



**RESIDENTIAL
ELECTRICAL INDUSTRY
CONSTRUCTION TRAINING
CRITERIA**

O*NET CODE 47-2111.00A

**Revised
October 2010**

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OCTOBER 2010

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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

By signature of the two (2) Co-Chairs below, we jointly confirm the Electrical Minimum Industry Training Criteria Committee recommends approval of this document by a greater than the required two-thirds majority.

Respectfully submitted to the California Apprenticeship Council,

Name: **Keith Chitwood**

Signature

Date: October 22, 2010

Name: **Don R. Davis**

Signature

Date: October 22, 2010