Critical Systems Consulting Group (CSCG) Grounding and Protection of Communications Sites Training Syllabus

OVERVIEW

Critical Systems Consulting group (CSCG) is pleased to submit this Syllabus Training Narrative of its One-day, Hands-on/In-person Training services for the proper Grounding and Protection of Communications Sites,

Audience: Construction Managers (CM), Project Managers (PM) and Operations Technicians personnel

- To determine that all End User's requirements of visual inspection, grounding and bonding testing procedure(s), power quality values and lightning protection are met and are in compliance with National's standards, local and national codes.

The One-day training will be comprised of two sessions:

1. The morning session will be classroom training on Power and Grounding topics presently affecting existing Communications Sites' infrastructures and recommendations of best practices for the rollout of new sites.
2. The afternoon session will be field based or classroom Laboratory emphasizing on properly performing and interpreting Power Quality and grounding tests utilizing Ground meters, Amp/Volt meters and Foreign Voltage Detector (FVD) for Stray Voltage

Deliverable(s)

- Classroom Training and Discussions
- Education in the process of inspecting existing and newly installed power and grounding installations with half a day of Risk Analysis Mitigation Plan (RAMP) Training
- Power Quality Measurements Training
- Procedures of Testing existing Site Grounding and Power Systems with applicable Ground Testers, Volt/Clamp Meters and Foreign Voltage Detectors (VFD) instruments
- Site Grounding and Bonding review and analysis
- Identifying NG Bond locations (Main Electrical Service and any installed Separately Derived Systems) and measurements for possible Objectionable Ground currents and/or Ground Loops
- Communications and Data Cables proper Installations and Grounding Requirements

Morning Classroom Syllabus

AC and DC Power Bonding and Grounding requirements

- National Codes and Standards overview
- Grounding Requirements per National Electrical Code, NFPA 70/Article 250
- Grounding and Bonding Overview
- Purpose of Grounding and Bonding
- Basic Grounding of AC Systems (60-1000VAC)
- AC Neutral-to-Ground requirements and location
- Basic Grounding of DC Systems (60-300VDC)

AC Equipment Grounding Conductor

- Grounded Conductor (Neutral) Main Bonding Jumper
- AC Power Grounding Electrode Conductor Sizing
- Minimum Size Equipment Grounding Conductors

AC Grounding Separately derived Systems Requirements

- Grounding of Single and Three-Phase Separately Derived Dry Type/Isolation Transformer
- Grounding of Separately Derived Generator with Switched Neutral
- Basic Grounding of Generator with Solid Neutral

Electricity Hazards to Humans

- Allowable of AC Ground Current

Internal Grounding and Single Point Ground (SPG)

- Single Point Ground (SPG) Topology
- Primary Bonding Bar (PBB) location
- Bonding to the PBB
- Grounding of the PBB
- Secondary Bonding Bars (SBB) Bonding and Grounding
- Rack Bonding Bars (RBB) Bonding and Grounding
- Equipment Bus Conductor(s) Installation

- Equipment Rack Grounding and Bonding
- Cable Tray System Grounding and Bonding
- Ancillary Equipment Grounding and Bonding
- Internal Perimeter Bonding Bus (IPBB)
- Communications Cables Installations
- Supporting and Securing – Cables and Raceways installed above Ceilings, Environmental Spaces and Risers
- Communications Cabling Separations

Shield Grounding of Communications Cables

- Shield Grounding for Communications Cables – Cat5/6, Coaxial, RS232 and Optical Fiber
- Cable Grounding for Multiple Buildings under the Same Management

Surge Protective Device (SPD)

- Surge Protective Devices Technology
- Voltage Protection Level (VPL) of AC Circuitry
- Normal vs. Common Mode Protection for AC, DC and Data Circuits Topology
- RF Transmission Lines SPD

Site Grounding Electrode System

- NEC-Approved Grounding Electrode System
- Grounding Electrode Rods – Size and installation Requirements
- Electrolytic Grounding Electrode Rods
- Ground Rings
- Concrete Encased Electrode
- Bonding of All Available Grounding Electrode Systems including installed Lightning Protection System (LPS)
- Ground Loop Currents Concerns
- Bonding to Available Grounding Electrode(s)
- Compression and Exothermic Bonding
- Grounding and Bonding conductors' installations

Afternoon Site Investigation Syllabus

Field visit to selected site or Classroom Laboratory

- Review of Typical Inspection Procedure during Site Investigation
- Site Analysis and Investigation with selected instruments
- Detection of Location and Existence or Lack of Neutral-to-Ground Bond(s)
- Identifying Available Objectionable Ground Current(s) and its Potential Sources
- Earth Ground Resistance Testing and Continuity using a Three-point Tester or Clamp-on Meter
- Clamp-on and Fall-of-Potential Ground Test Procedures and Interpretation of Measured Values
- Broadband Data Cables (Coaxial, Ethernet and Fiber) Protections, Grounding and Bonding
- Data Cables Installation in Environmental Spaces and in Building Risers Requirements
- Overall Class Review and Evaluation