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Grounding, Bonding, Lighting and Surge Protection of Utilities & Industries

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Dr. Nabil Khalil Ibrahim
Managing Director &Technical Advisor
Industrial Techology Consultation Group,
Cairo, Egypt

In Apex .....

We believe that continuous learning is essential to enhance individual comptency and business excellence

P.O. Box 502221, Knowledge Village, Dubai, U.A.E
Tel : +971 4 3622021 - Fax : +971 4 3678636
E-mail : info@apex-dubai.com - Website : www.apex-dubai.com

Grounding, Bonding, Lighting and Surge Protection of Utilities & Industries

COURSE OVERVIEW:

Lightning is the visible discharge of static electricity within a cloud, between clouds, or between the earth and a cloud. Scientists still do not fully understand what causes lightning, but most experts believe that different kinds of ice interact in a cloud. Updrafts in the clouds separate charges, so that positive charges flow towards the top of the cloud and the negative charges flow to the bottom of the cloud.

When the negative charge moves downwards, a ”stepped leader” is created. The leader rushes towards the earth in 150-foot discrete steps, producing an ionized path in the air. The major part of the lightning discharge current is carried in the return stroke, which flows along the ionized path.

WHO SHOULD ATTEND?

This seminar will benefit for:

Building service designers, Consulting engineers, Data systems planners and managers, Electrical and instrumentation technicians, Electrical contractors, Electrical engineers, Electrical inspectors, Instrumentation and control engineers, Maintenance engineers, Power system protection and control engineers, Project engineers, Safety professionals

COURSE OBJECTIVES:

During this seminar you will learn to:

- Apply the various methods of grounding electrical systems
- Detail the applicable national Standards
- Describe the purposes of grounding and bonding
- List the types of systems that cannot be grounded
- Describe what systems can be operated ungrounded
- Correctly shield sensitive communications cables from noise and interference
- Apply practical knowledge of surge and transient protection
- Troubleshoot and fix grounding and surge problems
- Design, install and test an effective grounding system for electronic equipment
- Understand lightning and how to minimize its impact on your facility
- Protect sensitive equipment from lightning

COURSE OUTLINES:

Module (01) Network Structures:

1.1 General Structure of the Private Distribution Networks
1.2 The Supply Source
1.3 MV Power Supply
1.4 Different MV Service Connections
  1.4.1 MV Consumer Substations
  1.4.2 MV Networks inside the Site
  1.4.3 MV Switchboard Power Supply Modes
  1.4.4 MV Network Structures
1.5 LV Networks inside the Site
  1.5.1 LV Switchboards Supply Modes
  1.5.2 LV Switchboards backed up by Generators
  1.5.3 LV Switchboards backed up by an uninterruptible Power Supply (UPS)
1.6 Industrial Networks with Internal Generation

Module (02) Earthing System:

2.1 The need for Earthing Systems.
2.2 Step and Touch Voltage.
2.3 Earthing System at Low Voltage.
  2.3.1 Different Earthing System – Definition and Arrangements.
  2.3.1 Comparison of Different Earthing System in Low Voltage.
  2.3.3 Unearthed or Impedance- earthed neutral (IT System).
  2.3.4 Directly Earthed Neutral (TT System)
  2.3.5 Connecting the Exposed Conductive Parts to the Neutral (TNC/TNS System)
2.4 Medium Voltage Earthing System.
  2.4.1 Different Earthing system – Definition and Arrangements.

COURSE OUTLINES:

Module (03) Soil Investigation:

3.1 Soil Characteristics
3.2 Soil as a Grounding Medium
3.3 Effect of Voltage Gradient
3.4 Effect of Current Magnitude
3.5 Effect of Moisture, Temperature and Chemical Content
3.6 Use of Surface material Layer
3.7 Soil Structure and Selection of Soil Model
3.8 Investigation of Soil Structure
3.9 Classification of Soils and range of resistivity
3.10 Resistivity Measurements
3.11 Interpretation of Soil Resistivity Measurements

Module (04) Earthing System Design:

4.1 Simple Earthing System Design
4.2 Earthing System Components
4.3 Techniques and Method for Ground System Construction
4.4 Ground Resistivity Measurements
4.5 Ground System Resistivity Measurements
4.6 Bonding
4.7 Transient and High Frequency Bonding and "Grounding"
4.8 Sample Calculations

Module (05) Substation Grounding Design:

