**Solar Electric Technician (Level 2)**

**Module 5: Installation and assembly**

**E17: Assignment – 3-phase wiring from main distribution board to load centres**

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| **E17: ASSIGNMENT MEMO** | |
| **Date** | …. |
| **To** | Participants |
| **From** | Trainers |
| **Subject** | 3-phase wiring from main distribution board to load centres. |
| **What** | Perform a 3-phase wiring from main distribution board to load centres. |
| **Why** | To enable participants in learning to do a 3-phase wiring from main distribution board to load centres. |
| **How** | 1. Group of 2 or 4. 2. As per the given instruction, perform the 3-phase wiring of a given electrical system. 3. Answer the questions and discuss the results. |
| **Time** | 180’ |

**As per the given site conditions, perform the 3-phase wiring to/from main distribution board to various points/load centres**

**Required tools/equipment**

* 3-phase distribution board
* Circuit breakers (MCBs, MCCBs)
* Neutral bars and earthing bars
* Copper bus bars
* AC wiring (different colors for each phase: L1, L2, L3, neutral, and earth)
* Conduits and cable ties
* Crimping tools, screwdrivers, wire strippers, cable lugs, and multimeter
* Distribution board layout diagram
* Load distribution plan (for appliances or circuits)
* Electrical safety equipment (gloves, goggles, etc.)

**Instruction**

Follow each step to conclude the practice session.

**Step 1: Familiarize with the layout of the distribution board and component placement.**

* Examine the provided layout diagram of the 3-phase distribution board.
* Identify the positions for connecting the incoming 3-phase wires, circuit breakers, neutral bar, earthing bar, and load-side outgoing terminals.

**Step 2: Connect the incoming 3-phase supply (L1, L2, L3) and neutral to the distribution board.**

* Connect the 3-phase incoming supply (live wires L1, L2, L3) to the appropriate bus bars or main circuit breakers in the distribution board using cable lugs.
* Ensure secure connections with the correct color-coded wires
* Connect the neutral wire from the supply to the neutral bar.
* Check for secure, clean connections using crimping tools and screwdrivers.

**Testing**

* Use a multimeter to verify that the correct voltage is present at each phase terminal (L1, L2, L3) and that neutral is properly connected.

**Step 3: Install circuit breakers for each circuit and connect them to the phases (L1, L2, L3), neutral bars, and earthing bars.**

* Install MCBs for each individual circuit (appliances, lighting, etc.) on the distribution board.
* Connect the output of the MCBs to the outgoing wires that will power the different locations in the building.
* Ensure that each phase (L1, L2, L3) is used and that load circuits are evenly distributed across these phases by checking the loads being used at each phase.
* Connect the neutral of each circuit to the neutral bar.
* Connect the earthing wires of each circuit to the earthing bar.

**Load balancing**

* Make sure to distribute the load evenly across all three phases to prevent overloading any single phase.

**Testing**

* Use a continuity tester to verify that each circuit breaker is correctly wired and functioning.

**Step 4: Connect the earthing system to the distribution board.**

* Ensure that the distribution board's earthing bar is properly connected to the main building earthing system.
* Verify that all metallic parts of the distribution board and the MCBs are earthed.
* Check that the earthing wire is properly secured and has low resistance.

**Testing:**

* Perform an insulation resistance test between live conductors and earth to ensure proper earthing.

**Distributing 3-Phase wiring throughout the building**

**Step 5: Distribute the 3-phase wiring from the distribution board to different locations in the building.**

* Identify the load points (appliances, lighting, or power sockets) where the wiring will terminate.
* Run the 3-phase cables (L1, L2, L3), neutral, and earthing wires from the distribution board to the various load points using conduits or cable trays.
* Ensure that each load point is evenly distributed across the three phases.
* Use different color-coded wires for each phase and label them properly.

**Load distribution**

* Assign loads (e.g., appliances, motors, lights) to specific phases to ensure even distribution across L1, L2, and L3.
* Make sure that high-load devices (e.g., motors, air conditioning units) are spread out over different phases.

**Step 6: Verify that the load is evenly distributed across all three phases and that all circuits are functioning.**

* Use a multimeter or clamp meter to measure the current flowing through each phase (L1, L2, L3) and verify that no phase is overloaded.
* Check for correct voltage and continuity at each load point.
* Test each circuit by turning on connected devices (lights, appliances) and ensuring they work as expected.

**Troubleshooting**

* If any phase is overloaded or circuits do not function correctly, trace the wiring and fix any errors.

**Step 7: Review the process and discuss key learning points from the practical exercise.**

* Review each group’s wiring and load distribution to identify any errors or areas of improvement.
* Discuss common challenges faced during wiring and load balancing.
* Highlight the importance of safe practices and proper load distribution in real-world installations.

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| **Answers** |
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