Apprenticeship and Industry Training

Apprentice Record Book Support Guide

Electrician

Alberta

Apprenticeship and Industry Training

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Electrician

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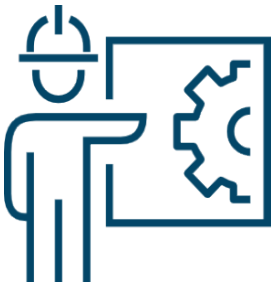
Purpose of the Guide

The purpose of this guide is to provide greater clarity, direction, and understanding for a sponsor, mentor, and/or apprentice as they collaboratively work through each competence that is presented in the record book.

Important Message – the Mentor



Mentors perform a critical role in the education and training of an apprentice or learner. They are essential partners within an Apprenticeship Education Program (AEP), whose purposes include guiding and directing the apprentice/learning through the demonstration and modeling of crafts, skills, and/or successfully completed activities.

Mentor responsibilities include:

- Providing opportunities for apprentices/learner to develop knowledge and skills;
- Assessing apprentice/learner competence and providing feedback;
- Providing a supportive learning environment that fosters continuous development; and
- Incorporating knowledge and skills learned at school with on-the-job instruction.

Apprentices also have an equally critical role. Their main responsibility is to learn, absorb, and then demonstrate the related skills they have had exposure to during their apprenticeship in a manner that is deemed acceptable.

Apprentice responsibilities include:

- Progress in a timely manner in an apprenticeship education program;
- Ensure the records of progress are kept up to date;
- Notify the Registrar of contact information changes; and
- Meet any additional obligations that the Registrar considers appropriate.

The Record Book

Competence

In a record book, a competence is defined as an activity, task, or function that requires satisfactory completion to a recognized standard.

Core Competences

Each period has a defined number of competences specifically developed in consultation with **industry subject matter experts (SMEs)** who have a broad understanding of the electrician trade.

Most period competences will require successful completion to meet the minimum requirements for that period. The competences are developed by extrapolating the intent from **one of the core competence section titles** listed in the record book.

The competences are presented in a table format and contain the following information:

Competence

A complete statement that prescribes the activity, task, or function the apprentice completes in the presence of their qualified mentor.

Mentor Endorsement

An endorsement in this column indicates successful completion of the competence to the recognized standard.

Competences	**Mandatory / Optional**	**Mentor Endorsement**
Don a safety harness to a manufacturer's standard.	Mandatory	Name: _____ Date: _____
Apply quality workmanship practices to an engineering standard.	Optional	Name: _____ Date: _____

Designation

Informs the apprentice and their mentor that a competence must (**Mandatory**) be successfully completed to satisfy the minimum requirement for the period or that a competence may (**Optional**) be successfully completed to satisfy the minimum requirement for the period.

Competences - Period One

The following competences were developed under the core competence section title of:

FOUNDATIONAL SKILLS, RESPONSIBILITIES, AND PROCEDURES:

Competences:	***FOUNDATIONAL SKILLS, RESPONSIBILITIES, AND PROCEDURES***
Use correct PPE for assigned tasks according to OHS Act and industry standards.	Apprentice can identify and select the correct PPE required for the task / job being performed. Apprentice is also able to properly inspect the PPE for defects prior to use. Apprentice can demonstrate proper use of the required PPE.
Perform hazard assessment applying safe work practices according to OHS Act and industry standards.	Apprentice participates in identifying and mitigating hazards and implements controls such as lockout / tagout as required. Apprentice reports safety concerns to their superior.
Communicate effectively with others on the jobsite.	The apprentice must successfully demonstrate the ability to receive and provide communication via verbal, nonverbal or written methods related to safety, job specific tasks, work progress update to supervisor, and exchange information with others.
Demonstrate knowledge of working at heights according to OHS Act and industry standards.	Apprentice will understand the different hazards and associated controls while working with ladders, manlifts, catwalks, harnesses, roofs, scaffolding, and tools above workers.
Demonstrate safe material handling practices according to industry standards.	Apprentice is able to move and store tools, materials and equipment on a jobsite in a safe manner without causing damage, including safe handling and storage of hazardous materials.

The following competence was developed under the core competence section title of:

TOOLS, EQUIPMENT, AND INSTRUMENTS:

Competences:	***TOOLS, EQUIPMENT, AND INSTRUMENTS***
Select the correct tools and equipment for assigned task according to industry standards.	Apprentice is able to identify and select the correct tools / equipment required for the task / job being performed. Apprentice is also able to properly inspect the tools/equipment for defects prior to use.
Use tools and equipment according to manufacturer and industry standards.	Understand that manufacturers have standards and specifications related to the safe use of tools and equipment that need to be followed. Demonstrate use, inspection for defects, order replacement parts, and store tools and equipment.

