

#### **1.11.5 Conductor & Earthwire Drums**

It is essential to save the conductor drums from damage during storage and transportation and the wooden battens and main wheel should be intact so that same can be successfully mounted on the conductor jacks to release the conductor during stringing. All the conductor and earthwire drums should be stored on a proper hard platform above ground to avoid deterioration of the drum and further avoiding the damage of conductor. The conductor & earthwire drums should be stored in such a manner that each drum can be accessed at any time for inspection purposes.

#### **1.11.6 Hardware fitting, Accessories & Insulators**

All the hardware fittings, accessories and insulators should be stored on raised platform above ground so as not to damage the packaging and to avoid further damage or denting on the fittings and chipping of insulators. All the aluminum parts should be stored on a plain/ raised platform under a cover shed in such a way that the aluminum fittings cannot be distorted during storage.

### **2.0 Employer's Environment and Social Policy and its Implementation**

2.1 Development and growth of mankind through Industrialization and unwarranted use of natural resources has inflicted considerable impact on Environment and Society. As a result, Environmental and Social issues have emerged as the focal point of global debate.

Employer's activities by their inherent nature and flexibility have negligible impacts on environmental and social attributes. In order to address these issues and to match the rising expectations of a cleaner, safer and healthier environment, Employer has evolved its Environmental and Social Policy and Procedures (ESPP). The key principles of Employer's Environmental and Social Policy are: -

- i) Avoidance of environmentally and socially sensitive areas while planning project activities.
- ii) Minimisation of impacts when project activities occur in environmentally and socially sensitive areas.
- iii) Mitigation of any unavoidable adverse impacts arising out of its projects.

2.2 Basic issues to be kept in mind while carrying out construction activities are to

- i) Avoid socially sensitive areas with regard to human habitations and areas of cultural significance.
- ii) Secure the interest of people affected by Employer's projects.
- iii) Involve local people affected by transmission line projects as per requirement and suitability.

- iv) Consult affected people in decisions having implication to them if considered necessary.
  - v) Apply, efficient and safe technology/ practices.
  - vi) Keep abreast of all potential dangers to people's health, occupational safety and safety of environment and the respective mitigatory measures.
  - vii) Establish preventive mechanisms to guarantee safety.
  - viii) Mitigation measures in case of accidents.
  - ix) Avoid unwarranted cutting of trees in forest area.
- 2.3 While constructing the lines through forest stretches the contractor will provide alternate fuel to its employee e.g. working labours/ supervisors etc. in order to avoid cutting of forest woods.
- 2.4 Contractor will ensure safety to the wild life, during working/ camping near to the National park.
- 2.5 Contractor during construction of lines in agricultural fields will ensure minimum damages to the crops, trees, bunds, irrigation etc. If the same is un-avoidable, the decision of Engineer- in-charge shall be final.
- 2.6 The waste/ excess material/ debris should be removed from the construction site including agricultural field, forest stretches, river etc. immediately after construction work.
- 2.7 The Contractor will ensure least disturbance to the hill slope and natural drainage so as to avoid soil erosion. Natural drainage in plain area if disturbed is to be trained to the satisfaction of Engineer- in-charge.
- 2.8 As far as possible existing path/ kutchha road/ approach shall be used for the construction.
- 2.9 The Contractor will ensure supply of stone chips/sand from authorised/ approved quarry areas.
- 2.10 Proper documentation of above, if any.
- 2.11 The Environment & Social Policy and Procedures (ESPP) evolved by POWERGRID is available at the POWERGRID's website, [www.powergrid.in](http://www.powergrid.in), which shall be referred by the Bidder for further information.
- 2.12 Facilities to be incorporated for labourers**
- The Contractor shall provide his/ their laborer with sufficient number of the following facilities with the indicated specifications:

**A) Tents:**

- i) Tent should be with double layer canvas, outer layer being water-proof. The size/ number should be sufficient to accommodate required number of people comfortably.
- ii) The preferred size of tent should be 20ft x 20ft with Centre height of 7 ft and side height of 2.5 ft.
- iii) Tent windows should have arrangement for mosquito net with waterproof outer covering.
- iv) Doors of the tents shall have Velcro or any other closing system.
- v) The site selected for the camp shall be on high ground, removed from Jungle.
- vi) Efficient arrangement for draining away stagnant water should be provided so as to keep the camp neat and tidy.
- vii) The tents should have illumination at night by providing battery operated LED lanterns or equivalent lighting system.

**B) Portable (tyre- mounted) Bio toilet**

- i) The toilet seats should be 'Indian'.
- ii) The number of Toilets should be not less than 2 per 50 laborers with separate toilets for female laborers.
- iii) Bio-tank should be of sufficient capacity to allow bacteria present to decompose.
- iv) the excreta and only waste water (odourless and harmless) gets discharged out of the toilet through a sewerage channel away from the tent areas and working areas.
- v) Water tank of adequate capacity should be installed with the Portable Toilet.

**Bidder shall quote for the above facilities in the BPS, wherever indicated .**

**3.0 Quality Assurance Programme**

Enclosed with this Technical Specification as Section-II, Annexure-A (Quality Assurance Programme).

