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**PROJECT NAME**

  
  

**METHOD STATEMENT FOR**

  
  

**TRANSFORMER TESTING AND COMMISSIONING**

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<b>REVISION RECORD</b>

This cover page is a record of all revisions of the document identified above by number and title. All previous cover pages are hereby superseded and are to be destroyed.

Rev. No.	Date	By	Chkd.	Approvals	Description and Page Numbers of Revisions

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## 1.0 PURPOSE

This method statement is applicable for Testing and Commissioning Medium voltage indoor dry type Transformers and its Accessories in transformer room area for the Project.

## 2.0 SCOPE

- This procedure defines the method that will be used to ensure proper testing of the transformers.
- All works relating to the above item will be carried out in accordance with the approved site test procedure and in compliance with the project specification.
- This method statement to be read in conjunction with relevant approved site test formats.

## 3.0 REFERENCE

- Latest Approved shop drawings for power distribution and Transformer room.
- Specifications for Transformers.
- Manufacturer's Recommendation.
- Institute of Electrical Engineers (IEE)
- Regulation of the local Electrical Authority,
- Requirements of Civil Defence Department.

## 4.0 DEFINITIONS:

PQP	: Project Quality Plan
PSP	: Project Safety Plan
QCP	: Quality Control Procedure
HSE	: Health, Safety and Environment
MS	: Method Statement
ITP	: Inspection Test Plan
QA/QC	: Quality Assurance / Quality Control Engineer.
SK	: Store Keeper.
WIR	: Inspection and Test Request
MIR	: Material Verification Record.

## 5.0 RESPONSIBILITIES:

Responsibilities for ensuring that the steps in this procedure shall be carried out are specified at relevant steps in the procedure:

- Project Manager.
- Construction manager
- QA/QC Engineer
- Site Engineer
- HSE officer

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- SK

### **5.1 Project Manager**

- Project Manager is the overall responsible for the project in terms of work execution, safety, planning & quality. The Project Manager will maintain the planning progress and coordination of works with the main contractor.
- The work progress shall be carried out as per planned program and all the equipment's required to execute the works shall be available and in good condition as per project planned.
- Specific attention is paid to all safety measures and quality control in coordination with Safety Engineer and QA/QC Engineer and in line with PSP and PQP.

### **5.2 Construction Manager**

- Construction Manager is responsible to supervise and control the work on site.
- Coordinating with QA/QC Engineer and site Team and foremen for all activities on site.
- Control and sign all WIR's before issuing to Consultant approval.

### **5.3 Site Engineer**

- The method of statement to the system shall be implemented according to the Consultant project specifications and approved shop drawings.
- Provision of all necessary information and distribution of responsibilities to his Construction team.
- The work progress shall be monitored in accordance with the planned work program and he will provide reports to his superiors.
- The constant coordination with the Safety Engineer to ensure that the works are carried out in safe working atmosphere.
- The constant coordination with the QA/QC Engineer for any works to be carried out and initiate for the Inspection for the finished works.
- He will ensure the implementation of any request that might be raised by the Consultant.
- Efficient daily progress shall be obtained for all the equipment and manpower.
- He will engage in the work and check the same against the daily report received from the Foremen.
- The passage of all the revised information to the Foremen and ensure that it's being carried out properly.

### **5.4 QA/QC Engineer (MEP):**

- The monitoring of executions of works at site and should be as per the approved shop drawings and project specifications.
- Ensure WIRs and MIRs are being raised for activities in timely manner and inspected by the Consultant.
- Check and insure that all activities / work done / completed prior to offer for consultant inspection.
- He will follow and carried out all the relevant tests as per project specifications.
- Obtain the required clearance prior to Consultant's inspections.
- Should acquire any necessary civil works clearances and coordination.
- Coordinate with site construction team.

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- One who will assist the Consultant Engineer / Inspector during inspection.

#### **5.5 Site Foreman**

- The carrying-out of work and the proper distribution of all the available resources in coordination with the Site Engineer on a daily basis.
- Daily reports of the works are achieved and coordinated for the future planning with the Site Engineer.
- Incorporate all the QA/QC and Safety requirements as requested by the concerned Engineer.
- Meeting with any type of unforeseen incident or requirement and reporting the same to the Site Engineer immediately.

#### **5.6 Safety Officer**

- The implementation of all safety measures in accordance with the HSE plan and that the whole work force is aware of its proper implementation.
- The implementation of safety measures is adequate to maintain a safe working environment on the work activity.
- Inspection of all the site activities and training personnel in accident prevention and its proper reporting to the Construction Manager and the Project Manager.
- The site is maintained in a clean and tidy manner.
- Ensure only trained persons shall operate the power tools.
- Ensure all concerned personals shall use PPE and all other items as required.
- Ensure adequate lighting is provided in the working area at night time.
- Ensure high risk elevated areas are provided are barricade, tape, safety nets and provided with ladders.
- Ensure service area/inspection area openings are provided with barricade, tape, and safety nets.
- Ensure safe access to site work at all times.

#### **5.7 Store Keeper (SK)**

- Responsible for overall Store operations in making sure to store the material delivery to the site and keep it in suitable area that will keep the material in safe from rusty and damage.
- One who will acknowledge the receiving of materials at site in coordination with QA/QC and concerned Engineer.