5.1 Primary and Auxiliary Ground Electrodes
5.2 Basic Aspects of Grid Design
5.3 Design in Difficult Conditions.
5.4 Connection to Grid
5.5 GIS Characteristics
5.6 Enclosures and Circulating Currents
5.7 Grounding of Enclosures
5.8 Cooperation Between GIS Manufacturer and User
5.9 Other Special Aspects of GIS Grounding
5.10 Design Criteria
5.11 Critical Parameters
5.12 Index of Design Procedure
5.13 Design Procedure
5.14 Calculation of Maximum step and mesh Voltages
5.15 Use of Computer Analysis in Grid Design (ETAP Application)

Module (06) Grounding of Electronic Equipments:

6.1 Electrical Power System Selection Consideration
6.2 Equipment Selection and Installation Considerations
6.3 Grounding Considerations
6.4 380 Hz to 480 Hz System
6.5 Industrial System noise Considerations
6.6 Industrial System Grounding Practices

Module (07) Lightning Protection:

7.1 Principles of Protection
7.2 Construction Protection Classes
7.3 Air Terminal Design
7.4 Grounding Consideration or Lightning Protection
7.5 Separately Mounted Protection Systems.
7.6 Overhead Ground Wire Type.
7.7 Waveguide Installation and Grounding
7.8 Lightning Generated Transient Surge Protection
7.9 Transient Source and Equipment Damage.
7.10 Transient Definition, AC Service Conductors.

Module (08) Surge Protection:

8.1 What is Surge?
8.2 Bonding of Different ground systems as a means of surge proofing.
8.3 Surges and Surge Protection.
8.4 Principle of Surge Protection.
8.5 Surge Protection of Electronic Equipment.
8.6 Achieving graded Surge Protection.
8.7 Positioning and Selection of Lightning/Surge arrestor

Module (09) Noise Mitigation:

9.1 Definition of Electrical noise and measures for Noise Reduction
9.2 Earth Loop as a Cause of Noise
9.3 Shielded isolation Transformer
9.4 The Use of Insulated Ground (IG) Receptacle Harmonics in Electrical Systems
9.5 Zero Signal Reference Grid and Signal Transport Ground Plane

Module (10) Special Considerations:

10.1 Industrial Hazardous Areas
10.2 Insulation Monitoring
10.3 Ground Fault Protection
10.4 Ground System Inspection

About Instructor

Dr. Nabil Khalil Ibrahim

Managing Director of Industrial Technology Consultation, Cairo, Egypt.

Dr. Nabil , B. Sc., M. Sc. in Electrical Engineers in 1987 and 1993 from the University of Helwan and Ph. D. in 1999 from the Polytechnic University of Catalonia, Spain. He is a lecturer in the Electrical Engineering-Department at the University of Helwan.

He worked for Qatar General Electricity and Water Corporation as senior counselor for development from 2005 to 2010. Recently he is the Managing Director for Industrial Technology Consultation Group. He is the official consultant of the US Army Corps of Engineers, CH2M, Multinational Forces (MFO) and observers in SAINAI, Siemens, ABB, Contrack/ Orascom, AICI/ Archridon, Aramco, and Sorenson Gross in the field of electric networks design and studies, protection systems design, testing, commissioning and startup of power plants.

Dr. Nabil is working as a free lance Instructor with APEX FZ LLC for numerous years and considered as one of the APEX pride when it comes to trainings.

His approach is at the cutting edge of development and unique perspectives and methodologies are based on the assumption that organizations must find ways of tapping the inventiveness of their systems and staff

in line with their customers changing expectations.

COURSE FEE

Investment Fee of **3500 USD** will be charged for the course fee per delegate.

PAYMENT METHOD

A confirmation letter will be sent upon your registration. Note that full payment must be made prior to the event. Only those delegates who have paid in full will be admitted to the event. All payments should be to APEX Account:

HSBC Bank Middle East limited,

Jebel Ali Branch, Dubai, UAE

A/C: 035 - 626472 - 101

Swift Code: BBME AEAD

CANCELLATION

If you are unable to attend the course you may send a substitute delegate.

Cancellation should be made 20 days prior to the course conduction. Failure to cancel within 10 days will be required to pay the course fee in full amount.

REGISTRATION FORM

Name (Mr./Ms.)_____

Position_____

Email_____

Department_____

Company_____

Address_____

Country_____ Zip Code_____

Telephone No._____

Fax No._____

CONTACT DETAILS

+971 4 3622021 / +971 4 4458567

00971 4 4542910

info@apex-dubai.com

www.apex-dubai.com