**7.0 QUALITY ASSURANCE PROGRAMME**

7.1 To ensure that the equipment and services under the scope of this Contract, whether manufactured or performed within the Contractor's Works or at his Sub-Contractor's premises or at the Employer's site or at any other place of Work as applicable, are in accordance with the specifications, the Contractor shall ensure suitable quality assurance programme to control such activities at all points necessary. A quality assurance programme of the Contractor shall be in line with ISO requirements & shall generally cover the following:

- a) The organization structure for the management and implementation of the proposed quality assurance programme.
- b) System for Document and Data Control.
- c) Qualification and Experience data of Bidder's key personnel.
- d) The procedure for purchases of materials, parts, components and selection of sub-Contractor's services including vendor analysis, source inspection, incoming raw material inspection, verification of material purchases etc.
- e) System for shop manufacturing and site erection controls including process controls, fabrication and assembly control.
- f) System for Control of non-conforming products including deviation dispositioning, if any and system for corrective and preventive actions based on the feedback received from the Customers and also internally documented system for Customer complaints.
- g) Inspection and test procedure both for manufacture and field activities.
- h) System for Control of calibration of testing and measuring equipment and the indication of calibration status on the instruments.
- i) System for indication and appraisal of inspection status.
- j) System of Internal Quality Audits, Management review and initiation of corrective and Preventive actions based on the above.
- k) System for authorizing release of manufactured product to the Employer.
- l) System for maintenance of records.

- m) System for handling, storage and delivery.
- n) A quality plan detailing out the specific quality control measures and procedure adopted for controlling the quality characteristics relevant to each item of equipment furnished and /or service rendered.
- o) System for various field activities i.e. unloading, receipt at site, proper storage, erection, testing and commissioning of various equipment and maintenance of records. In this regard, the Employer has already prepared Standard Field Quality Plan for transmission line/substation equipment as applicable, Civil/erection Works which is required to be followed for associated works.

The Employer or his duly authorized representative reserves the right to carry out quality audit and quality surveillance of the system and procedure of the Contractor/his vendor's quality management and control activities.

## 7.2 Quality Assurance Documents

The Contractor shall ensure availability of the following Quality Assurance Documents:

- i) All Non-Destructive Examination procedures, stress relief and weld repair procedure actually used during fabrication, and reports including radiography interpretation reports.
- ii) Welder and welding operator qualification certificates.
- iii) Welder's identification list, welding operator's qualification procedure and welding identification symbols.
- iv) Raw Material test reports on components as specified by the specification and in the quality plan.
- v) The Manufacturing Quality Plan (MQP) indicating Customer Inspection Points (CIPs) at various stages of manufacturing and methods used to verify that the inspection and testing points in the quality plan were performed satisfactorily.
- vi) Factory test results for testing required as per applicable quality plan/technical specifications/GTP/Drawings etc.
- vii) Stress relief time temperature charts/oil impregnation time temperature charts, wherever applicable.

## 8.0 INSPECTION, TESTING & INSPECTION CERTIFICATE

- 8.1 Contractor shall procure bought out items from sub-vendors as per the list in “Compendium of Vendors” available on POWERGRID web-site [www.powergrid.in](http://www.powergrid.in) after ensuring compliance to the requirements/conditions mentioned therein. Contractor shall explore first the possibilities of procuring the bought out items from POWERGRID approved existing vendors. In case of their unavailability / non-response, Contractor may approach POWERGRID for additional sub-vendor approval. In that case, the assessment report of proposed sub vendor by Contractor along with the enclosures as per **Annexure-I** shall be submitted within 60 days of the award. The proposal shall be reviewed and approval will be accorded based on the verification of the document submitted and/or after the physical assessment of the works as the case may be. The physical assessment conducted by POWERGRID, if required, shall be on chargeable basis. Charges shall be as per the POWERGRID norms prevailing at that time, which shall be intimated by POWERGRID separately. If proposal for sub-vendor is submitted after 60 days, the Contractor’s proposal normally will not be considered for current LOA. However, POWERGRID may process the case for developing more vendors for referred items, if found relevant. In all cases, It is the responsibility of the Contractor that Project activities do not suffer on account of delay in approval/non approval of a new sub-vendor.

For Telecom/GA&C packages, the makes/model of small items shall be finalized during approval of DRS by Telecom/GA&C department.

The responsibility and the basis of inspection for various items & equipment is placed at **Annexure-II** along with the requirement of MQP (Manufacturing Quality Plan), ITP(Inspection & Test Plan), FAT(Factory Acceptance Test) which should be valid & POWERGRID approved and Level of inspection envisaged against each item.

Contractor shall ensure that order for items where MQP/ITP/FAT is required will be placed only on vendors having valid MQP/ITP/FAT and where the supplier’s MQP/ITP/FAT is either not valid or has not been approved by POWERGRID, MQP shall be generally submitted as per POWERGRID format before placing order. A Copy of MQP format is placed at **Annexure – III**.

Items not covered under MQP/ITP/FAT shall be offered for inspection as per POWERGRID LOA/technical Specifications/ POWERGRID approved data sheets/ POWERGRID approved drawings and relevant Indian / International standards.

**Inspection Levels:** For implementation of projects in a time bound manner and to avoid any delay in deputation of POWERGRID or its authorized

representative, involvement of POWERGRID for inspection of various items / equipment will be based on the level below:

**Level –I:** Contractor to raise all inspection calls and review the report of tests carried out by the manufacturer, on his own, as per applicable standards/ POWERGRID specification, and submit to concerned POWERGRID inspection office/Inspection Engineer. CIP/MICC will be issued by POWERGRID based on review of test reports/certificates of manufacturers.

