

Earthing Conference UK

11th & 12th May 2021

Jurys Inn - Birmingham, United Kingdom

Your Keynote Speakers



Stephen Palmer

- ◆ Managing Director at Safearth
- ◆ Originally Australia's leading earthing specialists, but now a true international business
- ◆ Committee Member for IEEE Std80, Std81, Std 837, Std 998, Std 1268 & Std 1246
- ◆ Convenor of the International CIGRE Working Group B3.54
- ◆ Secretary of the CIGRE & CIRED Joint Working Group B3.35 who produced TB 749



John Maplesden

- ◆ Electrical Consultant and Industry Specialist, Covol Engineering Ltd
- ◆ 40 years of electrical engineering industry experience
- ◆ Member of the Institution of Engineering Technology
- ◆ Chartered Engineer and arc flash hazard studies expert

What You Will Gain From Attending?

- ◆ Learn how optimal electrical earthing design can improve production and reduce costs
- ◆ Gain practical advice on earthing system measurement
- ◆ Discuss compliance to standards with experienced electrical engineers
- ◆ Discuss safe and effective lightning protection earthing
- ◆ Understand how to design earthing systems for challenging conditions
- ◆ Discuss the pitfalls of inappropriate earthing and the hazards caused
- ◆ Learn best practice when it comes to split factors in earthing design
- ◆ Hear relevant local case studies from the UK electrical industry
- ◆ Network with specialists in the field and your peers
- ◆ No sales pitches – non commercial presentations

Who Should Attend?

- ◆ Electrical engineers and technicians
 - ◆ Substation, generation and transmission engineers
 - ◆ Maintenance engineers and asset managers
 - ◆ Engineering managers and electrical consultants
 - ◆ Plant, project and design engineers
 - ◆ Engineering and safety managers
 - ◆ Lightning protection professionals
 - ◆ Renewable energy specialists
 - ◆ Government safety regulators/inspectors
 - ◆ Network, protection and distribution engineers and technicians
 - ◆ Maintenance specialists
- And all other electrical engineering professionals who have an interest in earthing.

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Introduction to Earthing

Few topics generate as much controversy and debate as that of earthing and the associated topics of bonding, grounding, surge protection, shielding and lightning protection of electrical and electronic systems. Poor earthing practices can be the cause of continual and intermittent difficult-to-diagnose problems in a facility. This conference will explore these issues from a fresh yet practical perspective to help delegates reduce expensive downtime in their plant and/or equipment by identifying the correct application of these principles.

The aim of this conference is to demystify the subject of earthing and present the subject in a clear, straightforward manner. Earthing as a subject has been under-represented over the years and this event will attempt to remedy the gaps in technical knowledge and improve practices in the industry. The UK & Europe need a unified practical approach to earthing which can be commonly understood and widely applied.

Conference Program – Day One

11th May 2021

8:00am – Registrations Open

8:25am – Opening Address

8:30am – Session 1 **KEY NOTE**



Optimising Earthing System Design and Management Through the Responsible Application of Quantified Risk Analysis

Stephen Palmer – Managing Director at Safearth
Convener of the International CIGRE Working Group B3.54

For years, many engineers involved in earthing system design and management have recognised that traditional approaches can lead to over investment through expensive, potentially unjustified, additional control measures at one extreme, and unreasonable residual risks to staff and the public at the other. The work of the Cigre and Cired Joint Working Group B3.35 was to investigate the optimisation of earthing system design through the application of quantified risk analysis approaches. The technical brochure subsequently published as TB 749, details the findings and recommendations of that group. In this presentation the author will illuminate that work and provide accessible and practical guidance on how earthing related risks can be better managed with consideration of economic, justified improvements or demonstrated tolerable residual risks.

9:30am – Session 2 **CASE STUDY**



The Role of Earthing in Electrical Safety

John Maplesden – Electrical Consultant & Industry Specialist, Covol Ltd

This paper will focus on the role that earthing plays in the safe and effective operation of industrial electrical systems. Power system earthing will be considered throughout a typical industrial electrical system including earthing methodologies, the management of the shock hazard, step and touch potentials, the operation of protective devices and instrumentation systems. Earthing's part in the safe management of the static electricity and lightning hazards will be described and case studies will be presented throughout. This is intended to be a wide ranging presentation which will set the scene for more specialised papers covering specific elements of earthing systems.

