MAIN SUB-MAIN DISTRIBUTION BOARD TESTING AND COMMISSIONING PROCEDURE

REVISION HISTORY	ISSUE DATE	DESCRIPTION	REVIEW / STATUS

PREPARED BY:	REVIEWED & APPROVED BY:
QHSE ENGINEER	SR. PROJECTS ENGINEER

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1. SCOPE OF WORK

The purpose of this Procedure is the Testing and Commissioning for the following:

1.1. MSMDB
1.2. Sub-Main Distribution Boards (SMDB)
1.3. Distribution Boards (DB)
1.4. Consumer Units (CU)

2. REFERENCES

2.1. QHSE SMDB Plan
2.2. Project General Specification Section.
2.3. Manufacturer recommendations Installations instruction.
2.4. Project Safety Plan.
2.5. Approved Main Sub-Main Distribution Boards (SMDB) Material Submittals.

3. GENERAL SAFETY PRECAUTIONS

To be always observed by all staff, any deviation from these control procedures must be authorized by the site foreman or safety representative.

3.1. Contractor and Visitor Safety

Staff will liaise with other contractor staff on a day-to-day basis and ensure they are aware of the risks present during the work. Staff and contractors will not leave any area of work in a dangerous condition or with risks to themselves, other contractors, tenants, or visitors, all tools and equipment will be cleared to secure storage after each shift. Scaffolds, ladders, and any other access to height will be made inaccessible.

3.2. First Aid

It is essential to ensure adequate first aid provision for staff; Adequate means the provision of suitable first aid equipment and the provision of an appointed person at the minimum. It may be necessary to appoint a suitably qualified first aider where a risk assessment has identified the need for one.

3.3. Manual Handling

All staff have been instructed on the potential dangers of manual handling and have received manual handling training. Staff will not lift items of tools or equipment beyond their capabilities. Heavy or awkward items will be broken down into smaller pieces or dual lifted where this is not

possible. It is the responsibility of the site foreman to identify and control potentially dangerous manual handling situations as they occur on-site on a day-to-day basis.

3.4. Material Handling

All materials required for the site will be unloaded to a designated unloading and storage area which will be away from the work area as far as is practicable. This area will be kept tidy to minimize trip hazards. Materials as and when required will be collected from the storage area to the work area. All staff will take care when handling materials.

3.5. Personal Protective Equipment (PPE)

All site workers will wear Safety boots, Hi-Visibility Vests, Hard Hats, and protective clothing always, other items of PPE such as eye protection, and gloves are available to be worn as and when necessary.

3.6. Preparation & Induction

A risk assessment will be carried out for all tasks which will be discussed with members of staff and the subcontractors, any queries or concerns will be raised with the contract manager who will ensure it is dealt with. Staff and sub-contractors will be inducted onto the site by the principal contractor and will follow all site rules and safety procedures.

3.7. Staff and Training

The task will be carried out by staff members who are qualified, experienced and receive ongoing training, and hold suitable qualifications. Apprentices are under constant supervision by senior members of staff.

3.8. Housekeeping

All Staff are responsible to implement and maintain safe housekeeping practices including Providing appropriate, safe, and clear access to and from the workplace; Collecting, storing, and disposing of excess or waste materials; Providing adequate space for the storage of materials and plants.

3.9. Site Access and Egress

The principal contractor is responsible for providing safe access and exit to the site. Staff will ensure safe access and exit are maintained for themselves and other subcontractors in the area they are working in, and good standards of housekeeping will be maintained.

3.10. Tools and Electrical Equipment

All items of tools and equipment will be visually inspected regularly defective or damaged equipment will be removed from service. Electrical tools will be 220V where possible, sub-contractors will not be allowed to bring on to the site any damaged or defective tools, and the site foreman is responsible for ensuring all tools and equipment allowed on the site are fit for purpose.

3.11. Vehicle Safety

All company vehicles are subject to a planned maintenance and inspection program. Staff responsible for vehicles will carry out daily and weekly checks to ensure continued roadworthiness. All drivers will comply with road traffic regulations and the Highway Code. All loads will be securely fastened to the vehicle by competent persons before travel. Drivers will take regular breaks on long journeys.

4. RESPONSIBLE PERSONNEL

It is intended that the project organization shall consist of the following personnel

4.1. Project Manager
4.2. Site Engineer
4.3. Installation Supervisors
4.4. Commissioning Engineer

5. TESTING, COMMISSIONING AND START-UP PROCEDURES

5.1. Upon completion of equipment installation and before carrying out test runs, the Contractor shall visually inspect the installation and satisfy that the equipment has been properly installed.
5.2. Ensure that all moving parts (if any) are free from obstructions.
5.3. It should be ascertained that the system has been installed following the design and installation drawings and that each piece of equipment operates properly.
5.4. The manufacturer's instructions, where applicable, will be followed for the testing and commissioning of the system components.
5.5. All recommendations as per standards and regulatory requirements applicable to the project shall be followed.