**Level – II:** Contractor to raise all inspection calls and carry out the inspection on behalf of POWERGRID on the proposed date of inspection as per applicable standards/specification. However, in case POWERGRID wishes to associate itself during inspection, the same would be intimated to Contractor and CIP/MICC will be issued by POWERGRID. Else, Contractor would submit their test reports/certificates to POWERGRID. CIP/MICC will be issued by POWERGRID based on review of test reports / certificates.

**Level - III:** Contractor to raise inspection calls for both, stage (as applicable) & final inspection and carry out the stage inspections (if applicable) on behalf of POWERGRID on the proposed date of inspection as per applicable standards/specification. However, in case POWERGRID wishes to associate itself during stage inspection, the same would be intimated to Contractor and CIP will be issued by POWERGRID. Else, Contractor would submit the test reports / certificates of stage inspection after their own review and CIP will be issued by POWERGRID based on review of test reports / certificates. Final inspection will be carried out by POWERGRID and CIP/MICC will be issued by POWERGRID.

**Level – IV:** Contractor to raise inspection calls for both, stage (as applicable) & final inspections. POWERGRID will carry out the inspection for both stage & final inspection as per applicable standards/specification and CIP/MICC will be issued by POWERGRID.

- 8.2 Contractor shall ensure that to implement the above inspection levels, particularly for the quality control and inspection at sub-vendor's works, they would depute sufficient qualified & experienced manpower in their Quality Control and Inspection department. Further, to assure quality of construction, Contractor shall have a separate workforce having appropriate qualification & experience and deploy suitable tools and plant for maintaining quality requirement during construction in line with applicable Field Quality Plan (FQP).
- 8.3 The Employer, his duly authorized representative and/or outside inspection agency acting on behalf of the Employer shall have at all reasonable times access to the Contractor's premises or Works and shall have the power at all reasonable times to ensure that proper Quality Management practices /

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norms are adhered to, inspect and examine the materials & workmanship of the Works, to carry out Quality/Surveillance Audit during manufacture or erection and if part of the Works is being manufactured or assembled at other premises or works. The Contractor shall obtain for the Employer and for his duly authorized representative permission to inspect as if the works were manufactured or assembled on the Contractor's own premises or works. The item/equipment, if found unsatisfactory with respect to workmanship or material is liable to be rejected. The observations for improvements during product/ process inspection by POWERGRID shall be recorded in Quality Improvement Register (available & maintained at works) for review & timely compliance of observations.

- 8.4 Contractor shall submit inspection calls over internet through POWERGRID website. The required vendor code and password to enable raising inspection call will be furnished to the main Contractor within 30 days of award of contract on submission of documents by Contractor. After raising the inspection calls, Contractor shall then proceed as per the message of that particular call which is available on the message board.
- 8.5 The Employer reserves the right to witness any or all type, acceptance and routine tests specified for which the Contractor shall give the Employer/Inspector Twenty one (21) days written notice of any material being ready for testing for each stage of testing as identified in the approved quality plan as customer inspection point(CIP) for indigenous inspections. All inspection calls for overseas material shall be given at least forty five (45) days in advance. Such tests shall be to the Contractor's account except for the expenses of the Inspection Engineer. The Employer/inspector, unless witnessing of the tests is waived by Employer, will attend such tests within Twenty one (21) days of the date of which the equipment is notified as being ready for test/inspection, failing which the Contractor may proceed with the test which shall be deemed to have been made in the Inspector's presence and he shall forthwith forward to the Inspector three copies of tests, duly certified. Contractor shall ensure, before giving notice for type test, that all drawings and quality plans have been got approved. The equipment shall be dispatched to site only after approval of Routine and Acceptance test results and Issuance of Dispatch Clearance in writing by the Employer. CIP/Material Inspection clearance certificate (MICC) shall be issued by the Employer after inspection of the equipment or review of test reports as applicable. Employer may waive off the presence of Employer's inspecting engineer. In that case test will be carried out as per approved QP and test certificate will be furnished by the supplier for approval. CIP/MICC will be issued only after review and approval of the test reports.
- 8.6 Contractor shall generally offer material for inspection as per supply bar chart approved by POWERGRID and not before 30 days from schedule indicated in the bar chart. In case Contractor offers material(s) for inspection prior to 30



days from the scheduled date with necessary approval of POWERGRID, POWERGRID shall inspect the material and issue CIP only. However, in such an exceptional case, MICC shall be issued only as per provision of original / revised approved supply schedule.

