



2020 Electrical Commercial/Industrial Competition

FACT SHEET

Project Manager

Timothy Ely, Beacon Electric Company

For questions related specifically to the electrical competition, contact 2020 Electrical Project Manager Timothy Ely (513) 309-1586, or tim.ely@beacon-electric.com. For all event questions, contact Lisa Nardone, National Craft Championships director, (202) 595-1789 or nardone@abc.org.

Specific Competition Eligibility

The electrical competition has no competition-specific eligibility requirements. Please refer to overall eligibility requirements listed in the guidebook.

Special Competition Announcement

The conduit-bending portion of the electrical practical performance test will be conducted on Wednesday March 25, 2020 from 2 PM to 4 PM, during the competitor practical performance test site orientation. **All tools to complete this portion of the exam will be provided. Competitors will be required to wear hardhats (provided by ABC), safety glasses, gloves (ABC will provide glasses and gloves, but competitors may prefer their own) and boots (competitors must bring their own boots), which must be worn during this portion of the competition.**

Written Exam

Important news for 2020—The written exam must be completed before competitors arrive onsite. Exceptions will be made for extreme circumstances with prior approval of the NCC director via email. If an exception is granted, the make-up exam will take place Wednesday, March 25, 8:30 a.m.-11 a.m. and be proctored onsite by NCCER. Only those competitors with prior approval from the NCC director will be allowed to exam the test onsite. All competitors must sit for the written exam or face disqualification from the NCC. The written exam continues to make up 25 percent of one's overall competition score.

Competitors will complete the written exam at a local NCCER Accredited Assessment Center prior to arriving onsite. It is the responsibility of the sponsor organization to schedule test sessions directly with NCCER by emailing a request to: NCCTest@nccer.org SUBJECT: Schedule NCC Test.

NCCER will contact the sponsoring organization to provide access to the written test in NCCER's Online Testing System. Information on accessing the Testing System will be provided including requirements for the testing proctor.

All exams/tests are based on the standardized craft training process. In addition to the knowledge and skills required for each competition, all competitors should have completed the NCCER Contren® Learning Series Core Curriculum modules. A non-programmable calculator will be provided for the written exam, but no reference materials are permitted.

Practical Performance Test Description

Each competitor, over a two-day period, will perform three tasks utilizing knowledge and skills applicable to conduit bending (work boots or shoes must be worn during all tasks), and tasks utilizing knowledge and skills applicable to commercial and industrial construction.

Knowledge and Skills Required

Electrical Task: Commercial Construction

The competitor will be issued a drawing and a bill of materials. Working on an exposed stud wall, 6 feet, 6 inches by 4 feet, the competitor will be required to install a panel utilizing 120 volt, three-wire power source. Using an electrical plan drawing, the competitor may mount boxes, install EMT conduit and MC Cable, and install and wire switches, receptacles and lamp holders. The installation will be tested for correct operation.

All hand tools will be provided.

Knowledge and Skills Required

Electrical Task: Industrial Construction

The competitor will be issued a written scope of work and specification to design and construct a motor control circuit. Working on a plywood wall, 6 feet, 6 inches by 4 feet, the competitor will install an enclosure, motor starter, lamps, lamp holders and motor control devices. The competitor may install rigid metal conduit, flexible metal conduit, liquid tight flexible metal conduit, tray cable and electrical metallic tubing. Raceways will be bent, cut, threaded, connected and secured as appropriate. Circuit conductors will be installed, identified and terminated per the competitor's design drawings. **All hand tools will be provided.**

Safety Orientation

A safety program containing a general safety overview and safe work practices will be conducted during the scheduled competitor orientation. **Attendance is mandatory for all competitors.**

Personal Protective Equipment (PPE)

All personal protective equipment (PPE) must be appropriate for task and meet current ANSI standards, which have been incorporated into the Occupational Safety and Health Administration (OSHA) PPE regulations as follows: Eye and Face Protection ANSI Z87.1; Head Protection ANSI Z89.1; Foot Protection ANSI Z41.1. There are no ANSI standards for gloves; however, selection must be based on the performance characteristics of the glove in relation to the tasks to be performed. During the Practical Performance Test, **ABC National will provide and require** the proper use of the following personal protective equipment for all competitors:

- Ear protection;
- Safety glasses;
- Hard hat; and
- General work gloves.
- Each competitor may bring his own PPE: gloves, safety glasses.**

Exceptions to the provided PPE, with prior approval from the respective Project Manager, are:

- Prescriptive safety glasses with side shields;
- Prescriptive goggles; and
- Task-specific gloves per industry standards, designed to protect against sharp edges or high heat.

Competitors must provide and use the following:

- Standard work shoes or boots (*tennis shoes or sandals are not permitted*);
- Blue jean pants or work pants; and
- Shirts with sleeves of minimum 4 inches in length (*baggy or excessively loose fitting clothing is not permitted*).

