



Job Ready Assessment Blueprint

Electrical Construction Technology



Test Code: 4130 / Version: 01

“Measuring What Matters”

Specific Competencies and Skills Tested in this Assessment:

Introduction to the Electrical Construction Technology Career

- Identify various electrical construction technology positions and responsibilities
- Identify career-related professional organizations and their purpose

OSHA Regulations and Electrical Safety Practices

- Identify proper use of personal protective equipment (PPEs) according to NFPA 70E standards
- Explain the purpose of OSHA
- Identify procedures for fire, ladder, and environmental safety according to OSHA standards (including lock-out/tag-out)

Meters, Measurements, Testing

- Identify characteristics, uses, and connections of meters and measuring devices
- Identify meter safety procedures

Identification and Selection of Tools, Materials, and Components

- Identify and correctly use hand and power tools
- Identify and select proper conductor cable type
- Identify and select proper conduit, boxes, and fittings
- Identify the function and purpose of various specialty equipment, including Ground Fault Circuit Interrupter (GFCI), Arc-Fault Circuit Interrupter (AFCI), Tamper-Resistant, and Transient Voltage Surge Suppressor (TVSS)
- Identify commonly used listed and labeled equipment



Specific Competencies and Skills continued:

National Electric Code (NEC)

- Explain NEC and how it is organized
- Explain procedures involved in NEC wiring methods, materials, and protection regulations
- Identify basic service entrance requirements
- Properly apply NEC tables and charts
- Describe proper bonding and grounding methods

Blueprints, Specifications, and Estimations

- Identify and interpret electrical symbols and specifications in blueprints and/or plans
- Identify and interpret wiring and schematic diagrams
- Demonstrate planning and layout of a circuit

AC Theory, Magnetic Theory, and DC Theory

- Identify characteristics of AC circuits
- Explain capacitance, inductance, impedance, current, voltage, and resistance
- Calculate power consumption, dissipation, and loss
- Demonstrate principles of magnetic theory
- Identify materials as insulators, conductors, and semi-conductors
- Identify characteristics and components of DC circuits

Circuit Theorems and Conversions

- Identify and apply various circuit theorems, including Ohm's Law, Kirchoff's Law, Watt's Law, and electron theory
- Interpret meter readings
- Identify and apply various mathematical conversions, including scientific, engineering and metric notations/conversions



Specific Competencies and Skills continued:

Wiring, Circuits, and Installation

- Select appropriate wiring for specific installations (residential and commercial)
- Install various switching arrangements
- Install cabling, raceways, conduit, boxes, wiring, devices, and trims
- Test and troubleshoot completed installation

Green and Renewable Technology

- Discuss wind turbine, solar energy, and other renewable sources of energy
- Explain the function and characteristics of rectifiers, inverters, and filters
- Describe energy management devices (e.g., LED lighting, CFLs, occupancy sensors)

Transformers

- Identify and calculate voltage/current for primary and secondary windings
- Determine KVA capacity and differentiate between Delta and Wye connections

Motors

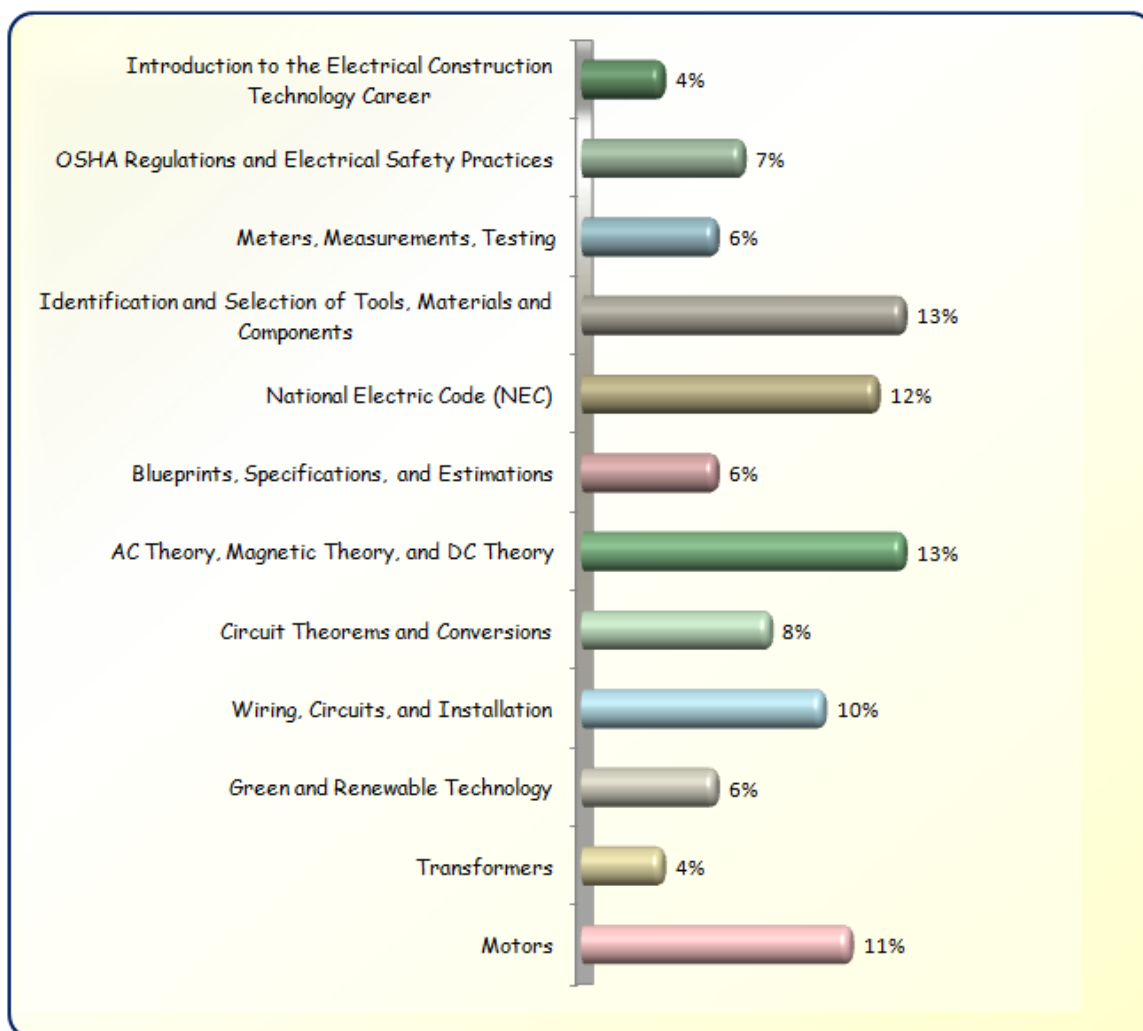
- Describe characteristics of various types of motors
- Identify and connect motor connections per nameplate (Delta/Wye and single-phase)
- Test, troubleshoot, and reverse motor rotation
- Select short-circuit and overload protection for specific applications
- Identify and interpret motor nameplate information (e.g., voltage and phases)