Competences:	*TOOLS, EQUIPMENT, AND INSTRUMENTS*
Use measuring equipment to measure current, voltage and resistance of an electrical circuit according to industry standards.	Select the right category of meter. Use appropriate measuring equipment to identify the presence or absence of voltage, amperage or resistance of an electrical circuit.

The following competence was developed under the core competence section title of:

CODES AND STANDARDS:

Competences:	*CODES AND STANDARDS*
Apply the CE Code for an electrical installation.	Know how to apply appropriate sections and tables of the CE Code and supporting standards for tasks being assigned, such as; Grounding and bonding; Wiring methods; Conduit sizing; Supporting methods; and Conductor sizing.

The following competences were developed under the core competence section title of:

ELECTRICAL SYSTEMS:

Competences:	*ELECTRICAL SYSTEMS*
Install electrical branch circuits according to the CE Code and industry standards.	Identify the methods of installation for a branch circuit such as raceways and cables. Identify components to be installed on branch circuits. Demonstrate understanding that circuit loading affects the sizing of conductors and raceways.
Demonstrate knowledge of troubleshooting branch circuits according to industry standards.	Identify and select the correct device to perform troubleshooting. Use voltage and/or continuity to troubleshoot circuits. Demonstrate or express the expected result prior to testing. For more information, see troubleshooting steps from the Electrical Code Quick Reference.

END OF PERIOD ONE COMPETENCES

Competences - Period Two

The following competences were developed under the core competence section title of:

FOUNDATIONAL SKILLS, RESPONSIBILITIES, AND PROCEDURES:

Competences:	***FOUNDATIONAL SKILLS, RESPONSIBILITIES, AND PROCEDURES***
Apply safe work practices to OHS Act and industry standards.	Apprentice can identify hazards, utilize proper PPE, describe LOTO procedures and understands basic emergency response procedures.
Demonstrate quality work practices to industry standards.	Apprentice understands and follows installation instructions. Apprentice demonstrates the ability to use required tools and equipment for the assigned task including the proper use and storage of use of calibrated tools.
Use ladders and elevated work equipment to OHS Act and industry standards.	Apprentice can select and deploy the task appropriate ladder or work platform. Apprentice understands manufacturer instructions and company safe work policies.
Select rigging equipment for hoisting, lifting or material handling tasks to industry standards.	Apprentice can select and use appropriate rigging and hoisting equipment. Apprentice demonstrates basic knot tying skills. Apprentice understands manufacturer instructions and company policies for hoisting and rigging equipment.
Interpret drawings, plans, specifications, and schematics to industry standards.	Apprentice can identify different types of drawings and their purposes used on the job site. Apprentice can identify symbols on drawings and explain the hierarchy of drawings as per company standards. Apprentice demonstrates how to select materials and layout instructions based on drawings.

The following competence was developed under the core competence section title of:

TOOLS, EQUIPMENT, AND INSTRUMENTS

Competences:	***TOOLS, EQUIPMENT, AND INSTRUMENTS***
Use measurement instruments according to manufacturers specifications.	Apprentice can select proper meters, gauges, scales, and other measuring equipment for the assigned task. Apprentice demonstrates knowledge of maintenance, calibrating and safe testing ranges for measuring equipment as per manufacturer instructions.

The following competence was developed under the core competence section title of:

CODES AND STANDARDS:

Competences:	***CODES AND STANDARDS***
Terminate conductors to CE Code and industry standards.	Apprentice demonstrates the understanding of manufacturer instructions for materials and equipment. Apprentice can prepare conductors and cables as per CE Code and industry standards in addition to demonstrating the ability to select proper tools and materials needed to terminate cables and conductors.