- 8.7 Contractor shall minimize the number of inspection calls by offering optimum quantities in each inspection call at the respective manufacturer's works.
- 8.8 Contractor shall inspect the material themselves and only after they are fully convinced about the Quality, they shall offer the material for POWERGRID inspection and shall also ensure that relevant portion of LOA/NOA, approved drawing and data sheets along with applicable Quality Plans are available at the works of Contractor or their Sub-vendor before the material is offered for inspection.
- 8.9 Contractor shall ensure that material which has been cleared for dispatch after inspection will be dispatched within 30 days in case of domestic supplies and within 60 days in case of Off-shore supplies from the date of issuance of CIP. Material which is not dispatched within stipulated time as above will be reoffered for POWERGRID inspection or specific approval of POWERGRID QA&I shall be obtained for delayed dispatch .
- 8.10 The Employer or IE shall give notice in writing to the Contractor, of any objection either to conformance to any drawings or to any equipment and workmanship which in his opinion is not in accordance with the Contract. The Contractor shall give due consideration to such objections and shall either make the modifications that may be necessary to meet the said objections or shall confirm in writing to the Employer/Inspection Engineer giving reasons therein, that no modifications are necessary to comply with the Contract.
- 8.11 All Test Reports and documents to be submitted in English during final inspection of equipment by POWERGRID or as and when required for submission.
- 8.12 When the factory tests have been completed at the Contractor's or Sub-Contractor's works, the Employer/Inspection Engineer(IE) shall issue a certificate to this effect within fifteen (15) days after completion of tests & submission of documents by Contractor/manufacturer but if the tests are not witnessed by the Employer/IE, the certificate shall be issued within fifteen (15) days of receipt of the Contractor's Test certificate by the Employer/IE. Contractor shall, on completion of all tests, submit test reports within Ten (10) days to POWERGRID IE. Failure of the Employer/IE to issue such a certificate shall not prevent the Contractor from proceeding with the Works. The completion of these tests or the issue of the certificate shall not bind the

Employer to accept the equipment should, it, on further tests after erection, be found not to comply with the Contract.

- 8.13 In all cases, where the Contract provides for tests whether at the premises or works of the Contractor or of any Sub- Contractor, the Contractor, except where otherwise specified, shall provide free of charge such items as labour, materials, electricity, fuel, water, stores, apparatus and instruments as may be reasonably demanded by the Employer/Inspector or his authorized representative to carry out effectively such tests of the equipment in accordance with the Contract and shall give facilities to the Employer/Inspection Engineer or to his authorized representative to accomplish testing.
- 8.14 The inspection and acceptance by Employer and issue of Inspection Certificate thereon shall in no way limit the liabilities and responsibilities of the Contractor in respect of the agreed quality assurance programme forming a part of the Contract, or if such equipment is found to be defective at a later stage.
- 8.15 The Employer will have the right of having at his own expenses any other test(s) of reasonable nature carried out at Contractor's premises or at site or in any other place in addition of aforesaid type and routine tests, to satisfy that the material comply with the specification.
- 8.16 The Employer reserves the right for getting any additional field tests conducted on the completely assembled equipment at site to satisfy that material complies with specifications.
- 8.17 Rework/ Re-engineering, if any, on any item/equipment shall be carried out only after mutual discussions and in accordance with mutually agreed procedure. Contractor shall submit Joint Inspection Report of equipment under Re-Work/Re-Engineering along with procedure for the same to POWERGRID for approval, before taking up the Re-Work/Re-Engineering, failing which POWERGRID reserves the right to reject the equipment.
- 8.18 Contractor may establish a field test Laboratory to execute Civil Construction testing requirements at site with the condition that all testing equipment shall be calibrated from POWERGRID approved accredited Testing laboratories, with calibration certificates kept available at site and all testing personnel employed in the Field Testing Laboratories to be qualified and experienced Engineers or testing to be carried out at POWERGRID approved Third Party Laboratories.
- 8.19 Contractor shall ensure that all possible steps are taken to avoid damage to the equipment during transport, storage and erection.

8.20 Contractor shall implement additional stringent quality checks and preparation during installation of GIS at site (if applicable) as per POWERGRID approved guidelines/Technical specifications.

8.21 Contractor shall ensure commissioning of all CSDs along with Circuit Breakers wherever applicable.

**8.22 For EHV transformers/reactors:**

Insulation oil shall be as per POWERGRID Technical specifications and same grade shall be used for impregnation of the active part & testing at the works of Transformer/Reactor Manufacturer and as well as for filling the Transformer/Reactors at site. Contractor to ensure that windings for Transformer/Reactors are made in air-conditioned environment. Core-coil assembly shall be performed in positive pressurized dust-controlled environment. Dust measurements shall be monitored regularly at Transformer / Reactor Manufacturer works. Contractor shall ensure that respective civil foundations & Fire walls for Transformer/Reactors units to be commissioned, shall be made ready at concerned sites before receipt of Transformer/Reactors units. All the requisite material for Neutral & Delta Bus formation required for charging of complete bank of 765KV class 1-ph Transformer/Reactor units shall be made available at the concerned sites before receipt of the Transformer/Reactor units at site.

8.23 The Employer reserves the right to increase or decrease their involvement in inspections at Contractor's Works or at his Sub-Contractor's premises or at the Employer's site or at any other place of Work based on performance of Contractor/sub Contractor.

8.24 Contractor/sub-vendor, who has more than one contract running concurrently for supply of material of same design and specification from the same factory, may propose to offer material in a single lot. No deduction from payments on account of call combination shall be made to the Contractor. However, POWERGRID reserves the right to carry out call combination as per requirement and decision of POWERGRID shall be final in this regard.

8.25 Unless specified otherwise, inspection shall be made at the place of manufacturer prior to dispatch and shall be conducted so as not to interfere unnecessarily with the operation of the work.

