



**RESIDENTIAL  
ELECTRICAL INDUSTRY  
CONSTRUCTION TRAINING  
CRITERIA**

**O\*NET CODE 47-2111.00A**

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## **INTRODUCTION**

The Electrical Industry Training Committee is appointed by the California Apprenticeship Council (CAC) with the assigned task of scheduled and periodic reviews of the uniform Minimum Industry Training Criteria for the occupation of Residential Electrician. During this review process, the Committee's responsibility is to recommend updates and revisions to the CAC. This will insure the minimum training criteria for all Electrical Apprenticeships within California are current and relevant to the Electrical Construction Industry. We believe this document contains the current knowledge, skills, and abilities required to be successful in a career as a Residential Construction Electrician.

## **LENGTH OF TRAINING**

Program sponsors shall establish a minimum of a three (3) year program of not less than 4,800 hours of on-the-job training and 480 hours of classroom instruction both of which are further detailed below.

## **RELATED SUPPLEMENTAL INSTRUCTION**

The required prescribed courses of related and supplemental instruction shall be no less than 160 hours per year. This instruction must include, at a minimum, the related and supplemental training processes listed in Exhibit "A". Additional focus on environmental awareness, energy efficiency, renewable and sustainable resources and recycling have been added in this 2010 revision.

## **ON-THE-JOB TRAINING**

On-the-Job Hands-on Skill Training shall be as continuous as possible throughout the 3-year program and shall be no less than 4,800 hours. This training must include, at a minimum, the processes listed in Exhibit "B".

## **COMPETENCY TESTING**

All apprentices must prove a satisfactory competency of prior skills and knowledge at the time of their advancement to the next higher level. The tests shall be based on all Related and Supplemental Instruction and hands-on manipulative skills. Periodic testing shall be done during each level of coursework and apprentices shall not advance to the next level unless they have achieved an average total score of 70% or higher.

## **COMPLETION PERCENTAGES**

Program sponsors must have a 50% graduation rate of all apprentices who satisfactorily complete the first year of their program

# **EXHIBIT A**

## **RESIDENTIAL ELECTRICAL CONSTRUCTION INDUSTRY ELECTRICAL WORKER TRAINING CRITERIA**

### **RELATED SUPPLEMENTAL INSTRUCTION**

#### **Safety**

- A. General job-site safety awareness
- B. First Aid/CPR Certification
- C. Emergency Procedures
- D. Compliance with OSHA, NFPA and EPA Regulations
- E. Substance Abuse Awareness

#### **Tools, Materials and Handling**

- A. Proper care and use of hand and power tools
- B. Proper rigging methods
- C. Proper digging techniques
- D. Proper material lifting and handling

#### **Math**

- A. Appropriate mathematical calculations to solve for related problems.

#### **Electrical Theory**

- A. Basic electro -magnetic principals
- B. Ohm's Law
- C. AC/DC Theory
- D. Series, parallel and combination circuits
- E. Characteristics of circuits; voltage, current, power, resistance, impedance, capacitance and reactance.
- F. Theory of superposition and solving for multiple voltage-sourced circuits
- G. Operation and characteristics of three-wire systems
- H. Use of electronics in the electrical industry

#### **Code Requirements**

National Electrical Code and Local Codes

### **Conductors**

- A. General characteristics
- B. Conductor installation codes and techniques
- C. Methods for selecting proper size and type of conductors

### **Lighting Systems**

- A. Function, operation and characteristics of various lighting systems
- B. Lighting distribution and layout
- C. Installation and connection of fixtures

### **Over-current Devices**

- A. Function, operation and characteristics of over-current protection devices
- B. NEC requirements for over-current protection devices
- C. NEC requirements for ground-fault and arc-fault protection

### **Grounding Systems**

- A. Functions, operation and characteristics of grounding systems
- B. Sizing, layout and installation of grounding systems
- C. Insulation and isolation
- D. Proper grounding and bonding techniques
- E. Special circumstances

### **Services and Distribution Systems**

- A. Function, operation and requirements for various panel boards and switch gear
- B. Grounding requirements
- C. Code requirements

### **Prints and Specifications**

- A. Creation of residential blueprints, plans and specification
- B. Use of residential blueprints, plans and specification
- C. Recognizing information contained within residential blueprints

### **Motors, Motor Controllers and Process Controllers**

- A. Function, operation and characteristics of motors (AC only)
- B. Basic motor control devices

### **Generation and Power Supplies**

- A. Principles of generating electricity
- B. Installation and maintenance of emergency battery systems

### **Personal Development**

- A. Orientation to organization and structures
- B. Working with others
- C. Personal financial development

### **Electrical Testing**

- A. Steps used for various testing processes
- B. Proper selection and use of test meters
- C. Utilizing the results of testing procedures

### **Specialty Systems**

- A. Fire Alarms
- B. Basic telephone, television and security systems

## **EXHIBIT B**

### **RESIDENTIAL ELECTRICAL CONSTRUCTION INDUSTRY ELECTRICAL WORKER TRAINING CRITERIA**

#### **WORK PROCESSES**

1. Planning and Initiating a Project
2. Implementing Conservation and Recycling Practices on a Project
3. Establishing OSHA and Customer Safety Requirements
4. Establishing temporary power during construction
5. Installing Service to Buildings and Other Structures
6. Installing and Maintaining Alternative Energy Generation Systems
7. Establishing a Grounding System
8. Layout, Boxing and Drilling
9. Installing New Wiring and Repairing Old Wiring
10. Installing Indoor and Outdoor Receptacles, Lighting Circuits and Fixtures
11. Proper Wiring for Swimming Pools and Spas
12. Providing Power and Controls to Motors, HVAC and Other Residential Equipment
13. Energy-Efficient Lighting and Residential Control Systems
14. Troubleshooting and Repairing Electrical Systems
15. Installing Telephone, Television and Security Systems