The following competences were developed under the core competence section title of:

ELECTRICAL SYSTEMS:

Competences:	***ELECTRICAL SYSTEMS***
Connect a single-phase motor to manufacturers specifications.	Apprentice can select proper tools for the job, understands safe work procedures. Apprentice demonstrates proper installation and termination techniques as per CE Code and industry standards. Apprentice sets rotation as per CE Code, industry standards and manufacturer instructions.
Install branch circuits to CE Code and industry standards.	Apprentice sizes cables accordingly, identifies proper field routing and support methods.
Install timers, smart relays, and contactors to industry standards.	Apprentice can select and utilize proper tools in addition to understanding safe work procedures. Apprentice demonstrates proper installation and termination techniques as per CE Code, industry standards and manufacturer instructions. Apprentice tests and commissions installed equipment.
Install heating and cooling controls to industry standards.	Apprentice can select and utilize proper tools in addition to understanding safe work procedures. Apprentice demonstrates proper installation and termination techniques as per CE Code, industry standards and manufacturer instructions. Apprentice tests and commissions installed equipment.
Troubleshoot motor control circuits to industry standards.	Apprentice demonstrates linear problem-solving processes. Apprentice can read and interpret schematics and wiring diagrams as per industry standards. Apprentice follows safe work procedures and demonstrate repair and remediation techniques as per company standards.

Competences:	***ELECTRICAL SYSTEMS***
Troubleshoot heating and cooling controls to industry standards.	Apprentice demonstrates linear problem-solving processes. Apprentice can read and interpret schematics and wiring diagrams as per industry standards. Apprentice follows safe work procedures and demonstrate repair and remediation techniques as per company standards. Apprentice demonstrates ability to nature of HVAC control problem (electrical, mechanical, or refrigeration).

END OF PERIOD TWO COMPETENCES

Competences - Period Three

The following competences were developed under the core competence section title of:

FOUNDATIONAL SKILLS, RESPONSIBILITIES, AND PROCEDURES:

Competences:	***FOUNDATIONAL SKILLS, RESPONSIBILITIES, AND PROCEDURES***
Organize work to industry standards.	Follows established procedures, maintains documentation, manages time effectively and prioritizes work accordingly. Ensure tools, parts and equipment required are maintained and readily available at work site.

The following competence was developed under the core competence section title of:

CODES AND STANDARDS:

Competences:	***CODES AND STANDARDS***
Bond electrical equipment according to CE Code, industry standards, and manufacturer specifications.	Describe when bonding of equipment is required. Apprentice must be able to describe difference between bonding and grounding. Describe minimum code requirements and be aware customer requirements may exceed code requirements.
Ground an electrical system Optional according to CE Code, industry standards, and manufacturer specifications.	Describe when grounding of equipment is required. Apprentice must be able to describe difference between grounding and bonding. Describe minimum code requirements and be aware customer requirements may exceed code requirements.
Size overcurrent protection for an electrical system according to CE Code and industry standards.	Apprentice understands the electrical load, how to select the appropriate device, and ensuring proper installation to maintain safety and compliance with code requirements or local industry standards exceeding these requirements. Components may vary by industry.

The following competence was developed under the core competence section title of:

ELECTRICAL SYSTEMS:

Competences:	***ELECTRICAL SYSTEMS***
Install a single-phase transformer according to CE Code and industry standards.	Installation meets all safety, operational, and regulatory requirements specified by the code, while also adhering to best practices in the industry for performance and reliability. Apprentice is able to differentiate between primary and secondary side of transformer and installs device accordingly.
Install a three-phase transformer according to CE Code and industry standards.	Installation meets all safety, operational, and regulatory requirements specified by the code, while also adhering to best practices in the industry for performance and reliability. Apprentice is able to differentiate between primary and secondary side of transformer and installs device accordingly. Apprentice connects transformer with proper phase rotation (maintains color coding from primary to secondary)
Install a three-phase motor starter to CE Code and industry standards.	Verify apprentice understands all components of a motor starter and their purpose. Apprentice must demonstrate appropriate wiring and connection technique for all circuitry. Apprentice must perform function tests to ensure the starter operates correctly under load.
Connect a three-phase capacitor for power factor correction to meet CE Code and industry standards.	Apprentice demonstrates zero energy verification of capacitors and demonstrates how to safely discharge capacitors. Apprentice utilizes manufactures wiring diagrams to properly hook up capacitors in circuit for power factor correction. Capacitor installations for power factor correction may vary by industry.
Connect a single-phase or three-phase motor to CE Code and industry standards.	Apprentice can interpret and wire motors as per manufacturers wiring diagrams. Apprentice is able to change motor rotation on single-phase or three-phase motors. Apprentice uses proper connection methods as per given installation requirements. Apprentice verifies overload device settings based on motor name plate ratings.
Troubleshoot a single-phase or three-phase transformer according to industry standards.	Apprentice identifies primary and secondary side of transformer. Apprentice completes a short circuit test. Apprentice measures voltage on secondary side of transformer compares to manufacturers tolerances. Apprentice identifies tap settings on transformer and adjust as needed to achieve required voltage on secondary.