### **6.0 EQUIPMENT:**

- 6.1 Indoor Dry Type Transformer & Accessories
- 6.2 Portable Hand Tools / Tool Box.
- 6.3 Digital Multimeter
- 6.4 Earth Resistance Tester
- 6.5 Megger Tester.

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6.6 Safety requirements tools such as safety shoes, safety helmet, safety glasses, fluorescent vest, and safety gloves to ensure maximum ability of safe work and dust mask when require.

## **7.0 PROCEDURE:**

### **7.1 SAFETY**

Ensure only trained persons shall operate the power tools.

Ensure all concerned personals shall use PPE and all other items as required.

Ensure adequate lighting is provided in the working area at night time.

Ensure service area/work area openings are provided with barricade, tape, and safety nets.

### **7.2 PREPARATION FOR TESTING**

1. Prior to the commencement of any permanent works, areas and access will be inspected to confirm that they are in a condition for permanent works to commence ensuring the environment is clean and dry. Testing will commence only after the equipment is completely installed as per approved method statement for the installation of the Transformer and released for testing commissioning.
2. All materials and relevant documentation to this testing works shall be checked by the responsible personnel prior to the commencement of testing activities.
3. Before any Item of equipment is accepted for testing a visual inspection will be carried out on that equipment. Where defective equipment is found it will be reported to Consultant for further action.
4. The testing Electrical Engineer/Supervisor should confirm the availability of necessary Three Phase AC power supply and Single phase for testing activities.
5. The testing Electrical Engineer/Supervisor should confirm the availability of proper access to the site area in which the equipment have to be tested.
6. When a satisfactory pre-testing inspection has been carried out, the testing work will commence.
7. The testing Engineer will instruct the supervisor regarding the testing works and will arrange for all necessary schematic drawings, data sheets and test formats to be available at the testing area.
8. The supervisor will check that all the necessary tools and equipment's to be used for testing are available at the testing area.
9. After the testing work is completed the supervisor checks all the testing equipment and returns to the storage cabin.

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10. While carrying out the testing work the Testing Engineer will fill all the necessary test formats. After completion of testing work the Testing Engineer will obtain the signature of relevant officials: Consultant.

### **7.3 METHOD OF TESTING OF TRANSFORMERS:**

#### **7.3.1 VISUAL INSPECTION:**

- Correctness of installation, assembly.
- Damage, paint, cracks checks.
- Tightness Checks.
- Earthing Connection Checks.
- Labels/Markings Rating Plate Correctness Checks.
- Ferrules/ terminal Numbering Checks.

#### **7.3.2 Insulation Resistance measurement for primary windings**

- Earth the Secondary windings
- Apply Voltage on the Primary windings
- Observe readings and record in the test format

#### **7.3.3 Insulation Resistance measurement for Secondary windings**

- Earth the Primary windings
- Apply Voltage on the Secondary windings
- Observe readings and record in the test format

#### **7.3.4 Windings Resistance measurement**

- Ensure the contacts at bushings are cleans
- Hold the sensing probes across the conduct between which the contact resistance is to be measured (Test Current 10A DC).
- Observe the reading and record in the test format.

#### **7.3.5 Ratio Measurement**

- Ensure that both the Primary and Secondary windings are not connected to any cables/Bus bar.
- Ensure the tap Changer in lowest tap Position.
- Apply three phase supply voltage (415 V AC) across the Primary Termination of the Transformer.
- Measure the secondary (LV) voltage at the LV termination. Observe the reading and record in the test format.
- If the tap changer is Off load type, switch of the power supply and rise one step and apply the Three phase 415 V AC across the Secondary termination and measure the voltage at both Secondary and Primary side.
- The above step to be carried-out until the highest tap.

**OR**

- The test is performed with a digital ratio meter which measures the ratio value of the transformer and simultaneously checks the vector group and the polarity.



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### **7.3.6 Vector group Checks**

- Ensure that both the Primary and Secondary windings are not connected to any cables /Bus bars.
- Connect the “R” phase of the Primary winding and “R” phase of the Secondary winding (Short R phase of Primary and Secondary termination).
- Apply 3 phase supply voltage (415 V AC) across the Primary Termination of the Transformer. Measure the voltage at the both Primary and Secondary termination at all the phases. Observe the reading and record in the test format.
- Apply the formula or plot the values in the graph to get the vector group.

### **7.3.7 Magnetic Balance Test**

- Ensure that both the Primary and Secondary windings are not connected to any cables/Bus bars.
- Apply 3 phase supply voltage (415 V AC) across the 1U & 1V and measure the Corresponding Voltage for 1U-1V, 1V1W & 1U1W.
- Switch off the Supply and repeat the test again by applying the voltage in 1V & 1W and Measure the corresponding voltage for 1U-1V, 1V1W & 1U1W.
- Again, Switch off the Supply and repeat the test again by applying the voltage in 1U & 1W and Measure the corresponding voltage for 1U-1V, 1V1W & 1U1W.
- Observe the reading and record in the test format.

### **7.4 On site Protection**

- Until the Equipment is permanently energized, client should ensure that a protective cover will Remain over all the equipment that is being tested.

## **8.0 ATTACHMENTS**

8.1 Inspection & Test Plan

8.2 Check List

8.3 Risk Assessment