Exposed jewelry is not permitted. Examples include (but are not limited to):

- Earrings (*stud or dangling*);
- Wrist watches;
- Rings;
- Studs exposed through the nose, jaw, lip, eyebrow or any part of the body that is visible; and
- Gauges.

Safety Judging

Judges will be present during the Practical Performance Test to score competitors in such safety areas as the use of personal protective equipment, hand and power tool safety, clean work area, etc. Depending on the severity and/or frequency of a violation or violations, the judges, in consultation with the project manager, have the authority to disqualify competitors.

Note: Competitors continue to be judged during disassembly/clean-up activities and are subject to disqualification or deduction of points for safety violations.

First Aid

All injuries should be reported to the project manager immediately. The project manager will determine the appropriate action, including assistance by onsite EMT personnel.

The knowledge and skills for this competition are based on the 2017 National Electrical Code® and all levels of the NCCER Contren® Learning Series Electrical curriculum 14 revisions with particular emphasis on the following modules:

- Electrical Safety
- Hand Bending
- Fasteners and Anchors
- Electrical Theory One
- Electrical Theory Two
- Electrical Test Equipment
- Introduction to National Electrical Code®
- Raceways, Boxes, and Fittings
- Conductors
- Introduction to Electrical Blueprints
- Wiring: Commercial and Industrial
- Alternating Current
- Motors: Theory and Application
- Grounding
- Conduit Bending
- Boxes and Fittings
- Conductor Installations
- Cable Tray
- Conductor Terminations and Splices
- Installation of Electric Services
- Circuit Breakers and Fuses
- Contactors and Relays
- Electric Lighting
- Calculations – Branch Feeders and Circuits
- Conductor Selection and Calculations
- Overcurrent Protection
- Raceway, Box, and Fitting Fill Requirements
- Wiring Devices
- Distribution Equipment
- Lamps, Ballasts, and Components
- Motor Calculations
- Motor Maintenance, Part One
- Motor Controls
- Hazardous Locations
- Load Calculations – Feeders and Services
- Practical Applications of Lighting
- Standby and Emergency Systems
- Basic Electronic Theory
- Fire Alarm Systems
- Specialty Transformers
- Advanced Motor Controls
- HVAC Controls
- Heat Tracing and Freeze Protection
- Motor Maintenance, Part Two
- High-Voltage Terminations/Splices
- Advanced Electronic Theory
- Voice and Data Systems
- Busses and Networks
- Fiber Optics
- Programmable Logic Controllers
- Medical Systems
- Television and Antenna Systems
- Medium Voltage
- Power Quality
- Energy Management Systems
- Traffic Signals
- Sound and Signal Systems
- Process and Distributed Control Systems
- Advanced Test Equipment

Tools

All hand tools will be provided

Each competitor will be provided with the tools needed, listed below is an example of the tools provided by NCC, no other tools will be allowed.

- Medium and large screwdrivers, straight
- Medium Phillips
- Wire strippers
- VOM Meter
- Channel locks
- Awl or center punch
- Claw hammer
- Utility knife
- 9-inch lineman pliers
- Diagonal-cutting pliers
- Roto stripper (MC cable)
- Keyhole saw
- EMT conduit reamer
- EMT Benders
- Rigid bender
- Pencils- Sharpe marker
- Basic, non-programmable calculator
- 25' Tape Measure
- Hacksaw
- Torpedo Level
- Tool pouch and belt
- Hard Hat, gloves and safety glasses
- Conduit Threader ½"

Please be aware of the hazards associate with the above tools

- All hand tools should be used for their purpose
 - Hazards include cuts, scrapes, crush, pinch, puncture
 - Hazards particular to the conduit threader include, cuts, crush, pinch, scrapes and snagging of loose clothing
 - Gloves must be worn when cutting, sawing or threading conduit
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- No loose clothing should be worn when using the power threader

Sample Score Sheet

The following sample score sheet is provided to give competitors an **example** of the criteria that may be included in the practical performance test. **However, this score sheet is only a sample and not intended to act as a study guide in preparation or to imply specific criteria that will be judged during the actual practical performance test.**

ABC National Craft Championships Electrical Sample Score Sheet

Judging Criteria	Competitor Identification Numbers					
	Maximum Points					
Use of materials						
Grounding						
Placement						
Follow prints/plans						
NEC						
Accuracy						
Terminations of conductors and cables						
Proper circuiting and device makeup						
Trim out of devices and conductors						
Panel						
Devices						
Installation of devices						
Operation						
Sequence of work						
Care and use of tools						
Proper use of fasteners						
General – ability to follow directions, quality of workmanship, neatness, best use of time and completion						
Project disassembly						
SUBTOTAL:	160					
Safety – housekeeping						
Use of hard hat						
Use of safety glasses						
Use of power tools						
Proper footwear						
SUBTOTAL:	40					
GRAND TOTAL:	200					
Tie Breaker #1						
Tie Breaker #2						