DOBLE TRAINING & EDUCATION COURSES

Grounding Fundamentals for Electric Power Systems

Overview:

Grounding is one of the most overlooked parts of electrical power design and maintenance. This interactive 2-day seminar will cover numerous grounding fundamentals, and which grounding system tests can prevent safety and operational issues at diverse facilities. Explanations will be provided as to which tests can be conducted safely during operations or when a shutdown may be required. Essential instruction will be provided regarding the engineering factors that influence how electrical energy propagates through grounding and earthing systems. One of the primary objectives of the course is to educate attendees on the related critical features of life and safety electrical principles and this course should empower both engineers and technical professionals.

Learning Outcomes:

Upon completion of this course, the participant will be able to understand:

- Fundamentals of grounding and bonding and how maintenance and repairs are conducted
- Relationship of grounding and bonding to personnel safety
- Requirements of grounding conductors, electrodes, and equipment grounding
- Importance of grounding in relation to system faults and ground-fault protection
- Requirements of grounding for Lightning Protection Systems
- Fall of potential and other resistance-to-ground measurement techniques

Course Audience:

Electrical engineers, electricians, and technicians working in operations, maintenance, engineering services, or other professional fields in which knowledge of grounding for electric power systems is required part of his job responsibility.

Duration: 2 Days Daily Schedule: 8:30 am – 4:30 pm Refreshments & Lunch Provided

Class Size: 20 - 40 Attendees

Credits: Up to 1.6 CEUs or 16 Professional Development Hours

Note: A digital copy of selected course materials will be emailed to the designated attendee contact address at the beginning of the first day of class. Copies of electrical codes and standards and/or any copyrighted documents (not under E&S copyright) will not be included, and if access is later desired by attendees, those materials will need to be purchased separately.

COURSE OUTLINE

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The course program contains the following training outline:

Day One – Fundamentals of Below Grade Grounding or "Earthing"

1. **Sphere of Influence**
2. **Soil Testing basics – Wenner 4-Point Soil Resistivity measurements**
3. **Electrode testing basics – 3-point Fall-of-Potential & Clamp-on Induced Frequency testing**
4. **Ground System Testing including continuity testing and troubleshooting**
5. **Electrical safety basics & NEC Article 250**
6. **Automatic Transfer Switches and Separately Derived Systems**
7. **Objectionable current, GFCI and surge protection**
8. **Questions and Answers**

Day Two – Engineering Special Subjects Review

1. **Advanced Engineering Topics**
2. **Ground Potential Rise, Ground Potential Difference, and other engineering factors related to target sites**
3. **Human safety in high-voltage environments – IEEE Std. 80 and 29 CFR 1910.269. Step & touch Potentials**
4. **Lightning topics including Lightning Risk Assessments**
5. **Field Testing – Hands-on testing examples – similar as would be in the field**
6. **Grounding of high-voltage power lines during shut-downs**
7. **Questions and Answers**

Presenter(s):

This training course will be conducted by three (3) E&S Grounding Solutions Engineers. Assistance from Doble facility personnel may be required to complete some of the above tasks.

David R. Stockin – Founder & President [E&S Grounding Solutions, Inc]

Mr. David Stockin leads the E&S Grounding Solutions (E&S) consultancy firm with great pride, while always demanding excellence from his highly capable Team. Today E&S is globally recognized as a leader in developing highly effective grounding designs, and the firm has successfully served many "blue-chip" Clients for more than two decades. He has been a full-time Grounding Projects Manager and Engineer for over 20 years. David is the author of numerous distinguished publications regarding electrical grounding and earthing and is an often sought after expert in the field. David's list of publications includes McGraw-Hill's UK Wiring Standards for Earthing & Bonding (2016), McGraw-Hill's National Electrical Code 2014 Grounding & Earthing Handbook (2014), Standard Handbook of Electrical Engineers, 16th Edition (2012), Standard Handbook of Electrical Engineers, 15th Edition (2008), Handbook of Electrical Power Calculations, 4th Edition (2014), and Handbook of Electrical Power Calculations, 3rd Edition (2000).

COURSE OUTLINE

Grounding Fundamentals for Electric Power Systems

Jeffrey D. Drummond – CTO/Principal Engineer [E&S Grounding Solutions, Inc]

Mr. Jeffrey Drummond has designed, lectured, and published in the field of electrical engineering for over 30 years. He has expertise in grounding design, lightning protection systems, and industrial power distribution. He is a Professional Engineer, licensed in electrical engineering in several states. He received his B.S. and Master of Engineering degrees from Harvey Mudd College, where he graduated with Distinction. Jeffrey is part of the IEEE Working Group of the PES Substations Committee for the revision of IEEE 80 and IEEE 81 substation grounding standards. He is a member of IEEE, NFPA, and Tau Beta Pi National Engineering Honor Society.

Koddin Nordaker – Electrical Engineer/Project Manager [E&S Grounding Solutions, Inc]

Mr. Koddin Nordaker is a distinguished Electrical and Electronic Engineering graduate from California State University Chico, with a specialization in Power Systems Management, who has been working in the engineering field for a decade. During his tenure as an Electronic Project Engineer for the FAA, Koddin oversaw projects across the Western Service area. As the lead engineer and project manager at several critical sites, Koddin played a crucial role in ensuring the uninterrupted flow of national airspace and in implementing national programs, earning him several awards for his exceptional service. He has expertise in project management, electronic system implementation, electrical grounding design, and lightning protection systems.