8.26 Should any item being supplied be found not to comply with the supplied design, it shall be liable to rejection. No item once rejected shall be resubmitted for inspection, except in cases where the Employer or his authorized representative considers that the defects can be rectified. All rejected material shall be disposed-off/destroyed under intimation to Employer QA&I representative as per laid down procedures.

- 8.27 The specified grade and quality of material from approved source shall be used by the Contractor. To ascertain the quality of material used, the inspector may at his discretion get the material tested at an approved laboratory.

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**Assessment report from Contractor for proposed sub-vendor along with following enclosures (to the extent available):**

1. Proof of MSME certificate (Udhyam registration), if applicable
2. Registration / License of the works
3. Organization chart with name and qualification of key persons
4. List of Plant and Machinery.
5. List of testing equipment with their calibration status.
6. List of Raw material, bought out items with sourcing details
7. List of out-sourced services with sourcing details.
8. List of supply in last three years.
9. Third party approval, if any (viz. ISO, BIS),
10. Pollution clearance wherever applicable
11. Energy Conservation & Efficiency report  
(Applicable to industries having contract load more than 100 KVA)
12. Formats for RM, in process and acceptance testing
13. Type test approvals conducted in last 5 years, if applicable
14. Performance Certificates from customers
15. Photographs of factory, plant and machinery & testing facilities
16. Audit report of the proposer, in case of request for approval of new vendor is submitted by Contractor/Sub-vendor

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## Annexure-II

| Sl. No | Item / Equipment  | Reference document for inspection | Inspection Level |
|--------|---|-----------------------------------|------------------|
| A.01   | LT Transformer /Power Transformer/ Reactor/ Converter Transformer/ Filter Reactor                 | MQP/ITP                           | IV               |
| A.02   | Bushing   | MQP                               | IV               |
| A.03   | Insulating Oil  | POWERGRID TS                      | III              |
| A.04   | Oil storage tank for transformers   | MQP                               | III              |
| A.05   | Nitrogen injection-based explosion prevention system  | FAT/ITP                           | III              |
| A.06   | Online oil drying system for transformers   | POWERGRID TS                      | II**             |
| A.07   | Online DGA and moisture monitoring system   | POWERGRID TS                      | II**             |
| A.08   | Flow sensitive conservator isolation valve  | POWERGRID TS                      | II**             |
| A.09   | Oil Filtration Machine  | MQP                               | III              |
| B.01   | Circuit Breakers  | MQP                               | IV               |
| B.02   | Current Transformers  | MQP/ITP                           | IV               |
| B.03   | CVT/PT/IVT  | MQP                               | IV               |
| B.04   | Isolators   | MQP/ITP                           | IV               |
| B.05   | Surge Arrestors   | MQP/ITP                           | III              |
| B.06   | Line Trap & Air Core Reactor  | MQP/ITP                           | III              |
| B.07   | Point On switching device (CSD) for Circuit Breaker (wherever required)                           | FAT/ITP                           | I                |
| C.01   | STATCOM including Valve, valve base electronics, DC capacitor, series reactor and all accessories | ITP                               | IV               |
| C.02   | Mechanically switched Reactor bank (3-ph) including all accessories (MSR Branches)                | ITP                               | IV               |
| C.03   | Mechanically switched Capacitor bank (3-ph) including all accessories (MSC Branches)              | ITP                               | IV               |
| C.04   | Harmonic Pass filters   | ITP                               | IV               |
| C.05   | HT Capacitor  | MQP                               | IV               |
| D.01   | Thyristor Valve   | FAT/ITP                           | III              |
| D.02   | PLC Capacitors for HVDC   | FAT/ITP                           | III              |
| D.03   | Valve Cooling system for HVDC   | FAT/ITP                           | III              |
| D.04   | AC/DC Filter Resistors  | ITP                               | III              |
| D.05   | DC Current and Voltage measuring device for HVDC  | FAT/ITP                           | III              |
| D.06   | Maintenance platform for valve hall   | POWERGRID TS                      | II               |
| D.07   | Optical signal column for FSC   | FAT/ITP                           | II               |
| E.01   | GIS including spares  | MQP/ITP                           | IV               |
| E.02   | Dew Point Meter for GIS   | POWERGRID TS                      | I*               |
| E.03   | Portable Partial Discharge monitoring system for GIS  | POWERGRID TS                      | I*               |

