**Solar Electric Technician (Level 2)**

**Module 5: Installation and assembly**

**E15: Assignment – Connecting and installing earthing system**

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| **E15: ASSIGNMENT MEMO** | |
| **Date** | …. |
| **To** | Participants |
| **From** | Trainers |
| **Subject** | Connecting and installing earthing systems. |
| **What** | Connect earthing system to various earth terminals and demo of earthing pits. |
| **Why** | To enable participants in learning to connect earthing to various terminals for protection of components. |
| **How** | 1. Group of 2 or 4. 2. Gather the required SLD. 3. As per the given instruction, review the SLD and prepare a wiring diagram. 4. Answer the questions and discuss the results. |
| **Time** | 120’ |

**Connect the earthing system to the earthing terminals and perform a demo earthing pit exercise**

**Required tools/equipment**

* Solar PV system components (modules, inverters, battery bank, etc.)
* Copper earthing rods
* Chemical earthing powder/ mud mix for demo (e.g., bentonite or earth-enhancing compound)
* Earthing conductors (copper or GI strips/cables)
* Earthing clamps and connectors
* Multimeter/Earth tester for continuity testing
* Shovel and digging tools for earthing pit
* Water supply for chemical earthing
* Safety gear (gloves, goggles, etc.)
* Wire cutters, strippers, crimping tools, screwdrivers
* Manual for earthing and installation guidelines

**Instruction**

Follow each step to conclude the practice session.

**Step 1: Get familiar with the tools and accessories needed for connecting the earthing system.**

* Identify the copper rods, earthing conductors, connectors, clamps, and accessories.
* Gather tools like wire cutters, crimpers, and testing devices (multimeter) for checking continuity and resistance.
* Ensure safety gear is available for all participants.

**Step 2: Understand which solar PV components require earthing.**

* Identify and label key components in the solar PV system that require earthing, such as:
* Solar panels (frames)
* Inverters
* …………………….
* …………………….
* …………………….
* Discuss the importance of earthing these components to prevent electric shock and system failure.

**Step 3: Safely connect the earthing system to solar PV components.**

**Solar panel earthing**

* Use earthing clamps to connect copper earthing wires to the metal frames of the solar PV modules.
* Ensure proper crimping of the wires using the appropriate lugs.

**Inverter and battery earthing**

* Connect the inverters and battery’s earthing terminals to the earthing rod/ earth busbar using copper cables.
* Ensure all connections are tight and secure, using proper cable lugs and clamps.

**Mounting structure earthing**

* Connect the earthing cable to the metal structure supporting the solar PV panels, ensuring proper continuity throughout.

**Testing**

* Test the continuity of the earthing system with a multimeter to ensure a low-resistance connection between all components.

**Chemical earthing exercise**

**Step 1: Set up the required materials and tools for the chemical earthing process**.

* Gather the chemical earthing powder (bentonite or other compounds), earthing rods, and water.
* Prepare digging tools to create the earthing pit.
* Ensure the copper rods and earthing conductors are ready for installation.

**Step 2: Install the earthing rod in the ground with chemical** **treatment.**

**Digging the pit**

* Dig a pit about 2-3 meters deep (or as per site conditions and instructions).
* Ensure the pit is wide enough to accommodate the copper earthing rod and chemical material.

**Installing the rod**

* Insert the copper earthing rod into the center of the pit, ensuring it extends deep into the ground.
* Pour the chemical earthing compound (bentonite) around the rod, ensuring it fills the pit and surrounds the rod completely.
* Add water to activate the chemical compound, which will improve soil conductivity and reduce earthing resistance.

**Step 3: Complete the earthing connection and test for proper functionality.**

**Cable connection**

* Attach the earthing cable securely to the copper rod using clamps and connectors.
* Run the earthing cable from the pit to the solar PV system components, ensuring all parts are properly grounded.

**Testing the earthing system**

* Use a multimeter or earth resistance tester to measure the resistance of the earthing system.
* Ensure the resistance is within acceptable limits (usually less than 5 ohms).

**Verify connections**

* Ensure that all the solar components (panels, inverter, battery) are connected to the earthing system.

**Step 4: Group review and discussion (Instructor-led discussion)**

* Review the steps involved in connecting the earthing system to solar PV components and performing chemical earthing.
* Discuss the benefits of chemical earthing over traditional earthing methods in areas with poor soil conductivity.
* Ask questions and clarify any issues or challenges faced during the exercise.

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| **Answers** |
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