



***Draft Exhibit A and Job Book
for Industrial Electrician***

April 2016

For Review by State Electrical & Instrumentation Apprenticeship Advisory Committee

EXHIBIT A

- A. Apply safety requirements to work processes and follow hazard awareness procedures.** 320
1. Adhere to all applicable federal, state, local and employer safety requirements, such as OSHA and NFPA 70E.
 2. Follow lock-out and tag-out procedures.
 3. Properly use personal protective equipment.
 4. Safely use hand tools, power tools, meters, and testing equipment.
 5. Work in a variety of industrial settings, including heights, tight quarters and confined spaces.
- B. Plan, lay out, and install electrical equipment, component and devices.** 1440
1. Interpret and apply Wisconsin Administrative Electric Code and NFPA 70: National Electric Code.
 2. Document circuits using employer's preferred software or tools.
 3. Plan, lay out, and install conduit, wire ways and raceways
 4. Plan, lay out, and install power distribution equipment
 5. Plan, lay out, and install machine and equipment control systems
 6. Plan, lay out, and install communication systems
 7. Plan, lay out, and install branch circuits
 8. Plan, lay out, and install lighting systems
 9. Plan, lay out, and construct control cabinets
 10. Plan, lay out, and install grounding and bonding
 11. Plan, lay out, and install transformers
 12. Plan, lay out, and install electrical/electric field devices
- C. Troubleshoot electrical systems on general plant equipment, power distribution systems, and industrial equipment and machinery.** 3000
1. Apply AC and DC electrical theory to analyze and troubleshoot circuits.
 2. Interpret drawings, schematics and symbols.
 3. Utilize electrical testing instruments, tools and diagnostic software.
 4. Troubleshoot electrical control systems on industrial equipment and machinery.
 5. Troubleshoot control networks, automation systems, and PLCs.
 6. Troubleshoot back-up power systems.
 7. Document equipment conditions and work performed.
- D. Maintain electrical systems on general plant equipment, power distribution systems, and industrial equipment and machinery.** 1000
1. Comprehend and utilize the NFPA 70B maintenance recommendations.
 2. Utilize electrical testing instruments, tools and diagnostic software.
 3. Perform predictive and preventative maintenance procedures.
 4. Maintain control networks, automation systems, and PLCs.
 5. Maintain substations.
 6. Maintain back-up power systems.
 7. Document equipment conditions and work performed.
- E. Apply energy management** 200
1. Demonstrate awareness of employer's energy management strategies and their benefits
 2. Demonstrate awareness of alternative energy sources
 3. Monitor energy usage

4. Optimize energy efficiency by retrofitting equipment or installing new technologies

F. Local Optional Work Processes

1640

These hours may be used for additional work in any of the processes listed above or in any others as deemed necessary by the employer, such as:

1. Sustainability practices, such as sustainable design

Paid Related Instruction

720

TOTAL

8320

DRAFT

C. Troubleshoot electrical systems, power distribution, and industrial manufacturing equipment.

1. Troubleshoot general electrical systems.

- Review how the system should operate.
- Review available technical documentation, including as-built drawings and operations manuals.
- Review maintenance and operations history for the system.
- Compare the malfunctioning system to a similar working system.
- Identify the potential malfunctions and the potential causes.
- Determine the proper test and testing equipment.
- Perform the test.
- Compare the results to the expected values or outcomes.
- Verify the malfunction(s) and cause(s).
- Determine whether the malfunction(s) affected other components.
- Replace or repair the malfunctioning component(s).
- Verify the repair after completion.
- Perform root cause analysis.

2. Troubleshoot PLCs and controllers.

- Review how the system should operate.
- Review available technical documentation, including schematic and logic diagrams.
- Review maintenance and operations history for the system.
- Compare the malfunctioning system to a similar working system.
- Identify the potential malfunctions and the potential causes.
- Identify the parameters that can be measured.
- Perform the test using the appropriate tools or software.
- Compare the results to the expected values or outcomes.
- Verify the malfunction(s) and cause(s).
- Determine whether the malfunction(s) affected other components.
- Repair or replace the malfunctioning component.
- Verify the repair after completion.
- Perform root cause analysis.

3. Troubleshoot control networks and automation systems.

- Review how the network should operate.
- Review available technical documentation, including network maps and system communications.
- Review the maintenance and operational history.
- Identify the potential malfunctions and the potential causes.
- Identify the parameters that can be measured.
- Perform the test using the appropriate diagnostic tools or software.
- Compare the results to the expected values or outcomes.
- Verify the malfunction(s) and cause(s).
- Determine whether the malfunction(s) affected other components.
- Replace or repair the malfunctioning component.
- Verify the repair after completion.
- Perform root cause analysis.

4. Troubleshoot power distribution.

- Review how the system should operate.
- Review applicable technical documentation, including one-line diagrams and operational manuals.
- Review the maintenance and operational history.
- Identify the potential malfunctions and the potential causes.
- Determine the proper test and testing equipment.
- Perform the test.
- Compare the results to the expected values or outcomes.
- Verify the malfunction(s) and cause(s).
- Determine whether the malfunction(s) affected other components.
- Replace or repair the malfunction component.
- Verify the repair after completion.
- Perform root cause analysis.

5. Troubleshoot motors, drives and starters.

- Review how the component should operate.
- Review applicable technical documentation, including **schematics and parameters**.
- Review the maintenance and operations history.
- Identify the potential malfunctions and the potential causes.
- Determine the proper test and testing equipment.
- Perform the test.
- Compare the results to the expected values or outcomes.
- Verify the malfunction(s) and cause(s).
- Determine whether the malfunction(s) affected other components.
- Replace or repair the malfunctioning component.
- Verify the repair after completion.
- Perform root cause analysis.