| Sl. No | Item / Equipment   | Reference document for inspection | Inspection Level |
|--------|--|-----------------------------------|------------------|
| E.04   | Partial Discharge Monitoring System (Online) for GIS   | ITP                               | III              |
| E.05   | PEB Structure and Puf Panels   | MQP                               | III              |
| F.01   | Substation Automation system   | FAT/MQP                           | III              |
| F.02   | Event Logger   | POWERGRID TS                      | III              |
| F.03   | PLCC equipment Viz PLCC Terminal, Carrier equipment, Protection Coupler , Coupling Device but excluding EPABX / HF Cable | MQP                               | III              |
| F.04   | Control & Relay Panels   | MQP                               | III              |
| G.01   | EHV Cables   | MQP/ITP                           | III              |
| G.02   | Power Cables & Control Cables  | MQP                               | III              |
| G.03   | Cable Joints (11 kV and above)   | POWERGRID TS                      | II               |
| G.04   | Cable Lugs & Glands / Clamps/Terminations  | POWERGRID TS                      | I                |
| G.05   | Distributed Temperature Sensing Instrument (DTS)   | POWERGRID TS                      | II               |
| H.01   | LT Switchgear & ACDB/DCDB/MLDB/ELDB  | MQP                               | III              |
| H.02   | Battery  | POWERGRID TS                      | II               |
| H.03   | Battery Charger  | MQP                               | III              |
| H.04   | UPS & Voltage Stabilizer   | MQP/FAT                           | III              |
| H.05   | D. G. Set  | FAT/ITP                           | III              |
| H.06   | Lighting Panel   | POWERGRID TS                      | II               |
| H.07   | Lighting Poles   | POWERGRID TS                      | II               |
| H.08   | Lighting Earthwire, Switches / sockets, Conduits, Lamps & fans including exhaust fans                                    | POWERGRID TS                      | I                |
| H.09   | MS/GI /PVC Pipes for cable trenches and lighting   | POWERGRID TS                      | I                |
| H.10   | Outdoor Receptacle   | POWERGRID TS                      | I                |
| H.11   | Split A.C/window A.C./ precision AC/ Kiosk AC/ Cascade AC/ Tower AC  | POWERGRID TS                      | I                |
| H.12   | Occupancy sensors for control of lighting  | POWERGRID TS                      | I                |
| H.13   | Solar based street lighting pole including Solar Panel, Inverter, Controller, etc.                                       | POWERGRID TS                      | III              |
| H.14   | Junction Box / Lighting Switch Boards / Bay MB / Portable Flood Light Panel  | POWERGRID TS                      | II               |
| H.15   | Lighting transformer   | POWERGRID TS                      | II               |
| H.16   | LED Lighting Fixtures  | POWERGRID TS/FAT                  | III              |
| I.01   | SF6 gas processing unit, SF6 gas Leakage detector, SF6 gas Analyzer  | POWERGRID TS                      | I*               |
| I.02   | SF6 Gas  | POWERGRID TS                      | I                |
| I.03   | Spark Gap  | FAT/ITP                           | III              |
| I.04   | Time synchronizing Equipment (GPS Clock)   | POWERGRID TS                      | I                |
| I.05   | Galvanized Cable trays   | POWERGRID TS                      | II               |
| I.06   | Video Monitoring System  | FAT/ITP                           | I                |
| I.07   | Public Address System (All Components)   | POWERGRID TS                      | I                |

| Sl. No | Item / Equipment   | Reference document for inspection | Inspection Level |
|--------|--|-----------------------------------|------------------|
| I.08   | Building Management System (All components)  | POWERGRID TS                      | I                |
| I.09   | Access Control System (All Components)   | POWERGRID TS                      | I                |
| I.10   | Video Display system/ Video Projection system  | POWERGRID TS                      | I                |
| I.11   | VESDA (smoke detector)   | POWERGRID TS                      | I                |
| I.12   | High Mast Pole   | MQP                               | III              |
| J.01   | Aluminium ladder   | POWERGRID TS                      | I                |
| J.02   | Hume Pipes   | POWERGRID TS                      | I                |
| J.03   | Castle Key   | POWERGRID TS                      | I                |
| J.04   | Water Treatment plant (All components).  | POWERGRID TS                      | I                |
| J.05   | Furniture  | POWERGRID TS                      | I                |
| J.06   | DOL Starter  | POWERGRID TS                      | I                |
| J.07   | Oil Sample Bottles and Syringe   | POWERGRID TS                      | I                |
| J.08   | Test & Measuring Equipment, T&P  | POWERGRID TS                      | I*               |
| K.01   | EOT Crane  | POWERGRID TS                      | II               |
| K.02   | Boom Crane/Golf Cart/Platform Truck/Man Lift/ Forklift/ Lifts  | POWERGRID TS                      | II               |
| L.00   | Fire Protection System   |                                   |                  |
| L.001  | Panels, Hydro pneumatic tank for fire protection system.   | POWERGRID TS                      | III              |
| L.002  | Deluge valve, Strainers, MS/GI pipes, Pumps, motors, air compressor, Solenoid and other valves, Diesel Engines | POWERGRID TS                      | II               |
| L.003  | Others   | POWERGRID TS                      | I                |
| M.00   | HVAC SYSTEM  |                                   |                  |
| M.001  | Air Cooled Chiller   | POWERGRID TS                      | III              |
| M.002  | Pump   | POWERGRID TS                      | II               |
| M.003  | Air Handling Unit  | POWERGRID TS                      | II               |
| M.004  | Fan Filter Unit With Centrifugal Blower  | POWERGRID TS                      | II               |
| M.005  | Axial Flow Fan   | POWERGRID TS                      | II               |
| M.006  | Main Climate Control Unit (Dehumidifier)   | POWERGRID TS                      | I                |
| M.007  | Dampers  | POWERGRID TS                      | II               |
| M.008  | Fire Dampers   | POWERGRID TS                      | II               |
| M.009  | Pressure Gauge, Thermometers, Other Instruments / Sensors  | POWERGRID TS                      | I                |
| M.010  | Grill, Diffuser, Jet Nozzle, Louvers etc   | POWERGRID TS                      | I                |
| M.011  | Ducting  | POWERGRID TS                      | III              |
| M.012  | M S Pipe   | POWERGRID TS                      | II               |
| M.013  | Pipe Insulation Material   | POWERGRID TS                      | I                |
| M.014  | Duct Insulation Material   | POWERGRID TS                      | I                |
| M.015  | Underdeck Insulation Material  | POWERGRID TS                      | I                |
| M.016  | Gate Valve & Non-Return valve  | POWERGRID TS                      | I                |
| M.017  | Y Strainer   | POWERGRID TS                      | II               |
| M.018  | Ball Valve/ Motorized Butterfly Valve/ Balancing Valve   | POWERGRID TS                      | I                |