10:15am – Morning Tea

10:45am – Session 3



HV and LV Earthing Requirements for HV Substations

Alex Bezugly – Senior Design Engineer, Freedom Electrical Design Services

This paper will offer a detailed explanation of HV and LV earthing system arrangements, and the requirements to keep those earthing systems combined or separate. HV bonding conductors and LV CPCs definitions will be covered and the common confusion these may cause (examples will be given from relevant UK Standards). Alex will touch briefly on LV Neutral Earthing with explanation of TN-S, TN-C-S (PME and PMB) systems, examples of their utilisation and interface with an HV earth system. Finally, earthing conductor sizing for HV and LV earths and an overview of site constraints. This presentation aims to improve the quality of earthing designs and client's earthing specifications.

11:30am – Session 4



Split Factors in Earthing Design - Best Practice

Ian Griffiths – High Voltage Earthing System Design – GreyMatters Technologies

What is a split factor? Split factor, definable as the 'split' or ratio of fault energy that returns to the source utilizing soil conduction versus more conductive routes such as metallic cables or other structures. This paper aims to answer the question 'why do we need split factors in earthing design?' and what does best practice look like. The power system is broken down into discrete parts and various scenarios explored to demonstrate why getting this calculation can and does have such a cost-impact on the post-design installation effort. Topics covered include: Geology - soil resistivity, soil conduction; electrical influence and mutual impedance; feeding arrangements; calculation methods; and examples.

12:15pm – Lunch



1:15pm – Session 5



Foundation Earthing – No More Lost Neutral Earth Faults

Sean Passant – Technical Manager, DEHN (UK) Ltd

Sean and his colleagues have been working with the IET, BSI & DNO on a potential new amendment to BS7671 to tackle the issues of neutral to earth fault in PME systems.

The ageing DNO distribution system is leading to frequent neutral to earth faults and these can result in dangerous floating voltages that can either cause electric shock or lead to sparks that can potentially lead to ignition. A FoI request to the DNO's regarding this issue has highlighted just how often these faults are creating very dangerous situations in commercial property as well as domestic. The preferred solution to this is to move away from PME on new builds and start installing foundation earthing systems as the PME network is no longer sustainable. This presentation will show examples of alternative sample installations, detailing the equipment required and how this safe and effective method can be installed. It will explore the basic theory and some real life examples of the ohmic values achieved.

2:00pm – Session 6



Earthing Rural Substations - Why There is No Such Thing as a Standard Earthing Design!

Steve Sommerville – Managing Director, SPE Electrical Ltd

A common mistake in earthing is the assumption that a standard design approach can be used at 11 kV. This assumption is both wrong and dangerous. HV earthing studies are carried out to determine the touch and step voltages of the system during a phase-earth fault; if these values are above a certain threshold then special mitigation measures are required to prevent shock risks to personnel, public and livestock. These risks are driven by local site conditions which may not be immediately obvious, and a standard design that may give a safe condition at one site, can give rise to a highly dangerous condition at a similar site, just a few miles away.

2:45pm – Afternoon Tea

3:15pm – Session 7

CASE STUDY



Designing Earthing Systems for Challenging Ground Conditions

Jon Williams – Engineering Consultant, PSE2 Consulting Ltd

There is a requirement for new high voltage installations, such as generation sites and substations to meet the ever-growing demand for electricity. To allow for cost-effective construction, it becomes inviting to build on land that is in low demand. An example was the proposal of a solar park positioned on an old landfill site, which had been capped with a geomembrane. This could not be penetrated, restricting the burial depth of earth conductor and acting as a site-wide below ground electrical insulator. These conditions presented a challenge to design an earth system with a low EPR and safe touch and step voltages.

4:00pm – Session 8

CASE STUDY



EPR Design Limit for Combined HV and LV Earthing Systems

Stefano Nicoletti – Earthing and Lightning Protection | Power GTD Consultant, RINA Tech UK Ltd

In the 2018 update of ENATS 41-24 the 1Q criteria for combining HV/LV distribution substation earths was replaced by touch voltage limits. For PME networks an assumption is made that earth potential rise (EPR) twice the touch voltage limit will ensure safety. This is based on there being earthing, e.g. PME electrodes or bare sheathed cables around the LV installations to raise surface potentials. In new developments where all cables have insulated sheaths this may not be the case and the new design criteria may not achieve a safe installation. This paper will explore this subject using a realistic case study.

4:45pm – Day One Closing

5:00pm – 6:00pm – Networking Drinks



Sponsorship Opportunities

Representing your business at the Earthing UK Conference in 2021 will provide you the opportunity to reach key decision makers from a multitude of industries.

