BOOM/ Approved drawing | BOMO/ Approved drawing | No.: PSQ/ P22A | A, S | W | |
| | | 2. Insulation resistance test | Major | Insulation resistance measurement | 100% | HBL NIFE test procedure/ Cust. Proce. | >/=10MΩ | “ | A, S | W | |
| | | 3. H. V. Test | Major | H. V. Test | 100% | Tech. Spec. | Should with stand 2KV/ min | “ | A, S | W | |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 4. Efficiency measurement | Major | Efficiency measurement | Type test | Tech. Spec. | Tech. Spec. | “ | A, S | W | |
| | | 5. Ripple measurement | Major | Ripple meas-urement | 100% | Tech. Spec. | Tech. Spec | “ | A, S | W | |
| | | 6. Voltage regulation measurement | Major | Voltage regulation meas-urement | 100% | Tech. Spec. | Tech. Spec. | “ | A, S | W | |
| | | 7. Heat run test | Major | Heat run test | Type test till stabi-lization | Mfrs. Standard (HNPS) | No failure | “ | A, S | W | |
| | | 8. Functional test & System details | Major | Annu-nciation check & Feature check | 1005 | Tech. Spec. | Tech. Spec. | “ | A, S | W | |
| IV. | Packing & Despatch | 1. Pre packing checks | Major | a). Tight-ness of all the fasteners and cable connections | 100% | As per Spec. 89397 | Packing spec. 89397 | No.: WI/P/ PI/11A | A | - | |
| | | | | b). Overall appearance | 100% | “ | “ | “ | A | - | |
| | | | | c). Paint finish | 100% | “ | No scratches | “ | A | - | |
| | | 2. Conformance to packing specification | Critical | Verification of packing materials and method of packing | 100% | Packing Spec. 89397 | Packing Spec. 89397 | “ | A | - | |
| | | 3. Packing of accessories spares, manual etc., | Critical | Verification as per BOM and Packing list | 100% | Production indent & packing spec. list 89397 | Packing list 89280 | “ | A | - | |

HBL POWER SYSTEMS LIMITED

QUALITY ASSURANCE PLAN FOR NICKEL CADMIUM POCKET PLATE BATTERIES

| | | | | | |
|---|---|---|---|---|---|
| CUSTOMER | : | M/S. SIEMENS LTD | QAP NO. | : | 5392 / NCD |
| PO/ LOI NO | : | e-mail , dt - 05.04.2008 | ITEM | : | NCPP BATTERIES |
| PROJECT | : | JSW Phase-II,Bellary | REVISION | : | 0, Dated 11.04.2008 |

**Model –87 KPH 40P**

TI - TEST INSTRUCTIONS

MPI - MANUFACTURING PROCESS INSTRUCTIONS

BOM - BILL OF MATERIAL

P.O. - PURCHASE ORDER

W - WITNESS

R - REVIEW

H - HOLD

**AGENCY:**

TPI - THIRD PARTY INSPECTION

V - VENDOR

C - CLIENT

| S. No. | Compo-nents | Quality Characteristics | Classifi-cation | Type of check | Quantum of check | Reference/ acceptance standard | Format of records | Agency | | | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | V | TPI | C | |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | | | 10 |
| RAW MATERIAL & BOUGHT OUT ITEMS | | | | | | | | | | | |
| 1 | Cell con-tainer (Poly-prope-lene) | Dimensional conformance | Major | Measure-ment & gauging | Sampling as per IS-2500,2000 part-I Inspection level (S-4) | Drg. Spec. | Inspection report | W | R | R | |
| | | Material quality | Major | Impact strength (Ball drop test ) | 1 No. of every lot | As per IS 1146 TI -Section:17 | Inspection report | W | R | R | |
| | | Free from war-page, flash and no colour shade | Major | Visual inspec-tion | Sampling as per IS-2500,2000 part-I Inspection level (S-4) | Drg. Spec. | Inspection report | W | R | R | |