| Sl. No | Item / Equipment  | Reference document for inspection | Inspection Level |
|--------|---|-----------------------------------|------------------|
| M.019  | Closed Expansion Tank   | POWERGRID TS                      | II               |
| M.020  | Air Separator   | POWERGRID TS                      | I                |
| M.021  | MCC /PLC /Electrical Panels                                   | POWERGRID TS                      | III              |
| M.022  | Propeller Fan/ Conduit  | POWERGRID TS                      | II               |
| M.023  | Air Filter/ Mixing Valve with Thermostat                      | POWERGRID TS                      | I                |
| N.01   | SDH Equipment   | FAT/ITP                           | IV               |
| N.02   | Termination Equipment Primary/ DI Multiplexer                 | FAT/ITP                           | IV               |
| N.03   | DACS  | FAT/ITP                           | IV               |
| N.04   | Optical Amplifier   | FAT/ITP                           | IV               |
| N.05   | FODP including pigtail, Joint Box, FDMS                       | FAT/ITP                           | II               |
| N.06   | IMPS  | FAT/ITP                           | IV               |
| N.07   | Optical bypass switch   | FAT/ITP                           | IV               |
| N.08   | Air Purifier  | FAT/ITP                           | I                |
| N.09   | Patch cord & connector  | FAT/ITP                           | I                |
| N.10   | NMS   | FAT/ITP                           | IV               |
| N.11   | OPGW Cable  | MQP/ITP/FAT                       | III              |
| N.12   | Hardware Fittings for OPGW cable                              | MQP/ITP                           | III              |
| N.13   | DCPS  | FAT/ITP                           | III              |
| N.14   | Radio Links   | FAT/ITP                           | III              |
| N.15   | SMPS based DC Power Supply (DCPS) system                      | FAT/ITP                           | III              |
| N.16   | WAMS (PMU & Accessories)                                      | FAT/ITP                           | III              |
| N.17   | PUF Shelter   | FAT/ITP                           | III              |
| N.18   | Aerial OFC/UGOFC/ADSS/FO Cable                                | FAT/ITP                           | III              |
| N.19   | DWDM  | FAT/ITP                           | III              |
| N.20   | OTN   | FAT/ITP                           | III              |
| N.21   | MPLS-TP Equipment   | FAT/ITP                           | III              |
| N.22   | L2 Switch   | FAT/ITP                           | III              |
| N.23   | IP-MPLS Router  | FAT/ITP                           | III              |
| N.24   | HDPE Pipes  | POWERGRID TS                      | II               |
| N.25   | Equipment Cabinets  | POWERGRID TS                      | II               |
| N.26   | Main Distribution Frame                                       | POWERGRID TS                      | I                |
| N.27   | Telephone system, EPABX, Telephone wires, Telephone sockets   | POWERGRID TS                      | I                |
| N.28   | Fiber Optic Cable   | MQP                               | III              |
| N.29   | Hardware Fittings for Fiber Optic cable                       | MQP                               | III              |
| O.01   | Re-rollers of MS/HT Angle Section and galvanized tower parts. | MQP                               | IV               |
| O.02   | Conductor   | MQP                               | IV               |
| O.03   | Hardware fittings and Conductor & Earthwire Accessories       | MQP                               | IV               |
| O.04   | Earth wire  | MQP                               | IV               |

| Sl. No | Item / Equipment  | Reference document for inspection | Inspection Level |
|--------|---|-----------------------------------|------------------|
| O.05   | Insulator   | MQP                               | IV               |
| O.06   | Bolts & Nuts of Gr 8.8 / 8                                    | MQP                               | IV               |
| O.07   | Mono Pole   | MQP                               | IV               |
| O.08   | Foundation Bolts and Anchor Bolts                             | POWERGRID TS                      | III              |
| O.09   | D-shackle/ Hanger / Links and associated Special bolt/nuts    | MQP                               | III              |
| O.10   | Span Marker, Obstruction lights and Wind Measuring Equipment  | POWERGRID TS                      | III              |
| O.11   | MS ROD rolled by Approved Re-roller of POWERGRID              | MQP                               | III              |
| O.12   | MS ROD rolled by Approved steel producers of POWERGRID        | POWERGRID TS                      | I                |
| O.13   | Spring Washers & Pack washers                                 | POWERGRID TS                      | II               |
| O.14   | Bolts & Nuts Gr up to 5.6/5                                   | POWERGRID TS                      | II               |
| O.15   | ACD & Barbed wire for ACD/Bird guard                          | POWERGRID TS                      | II               |
| O.16   | Danger Plate /Phase Plate / Number Plate / Circuit plate      | POWERGRID TS                      | I                |
| O.17   | Sub Station Structure (lattice/pipe type)                     | MQP                               | III              |
| O.18   | Clamps & Connectors (including equipment connectors)          | MQP                               | III              |
| O.19   | MS/ GI Flat, rod type, pipe type and other earthing material. | POWERGRID TS                      | II               |
| O.20   | Aluminium Tube & Busbar materials                             | POWERGRID TS                      | II               |
| O.21   | Pipe Type & Counter Poise Earthing                            | POWERGRID TS                      | II               |
| O.22   | Chemical and Mechanical Anchor Bolts                          | POWERGRID TS                      | I                |
| O.23   | Bird Flight Diverter  | POWERGRID TS/FAT                  | II               |

