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COURSE BROCHURE

# Earthing, Bonding and Surge Protection for Electrical Installations Training Course

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Singapore

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# Earthing, Bonding and Surge Protection for Electrical Installations Training Course

**Ref:** 2605_99094 **Date:** 8 – 12 November 2027 **Location:** Singapore **Fees:** 9300 GBP

Earthing, Bonding and Surge Protection for electrical installations is a 1-week training course for electrical design and maintenance engineers who specify, test and inspect earth electrodes, protective conductors and surge protective devices, and who leave with a completed earthing inspection record. Sensitive electronics now make a weak earth path costly in uptime as well as safety. The course is delivered by Jupiter Prime Training.

## Why Earthing, Bonding and Surge Protection Matters Now

Three forces shape earthing work today. Installations carry more drives, inverters, data equipment and battery systems, each sensitive to potential differences and transient overvoltages. Ageing electrodes corrode while sites extend, so the earth resistance measured at handover rarely holds years later. An organisation that keeps its earthing healthy avoids shock incidents, nuisance tripping and fire risk; one that neglects it meets equipment damage after the next storm. Asset owners and insurers increasingly ask for documented earth test results and bonding records.

## Who Gains Most from Earthing, Bonding and Surge Protection

- Engineers who size protective conductors, main earthing terminals and electrode arrangements for new installations
- Maintenance engineers responsible for periodic earth resistance and continuity testing
- Specialists who select surge protective devices and coordinate them with downstream equipment
- Site electrical leads who sign off bonding of pipework, structural steel and cable trays
- Reliability engineers who investigate unexplained trips, equipment failures and stray voltages

Design and maintenance groups gain most when they attend together, because the electrode layout drawn by one is measured and recorded by the other.

## Earthing, Bonding and Surge Protection Capabilities

Participants move from fault current physics to the measurements that show an earth still works.

- Compare TN, TT and IT earthing arrangements against a site's supply and fault loop — design approvals
- Calculate protective conductor sizes and fault disconnection conditions — cable and protection specifiers
- Specify main and supplementary equipotential bonding for metallic services — installation contractors
- Assess lightning risk and select surge protective device types and ratings — asset owners
- Test earth electrode resistance, soil resistivity and conductor continuity — maintenance planners
- Build an earthing inspection record with defects ranked by hazard — site safety committees

## Key Earthing, Bonding and Surge Protection Terms

- Earth electrode — A conductive rod, plate, tape or mesh buried in soil that carries fault and lightning current into the general mass of earth.
- Equipotential bonding — Connecting exposed and extraneous metal parts together so that dangerous voltage differences cannot appear between them during a fault.
- Touch voltage — The voltage a person bridges between a hand on faulted metalwork and their feet, while fault current flows.
- Step voltage — The voltage between two feet one stride apart on ground around an electrode carrying fault or lightning current.
- Surge protective device — A component that limits transient overvoltages and diverts surge current to earth.
- Soil resistivity — The resistance of a standard cube of soil, which governs electrode design.

## Earthing, Bonding and Surge Protection Day by Day

## Day 1: Fault Current Paths and Earthing Arrangements

- Fault Loop Impedance Concepts — Disconnection Times for Final Circuits
- TN-S, TN-C-S, TT and IT Arrangements — Choosing the Site Earthing System
- Main Earthing Terminal Layout — Routing Protective Conductors to Each Board
- Generator and Transformer Neutral Earthing — Fault Level and Neutral Practice
- Electric Shock Physiology — Setting Safe Touch Voltage Limits

## Day 2: Electrodes, Soil and Earth Grid Design

- Four-Pin Soil Resistivity Survey — Selecting Electrode Depth and Spacing
- Rod, Tape and Mesh Electrodes — Target Resistance for Each Site Type
- Substation Grid Design — Controlling Touch and Step Voltages
- Electrode Corrosion and Material Choice — Expected Electrode Service Life
- Ground Potential Rise Estimation — Transferred Voltage to Remote Services

## Day 3: Bonding, Conductors and Clean Earths

- Protective Conductor Sizing by Adiabatic Equation — Cable Schedule Sign-Off
- Main and Supplementary Bonding of Metallic Services — Installation Acceptance
- Bonding of Hazardous-Area Plant and Tanks — Static Discharge Control
- Functional Earths for Instrumentation and Data Rooms — Noise Versus Safety
- Circulating Current and Earth Loop Diagnosis — Cable Screen Bonding Choices

## Day 4: Lightning and Surge Protection

- Lightning Risk Assessment — Whether a Structure Needs External Protection
- Air Terminations, Down Conductors and Rolling Sphere — Protection Zone Layout
- Surge Protective Device Types One, Two and Three — Coordinated Installation
- Lightning Protection Zones and Cable Entry — Where Devices Are Fitted
- Surge Device Status Indication and Replacement — Spares and Inspection Intervals

## Day 5: Practising the Earthing Inspection Record

- Fall-of-Potential and Clamp-On Earth Testing — Choosing a Test Method
- Continuity and Bonding Resistance Measurement — Pass and Fail Criteria
- Applying Grid and Bonding Checks to a Case Site — Ranking Defects
- Reviewing Surge Device Placement on Single-Line Diagrams — Gap Findings
- Earthing Inspection Record — Defects, Test Results and Remedial Priorities

## Applying Earthing, Bonding and Surge Protection After the Course

- Lead a fall-of-potential and continuity test round on one site and compare results with the original commissioning values.
- Walk one switchboard room with the single-line diagram to confirm surge device positions, status windows and bonding connections.

## Earthing, Bonding and Surge Protection Questions FAQ

### What is earthing, bonding and surge protection, and why does it matter now?

It is the set of conductors, electrodes and devices that carry fault, lightning and transient currents safely away. It matters now because installations hold more sensitive electronics and older electrodes degrade, so poor earthing causes shock risk, trips and equipment damage.

### Which roles gain most from earthing, bonding and surge protection training?

Electrical design engineers and maintenance engineers gain most. The course links conductor sizing, electrode testing and surge device choice through shared records.

## How does earthing, bonding and surge protection training differ from a high voltage switching course?

It focuses on permanent earthing systems and surge devices, not on temporary earths applied during switching.

## What do you bring back from earthing, bonding and surge protection training?

You bring back an earthing inspection record for a case site. It lists test results, bonding findings and surge device gaps, ranked by hazard.

## Earthing, Bonding and Surge Protection: The Way Forward

The earthing inspection record gives maintenance and design engineers a shared baseline of electrode resistance, continuity and surge device condition. Its first use is to decide which defects need repair before the next storm season or shutdown. After the first inspection cycle, revisit the target resistance values and test intervals.