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## Military Electrical Grounding Training

Contact us Today for a FREE quotation to deliver this course at your company's location.

<https://www.electricityforum.com/onsite-training-rfq>

Electrical Grounding for military applications methods are presented in this course for operations of aircraft and naval vessels. These include operations such as fueling/defueling, parked evolutions store loadings hot refueling and all external power evolutions and on board ship, tiedown and static ground requirements.

Proper grounding is an essential for safely and reliably operating electrical systems. Improper grounding methodology has the potential to bring disastrous results from both an operational as well as a safety standpoint.

There are many different categories and types of electrical grounding principles. This Military Electrical Grounding Training course covers proper grounding techniques including low voltage Instrument and Control Systems that have been proven safe and reliable when employed in military operations.

The increased use of electrical and electronic equipment introduces risk of electromagnetic interference (EMI) problems to operations and performance will also be examined.

This course also contains information about bonding during Flight Line Electrical

Distribution System (FLEDS) operations.

It also addresses shipboard bonding, grounding, and other techniques for electromagnetic compatibility, electromagnetic pulse (emp) mitigation, and safety.

This course also addresses Ordnance Facilities Protection against lightning and protection of Storage and Handling Facilities Above Ground and Earth-Covered Magazines.

### **After Attending, You Will Learn:**

- Understand Classification Of Various Military Grounding Standards. Codes And Rules
- Be able to comply with Military Specifications
- Comply with DOD Specifications
- Ground potential for metallic hull ship
- Comply with Department Of Defense Standards
- Understand Military Emergency Power Systems
- Interpret Offshore & Ship's Grounding Systems
- Understand and deal with the detrimental effects of: Natural and manmade electromagnetic (EM) energy Spurious and intentional EM pulse energy
- Understand how to design, construct and test lightning protection systems in Ordinance
- Lightning Protection of aircraft and naval vessels
- Radiofrequency shielded enclosures grounding

### **WHO SHOULD ATTEND**

- Military Electrical Engineers and Engineering Technicians
- Military Base Project Engineers
- Design Engineers, Field Technicians, Military-Grade Electrical Technicians
- Sensitive Electronic Equipment Operators
- Air Force Electrical Engineers/technicians
- Aircraft technicians
- Naval Electrical Engineers/Technicians/
- Military Electrical Supervisors

- Telecommunication technical personnel
- Civil technical personnel in military bases

### **STUDENTS RECEIVE**

- **FREE** Electricity Forum 120-Page Digital Power Quality Handbook (Value \$20.00)
- **\$100 Coupon** Toward Any Future Electricity Forum Event (Restrictions Apply)
- 1.4 Continuing Education Unit (CEU) Credits
- **FREE** Magazine Subscription (Value \$20.00)
- Course Materials In Paper Format

### **COURSE OUTLINE**

#### **DAY ONE**

#### **SESSION 1: ELECTRICAL GROUNDING – SCOPE**

- Definitions
- Applications
- Grounding methods
- Ground Faults
- Why Ground Circuits and Systems
- Grounding Systems

#### **SESSION 2: CLASSIFICATION OF VARIOUS GROUNDING STANDARDS. CODES AND RULES**

- MIL-HDBK-419 A Grounding, bonding, and shielding for electronic equipments and

facilities

- MIL-HDBK-274(AS) - Electrical Grounding for aircraft safety
- MIL-STD-188-124B - Grounding, Bonding and shielding
- MIL-HDBK-1004/6 - Lightning Protection
- MIL-STD-464 - Electromagnetic environmental effects requirements
- MIL-STD-461 - Requirements for the Control of EMI and Susceptibility
- MIL-STD-1399-070 - Interface STD for Shipboard Systems
- DoDD 4650.1 - Management and Use of the Radio Frequency Spectrum
- DoDI 6055.11 - Protection of DoD Personnel from Exposure to Radio Frequency Radiation and Military Exempt Lasers
- NACSEM 5112 - NONSTOP Evaluation Techniques
- TEMPEST/1-92 - Requirements, Electromagnetic
- NTIA - Manual of Regulations and Procedures for Federal Radio Frequency Management

### **SESSION 3: ELECTRICAL GROUNDING ELECTRODE SYSTEM**

- Grounding Theory
- Parameters, Measurements and Calculations
- Types of grounds: Dirty Ground/Clean Ground
- Connecting IACS to the ground bed
- Star Point Ground, single point connection
- How not to ground
- Electrical Grounding and Corrosion
- Installation and Protection
- Sizing the Grounding Electrode Conductor