For Equipment where requirement of MQP is envisaged, ITP/FAT will be followed If sourced from off shore. For items required in S/S or T/L or TELECOM/GA&C , same inspection level as specified shall be followed for all the cases.

\* MICC for test and measuring equipment (inspection level I or II) shall be issued only after actual verification/ demonstration of satisfactory performance at site.

\*\* Though level-2 items, CIP/MICC can be issued also on review of TCs and visual inspection of these item.

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**MANUFACTURING QUALITY PLAN**

|  |   |                   |       |                                       |                                      |
|--|---|-------------------|-------|---------------------------------------|--------------------------------------|
| Manufacturers<br>Details (Name, Works<br>Address etc.) | <b>Customer</b><br><br><b>POWERGRID</b> | Vendor's<br>Code: | Item: | Q.P. No.<br><br>Rev. No.<br><br>Date: | Valid<br>From:<br><br>Valid<br>Upto: |
|--|---|-------------------|-------|---------------------------------------|--------------------------------------|

| Sr.<br>No. | Components /<br>Operations &<br>Description of Test | Type of<br>check | Quantu<br>m of<br>Check /<br>Samplin<br>g with<br>basis | Reference<br>document<br>for<br>Testing | Acceptance<br>Norms | Format of<br>Record | Applicable Codes |   |   |   |   |   | Remarks |
|------------|---|------------------|---|---|---------------------|---------------------|------------------|---|---|---|---|---|---------|
|            |   |                  |   |   |                     |                     | 1                | 2 | 3 | 4 | 5 | 6 |         |
|            |   |                  |   |   |                     |                     |                  |   |   |   |   |   |         |

|  |  |  |  |  |  |  |
|--|--|--|--|--|--|--|
| A. Section: RAW MATERIAL<br>INSPECTION |  |  |  |  |  |  |
| B. Section : IN PROCESS<br>INSPECTION  |  |  |  |  |  |  |
| C. Section: FINAL TESTING              |  |  |  |  |  |  |
| D. Section: PACKING &<br>DISPATCH      |  |  |  |  |  |  |

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# MANUFACTURING QUALITY PLAN

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|               |  |                              |                |   |                                   |                                |
|---------------|--|------------------------------|----------------|---|-----------------------------------|--------------------------------|
|               |  | Customer<br><b>POWERGRID</b> | Vendor's Code: | Item:   | Q.P. No.<br><br>Rev. No.<br>Date: | Valid From:<br><br>Valid Upto: |
| <b>Code 1</b> | Indicates place <b>where testing is planned</b> to be performed i.e. Inspection location |                              | <b>Code 2</b>  | Indicates <b>who has to perform the tests</b> i.e. Testing Agency                             |                                   |                                |
| A             | At Equipment Manufacturer's works  |                              | J              | The Equipment Manufacturer  |                                   |                                |
| B             | At Component Manufacturer's works  |                              | K              | The Component Manufacturer  |                                   |                                |
| C             | At Authorized Distributor's place  |                              | L              | The Third Party   |                                   |                                |
| D             | At Independent Lab   |                              | M              | The Turnkey Contractor  |                                   |                                |
| E             | At Turn Key Contractor's location  |                              |                |   |                                   |                                |
| F             | Not specified  |                              |                |   |                                   |                                |
| <b>Code 3</b> | Indicates <b>who shall witness</b> the tests i.e. Witnessing Agency                      |                              | <b>Code 4</b>  | Review of Test Reports/Certificates   |                                   |                                |
| P             | Component Manufacturer itself  |                              | W              | By Equipment manufacturer during raw material/bought out component inspection.                |                                   |                                |
| Q             | Component Manufacturer and Equipment Manufacturer  |                              | X              | By Contractor during product/process inspection   |                                   |                                |
| R             | Component Manufacturer, Equipment Manufacturer and Contractor                            |                              | Y              | By POWERGRID during product/process inspection  |                                   |                                |
| S             | Equipment Manufacturer itself  |                              | Z              | By Contractor and/or POWERGRID during product/process inspection                              |                                   |                                |
| T             | Equipment Manufacturer and Contractor  |                              |                |   |                                   |                                |
| U             | Equipment Manufacturer and/or Contractor and POWERGRID                                   |                              |                |   |                                   |                                |
| V             | Third Party itself   |                              |                |   |                                   |                                |
| <b>Code 5</b> | Whether specific approval of sub-vendor / Component make is envisaged?                   |                              | <b>Code 6</b>  | Whether test records required to be submitted after final inspection for issuance of CIP/MICC |                                   |                                |
| E             | Envisaged  |                              | Y              | Yes   |                                   |                                |
|               | Not Envisaged  |                              | N              | No  |                                   |                                |

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