Preparation

As per the procedure and requirements, the contractor and the project engineer jointly make a final inspection and will confirm that the system is installed correctly as per the design and is now ready for operation.

The following shall be observed closely:

6. **Punch List-PL:** The contractor shall observe and see that all the punch list items that may directly affect the system test all complied with the Engineer/Client requirements or as per the design.
7. **Notification:** The Contractor shall officially inform the project Engineer and/ or Client involved and the assigned representative of the pre-determined final schedule for inspection shall be conducted and accomplished. The Contractor shall notify and inform the Engineer and/ or Client representative 48 hours before the actual inspection to enable them to witness the tests. The values will be documented appropriately and submitted for further required approval.

8. TESTING PROCEDURE MSMDBS AND SMDBS

The following tests are to be carried out on a distribution board:

8.1. Verification of nameplate details for rating following approved General Arrangement (GA) drawings
8.2. Check for physical damage
8.3. General checks
8.4. Check for Electrical/ Functional checks
8.5. Insulation Resistance tests
8.6. Check earthing connection

Test equipment/ instruments:

- Insulation resistance tester with variable voltage selections
- Multi-meters

Insulation resistance test – Procedures

- Check for the tightness of all connections
- Clean all the supporting insulators
- Isolate the cables on the incoming and outgoing side
- Apply a Megger voltage of 1000 Volts DC with Respective Phases for one (1) minute and record the values
- Similarly, continue the test and record the values for the other phases

Electrical/ Functional Checks – Procedures

- Switch on the main incoming control supply for the SMDB
- Check the electrical operation of the switchgear using the schemes
- Check the operation of the indicating devices, voltmeters, protective devices, etc. mounted in the panel using the scheme

9. TESTING PROCEDURE OF DB'S & CU'S

The following tests are to be carried out on a distribution board:

- Verification of nameplate details for rating following approved General Arrangement (GA) drawings
- Check for physical damage and earthing connection
- General checks
- Check for Electrical/ Functional checks

Test equipment/ instruments:

- Multi-meters

Electrical/ Functional Checks – Procedures

- Switch on the main incoming control supply for the Sub-Main Distribution Boards
- Appropriately and carefully check the electrical operation of the Circuit Breaker (CB)
- Appropriately and carefully check the availability of voltage on the Circuit Breaker (CB) by using a multi-meter (MM)
- Appropriately and carefully check the operation of the Indicating Devices (IDs), Voltmeters (VMs), Protective Devices (PDs), etc. mounted in the panel using the same scheme and technique.

Before Energization

Check:

- Busbar chambers,
- Main and sub-main switch connections i.e.
- Bolts and nuts tightness.
- Earthing connections at compartments,
- All switches and earth electrodes.
- Clearance of live parts from direct contact with or any possibility of contact with tools, spurious Bare Conductors (BC) remaining in switches, Circuit Breakers (CB) and Switch Cubicles (SC).
- Vacuum cleaning of switches and Breakers.
- Provision of danger and warning signs.

Switch on Process

- Whenever there is any break of time e.g., the next day, in carrying out the switch-on process, a re-test of insulation resistance is required.
- Switch on the main incoming with all other outgoing breakers off.
- If normal, switch on other Sub-Main Switches (SMSs) one by one with all other outgoing switches off.
- If normal, then switch on all other outgoing switches one by one.
- Stay at the site and keep vigilance for approximately 30 minutes to see if any smell or unusual noise is being generated by the installed system.

10. ACCEPTANCE

After the system is completely examined, tested, and inspected appropriately and all design or highlighted comments have been duly complied with and done, the project installation, testing and commissioning Engineers shall sign the Acceptance Certificate (AC) verifying that the system is completely accepted and shall be ready for handing over to the client.

11. EMERGENCY CONTACT NUMBERS

Project Engineer	
HSE Engineer	
Police	
Ambulance	
Fire	

12. MANPOWER RESOURCING

Total	

13. INSPECTION & TEST PLAN

All work-in-progress shall be inspected by the designated project staff and the site resident engineer/site clerk of work at various inspection points as per the relevant project quality plan. Refer to the attachment.

14. APPENDICES (AS APPLICABLE)

Risk Assessment (Attached)