



## ELECTRICAL CONSTRUCTION WIRING

### PURPOSE

The Electrical Construction Wiring event will allow each competitor to perform in a practical work environment. Each competitor will have the opportunity to use his or her acquired electrical wiring skills to construct an electrical wiring installation, using electrical blueprints, written specifications and verbal instructions based on the National Electrical Construction Wiring standards in accordance with the National Electrical Code.

### CLOTHING REQUIREMENTS

#### **NYS SkillsUSA Construction Attire:**

- White crew neck short-sleeved T-shirt
- work pants or jeans
- leather or steel-toed work shoes
- hard hat, and gloves
- safety glasses or goggles, (Prescription glasses can be used only if they are equipped with side shields. If not, they must be covered with goggles.)

***Note:* Contestants must wear their contest clothing to the contest orientation meeting. Also bring #2 pencil, resume, safety assurance form and conference program.**

### ELIGIBILITY

Open to active NYS SkillsUSA members enrolled in career and technical education programs with electrical wiring or electrical trades as the occupational objective.

## EQUIPMENT AND MATERIALS

1. Supplied by the NY chair/committee:
  - a. All wiring panels,
  - b. 250 feet 14-2 w/grnd Romex
  - c. 200 feet 14-3 w/grnd Romex
  - d. 100 single gang plastic nail-on outlet boxes (deep)
  - e. 2 boxes Residential Romex staples
  - f. 25 octagon or round plastic nail-on boxes
  - g. 25 plastic lamp holder bases (keyless porcelain fixture equivalent)
  - h. 1 bag (100) red wire nuts
  - i. 1 bag (100) tan wire nuts
  - j. 1 bag (100) yellow wire nuts
  - k. 20-20amp - 120 volt - 3-way switches
  - l. 12-120 volt, 60- or 75-watt lamp (light bulbs)
  - m. 25-4 square x @2 1/2 deep boxes
  - n. 100 - Green ground screws
  - o. 20 feet 1/2" EMT
  - p. 50 - 1/2" Minerac straps
  - q. 500 1/2" Sheet rock screws
  - r. 100 1/2" EMT Set screw connectors
  - s. 100 feet - 4/0 aluminum SE cable
  - t. 100-3" Wood or sheet rock screws (put walls together).
  - u. 50 ft. Commercial grade extension cord w/ ground
  - v. 1 GFC1 – whip
  
2. Supplied by the contestant:
  - a. Latest edition of the National Electrical Code" 2020 is a must", do not bring an outdated book as the contestant will not be able to answer the questions correctly.
  - b. **Note:** Bring NEC code book to orientation for the written test.
  - c. Calculator (nonprogrammable)
  - d. Electrician's hand tools, (Assorted screwdrivers, hammer, linesman pliers, channel locks, wire strippers, torpedo level, hacksaw, tape measure
  - e. Two PENCILS
  - f. Cordless drill with Philips bits and wood bits
  - g. Hacksaw with blade
  - h. 1/2" EMT hand Bender

### RESUME REQUIREMENT

Competitors must create a one-page resume to submit at orientation.

### DEVICES

Cell phones or other electronic devices not approved by the NYS Chairperson will be collected by the contest chair during the competition. Chairpersons will announce their acceptance by listing it on their standard or at the orientation meeting. In case of emergencies advisors should allow the competitors to take their phones to the contest areas.

If the competitor uses their device in a manner which compromises the integrity of the competition, the competitor's score may be penalized.

## **SCOPE OF THE COMPETITION**

The competition will assess the ability to perform jobs or skills selected from the following list of competencies as determined by the NYS SkillsUSA Championships technical committee.

### **KNOWLEDGE PERFORMANCE**

All competitors are required to take the SkillsUSA professional development test online.

The competition will include a written knowledge exam assessing general knowledge of electrical construction wiring. There will be additional questions related to professional development. Written portions may also exist during the skills portion of the competition. Knowledge of terms and principles used in residential wiring will be required for the skill demonstration portion of the competition.

### **SKILL PERFORMANCE**

The skills portion of the competition will include a series of workstations equipped with information and instruction sheets for wiring a residence or completing a commercial installation.

All work must conform to the latest National Electrical Code specifications as of January before the NYS SkillsUSA Championships.