For more information on sponsorship and exhibition opportunities please contact:

Sarah Montgomery at: conferences@idc-online.com

8:30am – Session 9

MORNING WORKSHOP



Earthing System Measurement – Traditional practices, modern techniques, real experience and practical advice

Stephen Palmer - Managing Director at Safeearth.

Historically, the measurement of earthing systems has been difficult, expensive, and in some cases, inaccurate. New testing methods, instruments and analysis techniques are being developed which are increasingly being adopted across the globe. In contrast, earthing is becoming more complex due to shrinking substation footprints, closer proximity to third party infrastructure and increased interconnection through the wider use of various earth wires and cabled networks. This has made simple test methods ineffective and led to the broader adoption of more advanced methods.

This context has led many to contemplate what is being done in terms of earthing system testing, by whom, how often and with what justification regarding period and cost. Furthermore, some have wondered, of these commonly applied techniques, what are their strengths and weaknesses, what positives and negatives are evident from each, and how have they been improved or modified, if at all, by others around the world.

August 2018 saw the formation of a Cigre Working Group designated B3.54 with the specific assignment to research, analyse and understand all the information necessary to write a Technical Brochure on these issues.

Of particular interest are the range of testing methods applied and the great spread of what is considered best practice or what is even necessary. There is also evidence throwing into question whether earthing system testing is well enough understood to obtain reliable results and whether anything other than reliable results is sufficiently valuable to justify the costs, including the cost of the test and the associated costs such as storage, review, decision making and other asset management activities.

About the Workshop Presenter

Stephen Palmer - Stephen Palmer is Managing Director of Safeearth. He is an internationally recognised earthing specialist, with expertise in all areas related to earthing, including design, testing and investigation in sectors including power generation and delivery, heavy industry, mining and rail. For over 20 years Stephen has investigated and managed the risks associated with earthing, lightning protection and interference. As the leader of a team of 35 consultants & researchers, his experience extends well beyond the technical aspects of the field. He has been a contributing member on the committees responsible for Australian documents including EG-0, AS/NZ 3007 and AS/NZ 2067. He is a committee member for IEEE Std80, Std81, Std 837, Std 998, Std 1268 & Std 1246. He is Convenor of the international CIGRE Working Group B3.54 on earthing system testing and was the secretary of the CIGRE & CIRED Joint Working Group B3.35, which published TB 749 on substation earthing design optimisation including quantified risk analysis. Stephen has delivered formal earthing training for more than a decade and has presented at numerous Australian and international conferences including for the NSW Government, Energy Networks Association (ENA), Engineers Australia, CIGRE, CIRED and the IEEE.

Morning Tea from 10:00am – 10:30am

12:00pm – Lunch

1:00pm – Session 10

CASE STUDY



An Introduction to Earthing Systems within the Nuclear Generation Industry (NGI)

Richard T Davies – Technical Lead, MEH Alliance

This brief introduction discusses the earthing system's basic arrangements, functions and use within the nuclear power station, as well as their functionality in regard to specialist NGI procedures such as 'Nuclear Safety Cases'. This discussion shall comprise the entire earthing system stratagem through earthing, lightning protection, surge protection and electromagnetic compatibility. Whilst a final case-study will look at the evolution of the earthing system within the modern NGI, from Advanced Gas-cooled Reactors (AGRs), through Pressurised Water Reactors (PWRs), to the newest and most current build EPR reactor projects such as Hinkley Point C (HPC).'

1:45pm – Session 11



Safety in Underground High Voltage Power Lines Ancillary Facilities

Himanshu Negi – Electrical Engineer, Arcadis Consulting (UK) Limited

The cables are an essential part of the modern power transmission network. The common types of modern underground cable construction include high-pressure fluid-filled, gas-filled as well as solid cross linked polyethylene (XLPE) cables. Due to the demand for longer lines, higher current capacity and environmental problems at critical locations, cables are also used in combination with overhead power lines. In both partial and complete underground cable networks the metallic sheaths of cables are connected to earth at certain points of the circuit to minimize energy losses as well as to protect workers who maintain the power lines. Depending on several factors, the cable system requires different ancillary facilities such as sealing ends or transition stations and joint bays. Some of these facilities are constructed underground while others are aboveground. This paper discusses touch voltages and Earth Potential Rise (EPR) issues at such ancillary facilities.