### **SESSION 4: CIRCUIT GROUNDING**

- Sources of electrical power
- Grounded Conductor
- Direct-Current Systems
- Alternating-Current System

- Solidly Grounding system
- Resistance Grounding
- MCC's-Motors grounding
- Rigging Shore Power
- External source through shore power cables

## **SESSION 5: EQUIPMENT BONDING & GROUNDING**

- Major Requirements:
- Identification of the Bonding Conductor
- Bonding/Grounding and electric Shock
- Equipment cabinets and hardware items
- Aircraft grounding jacks
- Servicing and maintenance equipment grounds
- TEMPEST
- Emission control (EMCON)
- Electronic protection (EP)

## **SESSION 6: EMERGENCY POWER SYSTEMS**

- Proper grounding of emergency power systems (generators)
- Three Pole emergency generator grounding
- Four Pole emergency generator grounding.
- Main Bonding Jumper
- Portable generators
- Vehicle Mounted Generators

## **DAY TWO**

## **SESSION 7: ELECTRICAL GROUNDING FOR AIRCRAFT SAFETY**

- System Reference Zero
- Hazards during aircraft maintenance, fueling, store, handling & parking
- Aircraft grounding, fueling/refueling evolution
- Aircraft maintenance evolution
- Aircraft grounding, parked evolution
- Static Grounding
- Distinction between Power Grounding & Static Grounding
- Fueling & refueling Bonding & Grounding triangulation
- Grounding cables
- Bonding Cables
- Flight line electrical distribution (FLED) system
- Aircraft supplied with external power

## **SESSION 8: OFF-SHORE & SHIP'S GROUNDING SYSTEM**

- System Reference Zero
- Detection of a Faulty Neutral-Ground
- System Sizing Wiring to Meet Computer Industry Standards
- Shipboard internal electromagnetic environment (EME)
- Grounding Line Treatment Devices
- Transient Overvoltage Protector Grounding
- Gas Tubes Metal Oxide Varistors Silicon Avalanche Diodes
- Ship's Computer Grounding System
- Ship's Ground plane(s)/Elements of the ground plane
- Superstructure, equipment foundations and racks
- Shielded room(s)

## **SESSION 9: LIGHTNING PROTECTION**

- Electrical Grounding & Lightning
- Characteristics Protection Systems
- Electrogeometric & Rolling Sphere Concept
- NAVFAC Design Guides
- Ordnance Facilities Protection
- Storage and Handling Facilities Above Ground
- Earth-Covered Magazines
- Cranes on Piers and Wharves
- Marshalling Yards (Truck and Railroad)
- Explosives safety requirements
- Transient Overvoltage Protector Grounding
- Gas Tubes Metal Oxide Varistors Silicon Avalanche Diodes

#### **SESSION 10: GROUNDING OF SIGNAL REFERENCE SUBSYSTEM**

- Electronic equipment grounding
- Introduction and Definitions
- Computer and Electronic Equipment Grounding
- Data Processing Equipment
- SIGNAL REFERENCE SUBSYSTEM NETWORK CONFIGURATIONS
- Floating Ground
- Single-Point Ground (for Lower Frequencies)
- Multipoint Ground (for Higher Frequencies)
- Equipotential Plane
- Types of Equipotential Planes
- Floating System

#### **SESSION 11: TELECOMMUNICATION SITE GROUNDING**

- Grounding Subsystems
- Exterior Ground Ring
- Interior Ground Ring –
- Field transmitter grounding

- Techniques for floating transmitters
- Single Point grounding system
- Equipment & Cabinet grounding

## **SESSION 12: INTERFERENCE COUPLING AND REDUCTION**

- EMI on electronic circuits
- Nuclear emp effects
- Susceptibility - Immunity
- Minimization techniques. .
- Cable Shielding and Grounding
- Losses by Absorption and reflection
- Grounding Low- and High-Frequency Shielding
- Grounding High-frequency Shielding
- Coaxial Cables
- Superficial Resistivity
- Resonance and Skin Effect
- Facility and equipment requirements.
- SHIELDED ENCLOSURES (SCREEN ROOMS)
- PERSONNEL PROTECTION SHIELDS.

**Review of expectations**  
**Questions and Answers**

## **COURSE TIMETABLE**

**Both days:**

Start: 8:00 a.m.

Coffee Break: 10:00 a.m.

Lunch: 12:00 noon



Restart: 1:15 p.m.

Finish: 4:30 p.m.

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