



POWER NETWORKS

HV Earthing System Design

Overview

Relying on over 15 years of experience in the field, we support our clients in developing HV earthing systems to ensure the safety and protection of persons within an electrical power installation, protection of assets and the limitation of potentially hazardous transferred voltages to external third parties.

PSC UK are a vendor-neutral and independent technical consultancy; our sole focus is providing recommendations and services that best meet our clients' individual needs. As such, the technical guidance and proposals provided by our team of HV earthing system specialists are independent of the supply and installation of materials necessary for the earthing system designs.

Our extensive experience in the assessment, design, modelling and analysis of HV earthing systems ensures that our team of specialists demonstrates compliance with the UK, National Grid, DNO, or international standards for a range of installations such as generation, transmission, distribution or industrial, operating at voltages between 11kV and 400kV.



Key capabilities

- Soil resistivity measurements
- Soil resistivity analysis
- Preparation of HV earthing system designs
- HV earthing system modelling and analysis utilising SES CDEGS software (Current Distribution, Electromagnetic Fields, Grounding and Soil Structure Analysis)
- Earth Potential Rise (EPR) assessment
- Calculation of touch, step and transfer voltages
- Post-construction Fall of Potential (FOP) resistance measurement and analysis
- Third-party design audits
- HV earthing system feasibility studies
- Impressed voltage studies

PSC relevant experts

Robert Knott - Principal Engineer

Robert Knott is an IET Chartered Engineer, with over 15 years of international experience in the design and analysis of HV earthing systems at generation, transmission, distribution and industrial installations. Rob has a comprehensive understanding and practice of UK and international standards such as ENA TS 41-24, IEEE80, IEC 50522; applying this knowledge to HV earthing system studies using the industry-leading earthing analysis software SES CDEGS.

Stephen Lilley – Senior Engineer

Stephen is a senior engineer with over 6 years of experience of HV earthing system assessment and design for generation, transmission, distribution systems within the UK. Stephen has a vast knowledge of the earthing analysis software CDEGS and using UK and international standards such as ENA TS 41-24, IEC 50522 & EREC S41. Furthermore, Stephen has supported UK Distribution Network Operators (DNO) to update and manage their internal earthing policies and has also created various tools to help standardise their distribution substation earthing design process.



PSC relevant projects

Enoch Hill 33kV Onshore Wind Farm

PSC were requested to undertake an HV earthing design study for the Enoch Hill 33kV onshore wind farm, in accordance with UK standards. As part of the study, soil resistivity measurements were analysed to develop soil model for each turbine, the substation and overall wind farm. An earthing system design was produced for each turbine to achieve a resistance of less than 10Ω (where practicable) in accordance with BS EN61400-24. An overall earthing system design was produced for the wind farm and CDEGS earth fault simulation studies were carried out to determine the resistance of the proposed earthing system, the resultant EPR and, touch and step voltages at the site and to confirm the ITU (Hot / Cold) site classification.

Nairn Road Substation

PSC were requested to undertake an HV earthing design study for the Nairn Road Substation, in accordance with UK standards. As part of the study, soil resistivity measurements were analysed prior to designing the buried earth electrode system for the substation. CDEGS earth fault simulation studies were carried out to determine the resistance of the proposed earthing system and the resultant EPR and, touch and step voltages at the site.

Killala (Lisglannon) 38kV Substation

PSC were appointed to undertake an HV earthing design study for the 38kV AIS substation and associated wind turbines, in accordance with IEEE80, IEEE81 and ESBN specifications 18134 and 18133. As part of the study, soil resistivity measurements were analysed prior to designing the buried earth electrode system for the substation and each wind turbine. CDEGS earth fault simulation studies were carried out to determine the resistance of the proposed earthing system and the resultant EPR, hot zone contours, and touch and step voltages at the substation and connected wind farm.

South Redhouse BESS

PSC were requested to update the existing South Redhouse BESS earthing system to accommodate the inclusion of new HV plant, in accordance with ENA TS 41-24, BS EN 50522 and ENA ER S34. As part of the study, an earthing system design for the new HV plant area was incorporated into the existing CDEGS model for the substation and was simulated under single phase-to-earth fault conditions. The resultant EPR and touch and step voltages were determined to confirm site classification in accordance with ITU specifications and the safety of personnel within the site.

Millvale Solar PV Site

PSC were commissioned to design the Medium Voltage (MV) earthing system for the proposed Millvale Solar PV plant. The purpose of the study was to demonstrate that the earthing system will provide safe step and touch potentials throughout the site in accordance EN 50522. As part of the study, soil resistivity measurements were conducted and analysed prior to designing the buried earth electrode system for the substation. CDEGS earth fault simulation studies were carried out to determine the resistance of the proposed earthing system and the resultant EPR and, touch and step voltages at the site.



**Specialist Consultants
to the Electricity Industry**
pscconsulting.com

New Zealand
Wellington
+64 4 232 7680

Australia
Fortitude Valley, QLD
+61 1300 933 632

North America
Kirkland, WA
+1 425 822 8489

Europe
Newcastle, UK
+44 7967 228 064

Asia
Singapore
+65 (800) 616 3283

© 2024 PSC Specialists Group, Inc. All Rights Reserved.

CONTACT US