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | | | 10 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 2 | Terminal post | Dimensional conformance | Major | Measure-ment | Sampling as per IS-2500,2000 part-I Inspection level (S-4) | Drg. Spec. | Inspection report | W | R | R | |
| | | Thread size and depth | Major | Gauging & visual | --------Do-------- | Drg. Spec. | Inspection report | W | R | R | |
| | | Surface finish & defects | Major | Visual Inspec-tion | --------Do-------- | Drg. Spec. | Inspection report | W | R | R | |
| | | Plating quality | Critical | Thick-ness measure-ment | Sampling as per IS-2500,2000 part-I Inspection level (S-3) | TI - Sections: 1,4,6A | Plating report | W | R | R | |
| 3 | Spacing ring | Dimensional conformance | Major | Measure-ment | Sampling as per IS-2500,2000 part-I Inspection level (S-4) | Drg. Spec. | Inspection report | W | R | R | |
| | | Plating quality | Major | Thick-ness measure-ment | Sampling as per IS-2500,2000 part-I Inspection level (S-3) | TI - Sections: 1,4,6A | Plating report | W | R | R | |
| W - WITNESS \| R - REVIEW \| H - HOLD \| C - CLIENT \| TPI - THIRD PARTY INSPECTION \| V - VENDOR | | | | | | | | | | | |
| 4 | Stud & Nut | Dimensional conformance | Major | Measure-ment | Sampling as per IS-2500,2000 part-I Inspection level (S-4) | Drg. Spec. | Inspection report | W | R | R | |
| | | Thread size and form | Major | Gauging & visual inspec-tion | --------Do-------- | Drg. Spec. | Inspection report | W | R | R | |
| | | Free from de-fects | Major | Visual inspec-tion | --------Do-------- | Drg. Spec. | Inspection report | W | R | R | |
| 5 | Inter cell connec-tor | Material confor-mance | Major | Hardness & conduc-tivity check | One sample every lot | TI-Sections : 10 & 11 | Test report | W | R | R | |
| | | Dimensional conformance | Major | Measure-ment | Sampling as per IS-2500,2000 part-I Inspection level (S-4) | Drg. Spec. | Inspection report | W | R | R | |



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| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | | | 10 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 6 | Tab | Dimensional conformance | Major | Measure-ment | --------Do-------- | Drg. Spec. | Inspection report | W | R | R | |
| | | Plating quality | Major | Thick-ness Measure-ment | Sampling as per IS-2500,2000 part-I Inspection level (S-3) | TI - Section: 1 , 4 , 5 & 6A | Plating report | W | R | R | |
| | | Free from burrs & defects | Major | Visual inspec-tion | Sampling as per IS-2500,2000 part-I Inspection level (S-4) | Drg. Spec. | Inspection report | W | R | R | |
| 7 | Plastic / Nylon compo-nents | Dimensional conformance | Major | Measure-ment | Sampling as per IS-2500,2000 part-I Inspection level (S-4) | Drg. Spec. | Inspection report | W | R | R | |
| | | Free from de-fects | Major | Visual inspec-tion | --------Do-------- | Drg. Spec. | Inspection report | W | R | R | |
| 8 | Rubber compo-nents (Gasket & Seal-ing ring etc.,) | Material quality | Critical | Shore hardness (Rubber button) | 1 Sample per lot | Drg. Spec. & TI-Section : 20 | Inspection report and Test report | W | R | R | |
| | | Dimensional conformance | Major | Measure-ment | Sampling as per IS-2500,2000 part-I Inspection level (S-4) | Drg. Spec. | Inspection report | W | R | R | |
| | | Free from de-fects | Major | Visual inspec-tion | --------Do-------- | Drg. Spec. | Inspection report | W | R | R | |
| W - WITNESS \| R - REVIEW \| H - HOLD \| C - CLIENT \| TPI - THIRD PARTY INSPECTION \| V - VENDOR | | | | | | | | | | | |
| **IN PROCESS INSPECTION** | | | | | | | | | | | |
| 1 | Plate blank manu-facturing | Dimensional conformance | Major | Measure-ment | IS-2500,2000 part-I Inspection level (S-4) | MPI Section: 07 | Process quality reports | W | R | R | |
| | | Conformance of plate blank weights | Critical | Weighing | --------Do-------- | ..do.. | Process quality reports | W | R | R | |
| | | Absence of defects | Major | Visual inspec-tion for empty pockets, burrs & damages | 100% | ..do.. | Process quality reports | W | R | R | |