Written Assessment:

Administration Time: 3 hours

Number of Questions: 164

Areas Covered:



Sample Questions:

Measure the current in a circuit with a/an

- A. voltmeter
- B. ohmmeter
- C. anemometer
- D. ammeter

AWG units are units used to express conductor sizes and represent the

- A. Associated Wire Gage
- B. American Wire Gage
- C. Apiarian Wire Gage
- D. Approximate Wire Gage

The AC voltage waveform is called a _____ wave.

- A. cosine
- B. full
- C. half
- D. sinusoidal

Electromotive force is measured in

- A. watts
- B. ohms
- C. amps
- D. volts

A rectifier converts

- A. alternating voltage to direct voltage
- B. alternative voltage to direct current
- C. farads to microfarads
- D. megohms to ohms



Performance Assessment:

Administration Time: 3 hours and 20 minutes

Number of Jobs: 3

Areas Covered:

34% **Bend Conduit**

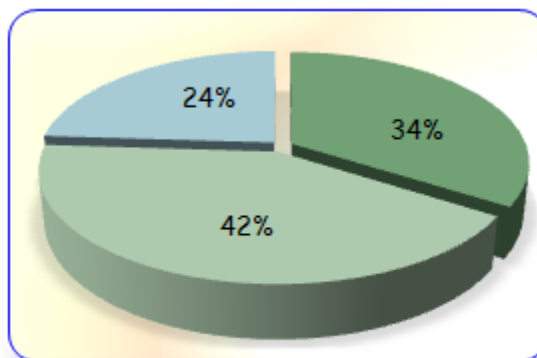
Installation of boxes onto the wall, proper bending and cutting techniques, safety, and time to complete Job 1.

42% **Switching and GFCI Receptacle in a Residential Setting**

Schematic drawing, installation of wiring, installation of devices, finish, trim-out, operation, safety, and time to complete Job 2.

24% **Install Two Smoke Alarms in a Commercial Setting**

Installation of components, smoke alarms, functionality, safety, and time to complete Job 3.



Sample Job: Install Two Smoke Alarms in a Commercial Setting

Maximum Time: 1 hour

Participant Activity: The participant will install two smoke alarms in a commercial setting referring to the drawings provided, using MC 14-2 and 14-3 AWG, install two interconnected smoke alarms, use a separate circuit, and home run first smoke alarm; interconnect between the two smoke alarms.



The Association for Career and Technical Education (ACTE), the leading professional organization for career and technical educators, commends all students who participate in career and technical

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education programs and choose to validate their educational attainment through rigorous technical assessments. In taking this assessment you demonstrate to your school, your parents and guardians, your future employers and yourself that you understand the concepts and knowledge needed to succeed in the workplace. Good Luck!



The Pennsylvania Builder's Association utilizes this assessment to assist in determining competencies for granting skill certificates to students graduating from Pennsylvania secondary trade programs that have been endorsed by the Pennsylvania Builders Association (PBA).

PBA's services include support to workforce training and education by linking industry employers with educators to grow the workforce of tomorrow. PBA serves Pennsylvania communities and consumers through its steadfast efforts to protect homeownership rights and advocate for affordable housing options. PBA is affiliated with the National Association of Home Builders.