Competences:	***ELECTRICAL SYSTEMS***
Troubleshoot a single-phase or three-phase motor to industry standards.	Apprentice meggers phase to phase and phase to ground on motor to identify short or opening in windings. Apprentice understands when motor troubleshooting requires interdisciplinary communication. Apprentice demonstrates understanding of locked rotor current. Apprentice interprets and utilizes name plate data for troubleshooting
Install a single-phase or three-phase VFD to CE Code and industry standards.	Apprentice utilizes CE code to properly size all associated wiring and protective devices for installations in the set environment. Apprentice utilizes manufacturers manuals to ensure proper connection and settings as per site provided specification.
Troubleshoot a single-phase or three- phase VFD to industry standards.	Apprentice utilizes vendor manuals to aid in VFD troubleshooting including and test measurements or system checks that can be performed. Apprentice demonstrates knowledge of VFD components and expected performance. Apprentice demonstrates zero energy verification of capacitors and demonstrates how to safely discharge capacitors as part of system troubleshooting.

END OF PERIOD THREE COMPETENCES

Competences - Period Four

The following competences were developed under the core competence section title of:

FOUNDATIONAL SKILLS, RESPONSIBILITIES, AND PROCEDURES:

Competences:	***FOUNDATIONAL SKILLS, RESPONSIBILITIES, AND PROCEDURES***
Interpret a schematic or wiring diagram to industry standards.	Recognize how the sequence of component connections can affect the wiring installation. Identify the appropriate symbols in relation to field devices. Develop schematic diagrams for control circuits. Modify drawings according to field conditions i.e. “as builds, red lines”.
Perform lock-out and tag-out procedures according to OHS Act, CSA, and industry standards.	Identify and apply the appropriate standard. Identify the source of energy (electrical, mechanical, and other). Select and install required lockout equipment and complete all required documentation.
Use arc flash PPE according to OHS Act, CSA, and industry standards.	Identify situations that require arc flash protection. Identify boundary limits. Reference appropriate CSA Z462 tables. Select and use PPE related to arc flash hazards.
Install personal protective grounding according to OHS Act, CSA, and industry standards.	Identify the hazards where personal protective grounds are required. Recognize, where in high voltage situations, step and touch potential present hazards and how to mitigate the hazards. Recognize when equal-potential bonding and grounding for electrical systems is required. Follow the procedure for installing and removing personal protective grounds on electrical systems.

The following competence was developed under the core competence section title of:

TOOLS, EQUIPMENT, AND INSTRUMENTS:

Competences:	***TOOLS, EQUIPMENT, AND INSTRUMENTS***
Use testing equipment to assess an electrical system to industry specifications.	Demonstrate proper use of testing equipment, such as, but no limited to, megohmmeters, GFCI testers, multimeters, power quality analyzers, to determine functionality of electrical equipment and/or systems.

The following competence was developed under the core competence section title of:

ELECTRICAL SYSTEMS:

Competences:	***ELECTRICAL SYSTEMS***
Troubleshoot and diagnose electrical system equipment and components to industry standards.	Locate faults in wiring and/or equipment. Identify likely failure points in equipment based on age or use.
Repair electrical system equipment and components to industry standards.	Demonstrate understanding of opportunities for repair versus replacement in accordance with manufacturer's standards and approved materials and techniques.
Energize electrical system equipment and components to industry standards.	Demonstrate knowledge of procedures to safely energize equipment.
Install communication systems according to CE Code and industry standards.	Demonstrate correct wiring and installation of cabling and equipment for various communication systems as per manufacturer's standards.
Install metering systems according to CE Code and industry standards.	Demonstrate correct connections for single and three phase metering and/or potential and current transformers.
Install life safety systems according to CE Code and industry standards.	Installs residential smoke alarms. Installs fire alarm systems with associated ancillary equipment. Installs industrial gas and fire detection.
Install electrical distribution systems according to CE Code and industry standards.	Demonstrates understanding of the installation of transformers, central distribution panels, combination panels and sub-panels. Demonstrate the ability to preform high voltage terminations.
Connect a hydraulic/pneumatic control system according to CE Code and industry standards.	Demonstrate a working knowledge of pneumatic and hydraulic systems and control components. Connect and analyze pneumatic and hydraulic system controls and/or process control systems.
Commission electrical system equipment and components to industry standards.	Identify and follow client and/or manufacturer requirements for commissioning and start up.
Maintain electrical system equipment and components to industry standards.	Identify, understand, and apply manufacturers or client's preventative requirements for various types of electrical equipment.

END OF PERIOD FOUR COMPETENCES

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