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | | | 10 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 2 | Plate assembly | Dimensional conformance | Major | Measurement of plate thickness & width | IS-2500,2000 part-I Inspection level (S-4) | MPI Section: 07 | Process quality reports | W | R | R | |
| | | Quality of spot welding | Major | Visual inspection | 100% | MPI Section: 08 | Process quality reports | W | R | R | |
| | | Absence of defects and damages | Major | Visual inspection | 100% | ..do.. | Process quality reports | W | R | R | |
| 3 | Plate block assembly | Assembly correctness of +Ve & -Ve groups | Major | Visual inspection of matching of +Ve & -Ve groups | 100% | MPI Section: 13 | Process quality reports, route tags | W | R | R | |
| | | Correctness of insulation | Major | Visual inspection of grids | 100% | ..do.. | Process quality reports, route tags | W | R | R | |
| | | Tightness of strapping & damages | Major | Visual inspection for position and No. of straps | 100% | MPI Section: 14 | Process quality reports, route tags | W | R | R | |
| | | Plate block tightness | Critical | Torquing of stud nuts | 100% | ..do.. | Process quality reports, route tags | W | R | R | |
| 4 | Formation assembly | Function / capacity test | Critical | Charging and discharging cf formation cycle | 100% | MPI Section: 17 | Formation Record | W | R | R | |

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | | | 10 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 5 | Cell assembly | Correctness of plate blocks | Major | Visual inspection | 100% | MPI Section: 18,19 | Process quality reports, route tags | W | R | R | |
| | | Position of inner sealing parts | Major | Visual inspection | 100% | ..do.. | Process quality reports, route tags | W | R | R | |
| | | Lock washer sealing parts | Major | Visual inspection for proper locking | 100% | MPI Section: 21 | Process quality reports, route tags | W | R | R | |
| | | Polarity of terminals | Major | Checking according to polarity marking | 100% | MPI Section: 21 | Process quality reports, route tags | W | R | R | |
| W - WITNESS \| R - REVIEW \| H - HOLD \| C - CLIENT \| TPI - THIRD PARTY INSPECTION \| V - VENDOR | | | | | | | | | | | |
| | | Polarity of terminals | Major | Checking of polarity according to marking | 100% | MPI Section: 21 | Process quality reports, route tags | W | R | R | |
| | | Soundness of sealing & welding (leak test) | Major | Pneumatic pressure test at 0.5 kg/ sq.cm. | 100% | MPI Section: 23 | Process quality reports, route tags | W | R | R | |
| **3.0 FINAL INSPECTION AND TESTING** | | | | | | | | | | | |
| 1 | Cell Testing | Physical examination | Major | Visual inspection | Sample as per IS-8320 | IS-10918 | Acceptance test certificate | W | W | W | |
| | | Cell Designation | Major | Visual inspection for cell type and Sl.No. | Sample as per IS-8320 | IS-10918 | Acceptance test certificate | W | W | W | |

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | | | 10 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Dimension, mass & layout | Major | Measure-ment of cell dimen-sion, weight & GAD | Sample as per IS-8320 | Drg. Spec. & GAD | Acceptance test certificate | W | W | W | |
| | | Cell marking & content of type stickers | Major | Identifica-tion of cells | Sample as per IS-8320 | IS-10918 | Acceptance test certificate | W | W | W | |
| | | Polarity and absence of short circuit | Major | Voltage measure-ment according to polarity | Sample as per IS-8320 | IS-10918 | Acceptance test certificate | W | W | W | |
| | | Air pressure test | Major | Measure-ment of pressure drop with in 15 seconds | Sample as per IS-8320 | IS-10918 | Acceptance test report | W | W | W | |
| | | Insulation resis-tance test | Major | Megger test (250 VDC) | Sample as per IS-8320 | IS-10918 | Acceptance test report | W | W | W | |
| | | AH capacity test | Critical | Charging & dis-charging of cells at 0.2 C5 rate | Sample as per IS-8320 | IS-10918 | Acceptance test report | W | W | W | |
| **4.0 PRESERVATION & PACKING** | | | | | | | | | | | |
| 1 | Packing and des-patch | Conformance of packing spec. | Critical | Verifica-tion of packing method & materials | 100% | MPI Section: 30 | Packing check list | W | R | R | |
| | | Conformance of quality product to spec. | Critical | Visual as per check sheet | 100% | ..do.. | Packing check list | W | R | R | |
| REVIEWED BY | | | | | | APPROVED BY | | | | | |



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