

ATCW-1270: GROUNDING AND BONDING

Cuyahoga Community College

Viewing: ATCW-1270 : Grounding and Bonding

Academic Term:

Spring 2019

Subject Code

ATCW - AIT-Communication Workers

Course Number:

1270

Title:

Grounding and Bonding

Catalog Description:

Basic course covering grounding and bonding of active and inactive electronic components required for worker and equipment protection. In addition, governing bodies that oversee the communications industry will be identified and application procedures are covered.

Credit Hour(s):

1

Lecture Hour(s):

1

Requisites

Prerequisite and Corequisite

Departmental approval: admission into the CWA apprenticeship program.

Outcomes

Course Outcome(s):

I. Discuss the purpose of grounding and bonding and identify the sources of electrical malfunctions.

Objective(s):

1. Define the terms related to grounding and bonding.
2. Differentiate between grounding and bonding.
3. Discuss the need for worker safety and equipment protection.
4. Explain the difference between active and inactive electronic equipment and discuss the related potential hazards.
5. Identify the grounding and bonding systems and paths.
6. Discuss the various requirements for proper grounding and bonding of equipment and electronic components.
7. List the sources of natural and man-made electrical surges.

Course Outcome(s):

II. Discuss the function of the governing bodies, international, national and local agencies that establish codes and practices for grounding and bonding and regulate the industry.

Objective(s):

1. Review the codes and standards of the governing bodies in order to meet minimum standards for proper grounding and bonding.
2. Interpret grounding and bonding codes and standards to provide worker and equipment protection from electrical surges.
3. List the governing bodies of the low voltage industry.
4. Differentiate between the respective governing bodies.

Course Outcome(s):

III. Demonstrate the ability to properly install components and conductors required for worker and equipment protection.

Objective(s):

1. Employ accepted procedures for grounding and bonding.
 2. Operate the tools and equipment required for safe grounding and bonding of communications and data equipment.
 3. Select and secure the special fasteners, connections and wire used in installations.
 4. Adhere to the safety standards for worker protection identified by the industry regulations.
 5. Interpret construction working drawings to locate grounding equipment.
 6. Position and install the components and conductors required for grounding/bonding installations.
 7. Operate the respective power and hand tools used for making connections.
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Methods of Evaluation:

1. Quizzes
2. Tests
3. Class participation

Course Content Outline:

1. Grounding and bonding
 - a. Terminology
 - i. Conductor
 - ii. Bus bar
 - iii. Lugs
 - iv. Grounding bus bar
 - v. Clamps
 - vi. Bonding
 - vii. Continuity
 - viii. Voltage
 - ix. Ohms
 - x. Ground rod
 - xi. Shield bonds
 - xii. Pathway
 - xiii. Data
 - xiv. Wireless access points
 - a. Grounding
 - i. Pathway
 - ii. Earthing
 - iii. Purpose
 1. Worker safety
 2. Equipment to earth protection
 - b. Bonding
 - i. Equipment to equipment
 - ii. Equipment to bus bar
 - iii. Purpose
 1. Safety
 2. Equipment operation
 - iv. Worker safety
 1. Hazards
 - a. Electrical
 - b. Overhead
 - c. Fall protection
 2. Requirements
 - a. Occupational Safety and Health Administration (OSHA)
 - b. Company policies
 - v. Electrical equipment
 1. Active
 2. Servers
 3. Data switches
 4. Wireless access points
 5. Control units

- 6. Paging amplifiers
- 7. Internet protocol (IP) cameras
- vi. Inactive
 - 1. Jacks
 - 2. Face plates
 - 3. Cable
 - 4. Patch panel
 - 5. Rack
 - 6. Cable accessories
- c. Electrical surges
 - i. Natural
 - 1. Lightning
 - 2. Solar flares
- d. Man-made
 - i. Accidental high voltage exposure
 - ii. Malfunctioning components
- e. Electrical surge protection
- f. Electrical potential hazards
 - i. Fusing
 - ii. Environmental causes
 - iii. Electromagnetic inference
- g. Pathways
 - i. Conductors
 - ii. Installation procedures
 - iii. Grounding source
 - iv. Grounding systems
 - 1. Components
 - 2. Conductors
 - 3. Wire
- 2. Governing bodies
 - a. Organizations
 - i. National Electrical Code (NEC)
 - ii. Building Industry Consulting Service International (BICSI)
 - iii. Manufacturers specifications
 - iv. Authorities Having Jurisdiction (AHJ)
 - v. Telecommunication Industries Association/Electronic Industries Association (TIA/EIA)
 - vi. American National Standards Institute (ANSI)
 - vii. OSHA
 - b. Jurisdictional boundaries
 - i. Local Authority Having Jurisdiction (AHJ)
 - ii. Local Code
 - iii. State Adopted code
 - i. National Electric Code
 - c. Grounding and bonding
 - i. Worker protection
 - ii. Performance standards
 - iii. Manufacturing products requirements
 - iv. Minimum safety standards
- 3. Grounding and bonding installation
 - a. Procedures
 - i. Identification of grounding requirements
 - 1. Equipment
 - 2. Components
 - ii. Bonding
 - 1. Component level
 - 2. Equipment
 - 3. Bond bus bar
 - b. Tools

- i. Hand Tools
 - 1. Cable strippers
 - 2. Wire Gage
 - a. Assorted wrenches
 - b. Torque
 - c. Socket
 - d. Open end
 - e. Allen key/hex set
 - f. American standard/metric
 - 3. Crimping tool
- ii. Power tools
 - 1. Drill
 - 2. Screw gun
- c. Equipment
 - i. Mechanical
 - ii. Exothermic
- d. Fasteners, connectors and wire
 - i. Various lugs
 - ii. Mechanical crimp
 - iii. Nuts and bolts
 - iv. Connector match
 - v. Various concrete fasteners
 - vi. Wire
 - 1. Stranded
 - 2. Solid
 - 3. Insulated
 - 4. Gauge
 - 5. Insulation rating
- e. Tests
 - i. Continuity
 - ii. Voltage
 - iii. Ohm
 - iv. Verification

Resources

National Fire Protection Association. *National electric Code 2011 (NEC)*. 2011 Edition (cu. NFPA Location Quincy, Massachusetts, 2010).

Stallcup's NFPA. *Stallcup's Illustrated code Changes*. 2011 Edition (cu. NFPA Quincy, Massachusetts, 2010).

Independent Electrical Contractors Chesapeake and Western Contractors. *Electrical Pre Apprenticeship Workforce Development*. 2013 (Current). Delmar, Cengage Learning Clifton Park, New York, 2013.

BICSI. *Information Technologies Systems Installation Methods*. 6th. BICSI Tampa, Florida, 2007.

Resources Other

1. *EIA/TIA-607 GROUNDING AND BONDING REQUIREMENTS*. www.uiowa.edu/.../pdf/4.TelecomClosetsGrounding&Bonding.pdf (<http://www.uiowa.edu/.../pdf/4.TelecomClosetsGrounding&Bonding.pdf>)
2. Taking the mystery out of grounding and bonding - Cabling Install. www.cablinginstall.com/articles/print/volume-9/issue-8/ (<http://www.cablinginstall.com/articles/print/volume-9/issue-8/>)...
3. Grounding & Bonding - The Energy Education Council. [www.energyeducationcouncil](http://www.energyeducationcouncil.com)

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