### **STANDARDS AND COMPETENCIES**

#### **ECW 1.0 — Define and apply safety rules and practices in electrical construction wiring according to NEC standards**

- 1.1. Apply shop rules and regulations to workstations
- 1.2. List the techniques and practices used to prevent fires
- 1.3. Use electrical and hand tools correctly
- 1.4. Discuss the appropriate methods for lifting and climbing ladders
- 1.5. Explain appropriate clothing for electrical wiring construction
- 1.6. Outline the safety requirements for installing temporary electrical services

**ECW 2.0 — Apply knowledge of basic wiring theory according to NEC standards**

- 2.1. Use wiring diagrams, schematic diagrams and prints successfully in a scenario
- 2.2. Apply math calculations to circuits and measurements
- 2.3. Discuss theory concepts for troubleshooting

**ECW 3.0 — Discuss important trade information and standards according to the NEC**

- 3.1. Explain the purpose and use of the National Electric Code
- 3.2. Sketch and diagram effectively
- 3.3. Plan the layout of an electrical installation
- 3.4. Use trade catalogs and publications to solve electrical construction wiring problems
- 3.5. Correlate specifications, prints and job sites

**ECW 4.0 — Use basic equipment and procedures defined by industry standards**

- 4.1. Discuss techniques of residential and commercial wiring
- 4.2. Demonstrate wire-pulling techniques

**ECW 5.0 — Apply knowledge of service loads and electrical safety to electrical construction wiring situations**

- 5.1. Compute service loads
- 5.2. Calculate individual service loads
- 5.3. Determine the number of outlets permitted in a circuit
- 5.4. Compute the size of service entrance conductors
- 5.5. Use any wire types listed in NEC 310.16

**ECW 6.0 — Install a service entrance to meet NEC standards**

- 6.1. Install a main service panel and sub-panel
- 6.2. Install circuit breakers in a panel
- 6.3. Install a service entrance cable to service drop
- 6.4. Install temporary electrical service
- 6.5. Install equipment disconnect
- 6.6. Install meter bases

### **ECW 7.0—Install switch boxes and outlet boxes to meet NEC standards**

- 7.1. Install box hangers
- 7.2. Install recess boxes for outlets
- 7.3. Install hangable boxes
- 7.4. Install octagon boxes
- 7.5. Install surface mount boxes
- 7.6. Install recessed fixture housing in a ceiling
- 7.7. Install outlet boxes in drywall, lath plaster or paneled walls
- 7.8. Install telephone boxes in drywall, lath plaster or paneled walls

### **ECW 8.0—Maintain already existing wiring to meet NEC standards**

- 8.1. Diagnose and repair incandescent lights
- 8.2. Replace existing receptacles and switches
- 8.3. Troubleshoot a branch circuit
- 8.4. Test wiring for correct voltages

### **ECW 9.0—Rough in, connect and install electrical devices to meet NEC standards**

- 9.1. Rough in, connect and install a single pole switch
- 9.2. Rough in, connect and install a three-way switch
- 9.3. Rough in, connect and install a four-way switch
- 9.4. Rough in, connect and install a duplex grounded receptacle
- 9.5. Rough in, connect and install a 120-240-volt distribution panel
- 9.6. Rough in, connect and install a door chime system
- 9.7. Rough in, connect and install a ground fault interrupting device
- 9.8. Rough in, connect and install an emergency warning system
- 9.9. Rough in, connect and install a photoelectric cell control
- 9.10. Rough in, connect and install a surface raceway
- 9.11. Rough in, connect and install an exterior lighting fixture
- 9.12. Rough in, connect and install lighting dimmers
- 9.13. Rough in, connect and install TV outlets
- 9.14. Rough in, connect and install telephone outlets
- 9.15. Rough in, connect and install emergency lighting systems
- 9.16. Rough in, connect and install appliance circuits
- 9.17. Rough in, connect and install occupancy sensor
- 9.18. Rough in, connect and install motion sensor

### **ECW 10.0—Install PVC and EMT conduit to meet NEC standards**

- 10.1. Make 90-degree bends from measurements
- 10.2. Make offset bends from measurements
- 10.3. Make back-to-back bends from measurements
- 10.4. Make saddle bends from measurements
- 10.5. Determine correct conduit measurements

### **ECW 11.0—Install telecommunications infrastructure to meet current TIA/EIA 570 standards**

- 11.1. Install a coaxial cable with “F” type connectors and terminating hardware
- 11.2. Install unshielded twisted-pair cable, connectors and terminating hardware
- 11.3. Install 110-type terminating hardware

### **ECW 12.0—Apply knowledge of NEC Chapter 5 Special Occupancies**

### **ECW 13.0—Apply knowledge of the International Energy Conservation Code**