2:30pm – Afternoon Tea

3:00pm Session 12



Complex Earth Fault Current Distribution at Co-Located, Interconnected Sites

Matthew Taylor – Principal Engineer / Managing Director, Earthing Risk Management

The need for fault current distribution calculations, to provide accurate results in earth fault or 'rise of earth potential' studies is known. The technical standards provide equations that can be used to calculate the ground-return component of earth fault current. However, at complex sites such as power stations, transmission/distribution substations, onshore substation interfaces or battery storage sites, further analysis is necessary in order to determine the correct distribution of ground-return fault current. Failure to recognise this can lead to incorrect evaluations with the potential to cause safety hazards and under-size earth conductors or produce over-engineered solutions, even when accurate modelling software has been used. This paper explains the accurate simulation of ground-return fault current within complex earthing systems.

3:45pm – Session 13



Earthing for Power Systems - Design, Bonding, Installation, Testing, Surge Protection, Lightning, Standards & Regulations and Mitigations

Saravana Sundar – Director, Maverick Power Technologies Ltd

The aim of this presentation is to explore safe earthing requirements and best practice with mitigations, testing and lessons learnt explored to make sure all the requirements are covered to protect the power system. Saravana will cover earthing system design, required mitigations for design challenges, risks and hazards and the earthing requirements for equipment and various systems. Also covered will be the interface with neighbouring systems, temporary earthing requirements, instruments, separate types of earthing as applicable to different systems, impressed voltage in the system during the construction & maintenance, earthing test requirements and its importance. Lastly, HF earthing, bonding of cables, earthing related to protection systems and its operations, fault clearance, step and touch potential, insulation coordination studies, surge protection and lightning protection.

4:30pm – Closing

About the Keynote Presenters



Stephen Palmer

Stephen Palmer is Director of Safeearth Consulting. He is Australia's leading earthing specialists, with expertise in all areas related to earthing, including design, audit and test in sectors including power generation and delivery, heavy industry, mining and rail. For

over 20 years Stephen has investigated and managed the risks associated with earthing, lightning protection and interference. As the leader of a team of 35 consultants & researchers, his experience extends well beyond the technical aspects of the field. He has been a contributing member on the committees responsible for Australian documents including EG-0, AS/NZ 3007 and AS/NZ 2067. He is a committee member for IEEE Std80 and Std81. He is Convenor of the International CIGRE Working Group B3.54 on earthing system testing and was the secretary of the CIGRE & CIRED Joint Working Group B3.35, which has published TB 749 on substation earthing design optimisation including quantified risk. Stephen has delivered formal earthing training for more than a decade and has presented at numerous Australian and international conferences including for the NSW Government, Energy Networks Association (ENA), Engineers Australia, CIGRE and the IEEE.



John Maplesden

John is a Chartered Engineer and a Member of the IET with more than 40 years' experience in the electrical industry. John has led over 200 electrical studies across a wide range of facilities in the UK, Europe, the Middle East and Africa. He has constantly updated his knowledge of the

relevant standards and best practice in this rapidly evolving field.

John is currently involved in a portfolio of consultancy assignments which provide new and exciting challenges that build on the technical and commercial skills, knowledge and experience he had gained in his career to date. John's specialities include:

- ◆ Management Consultancy
- ◆ Business Development
- ◆ Electrical Engineering
- ◆ Earthing
- ◆ Electrical System Design
- ◆ Electrical Safety Management
- ◆ Arc Flash Hazard Studies and Remediation Programmes
- ◆ Hazardous Areas and compliance with ATEX/DSEAR
- ◆ Functional Safety
- ◆ Renewable Energy

General Information

Confirmation Details

A confirmation email and invoice will be sent to delegates within 3 days of receiving the registration.

Cancellation Policy

A 20% cancellation fee will apply for cancellations received 7 – 14 days prior to the start date of the conference. Cancellations received less than 7 days prior to the start date of the conference are not refundable, however substitutes are welcome.

Venue

Jurys Inn Birmingham

245 Broad Street, Birmingham, UK
Tel: +44 121 606 9000

Accommodation

The conference venue has accommodation available. Please book through their reservations team on +44 121 606 9000 or jurysinnbirmingham@jurysinns.com.

Food and Beverages

All lunches, morning and afternoon refreshments are included in your delegate registration.

Unable to Attend

If you are unable to attend the full conference program, contact us for details to attend individual sessions or to purchase the Conference Resource Kit.



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02 How Did You Hear About This Event?

Received an email from IDC Received an email from the Institution of Engineering and Technology IET
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 Other (please specify): _____

03 Registration & Payment Details (NB: prices shown are inclusive of GST)

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