COMPETENCY PROFILE:

AUTOMOTIVE ELECTRICIAN

ROLE OVERVIEW

Automotive electricians play an integral role in the electric vehicle supply chain and is pivotal to ensuring the optimal performance of a vehicle's electrical system. Professionals are entrusted with the inspection, diagnosis, and resolution of electrical issues by using specialized tools and software. Primary responsibilities will include installing, repairing, and maintaining electrical components and systems required for the operation and charging of electric vehicles.

To be successful, one must demonstrate proficiency in calibrating and programming electronic devices and a commitment to maintaining accurate service records. Automotive electricians must demonstrate a range of applied knowledge of electrical systems to troubleshoot various technical problems accurately and efficiently.

Automotive electricians must also be knowledgeable about specific regulations and be able to adhere to protocols and best practices. While also staying current on industry trends to ensure they are adaptable to learning new techniques and updating their skill sets as industry demands shift.

ALSO KNOWN AS:

- Diagnostic Electrician
- Automotive Electrical Systems Specialist
- Electrical Vehicle (EV) Specialist

NATIONAL OCCUPATIONAL CLASSIFICATION:

- 74203 – Automotive and heavy truck and equipment parts installers and servicers
- 72200 – Electricians (except industrial and power system)

EDUCATION AND EXPERIENCE

- A bachelor's degree in engineering, preferably focusing on electrical engineering or a related field, provides essential theoretical knowledge for solving complex electrical issues in vehicles.
- A Red Seal certificate is often required for specific roles. This certificate represents high skill and expertise in the automotive electrical trade across Canada. It is obtained through an apprenticeship program and a comprehensive exam.
- Two to three years of hands-on experience with automotive electrical systems is typically expected. Experience can be gained in automotive repair shops, dealerships, or through an apprenticeship, teaching individuals to diagnose and repair electrical problems, use diagnostic equipment, and understand vehicle wiring.
- Achieving proficiency as an automotive electrician involves integrating formal education, certification, and practical experience, equipping individuals to effectively address the field's challenges.

TECHNICAL

Automotive Repairs

Applies electro-mechanical knowledge of vehicle systems, parts, and processes to identify vehicle problems and perform appropriate service and repairs.

- Identify technical car problems relating to electrical systems to perform improvised or intermediate vehicle repairs.
- Accounts for customer requests when considering appropriate repair solutions to restore the vehicle to operating conditions most efficiently and effectively.
- Use various tools and equipment to service, repair, or maintain vehicle electrical systems.
- Tests electrical equipment or systems following vehicle repairs to ensure all systems and parts function as specified by the vehicle manufacturer.

Automotive Assembly

Fasten components together according to technical plans or best practices to create subassemblies or finished vehicle products.

- Prepare sketches or follow vehicle blueprints or process drawings to comprehend the technical specifications required for accurate vehicle assembly.
- Install electrical circuits and wiring in vehicles to distribute and regulate electrical power and supply vehicle devices and components.
- Install electronic systems and components using hand or power tools to connect to electrical circuits to have an operating vehicle.
- Perform a series of tests on vehicle equipment to assess the reliability and suitability of a component to complete standard operating functions.

Software and Firmware Updates

Uses specialized software or digital tools to conduct software or firmware troubleshooting and updates to improve electrical vehicle management systems.

- Utilizes specialized computer software to identify vehicle issues, adding additional protection against software-related problems.
- Use different programmable logic controller programming devices to modify and read logic control programs, and program and interrogate vehicle controllers for software updates and diagnostics.
- Maintains knowledge of manufacturer-specific software tools to ensure updates and vehicle management are performed efficiently.
- Implements firmware upgrades to electric vehicles to maintain optimal vehicle performance.

Troubleshooting

Identifies operating problems and inefficiencies in current equipment, processes, or systems and reports issues to determine effective solutions.

- Documents the solution or service performed when receiving abnormal or unique fault codes on an electric vehicle's components to record the solution and improve the ease of service for the next technician.
- Identifies and reports major equipment/tool maintenance needs to maintenance personnel to ensure safe and efficient operations.
- Uses specialized instruments to test electrical components of electric batteries and other system components to diagnose the root cause of the problem.
- Read the manufacturer's circuit diagrams and specifications to look for flaws in vehicle electrical systems and maintain vehicle operating conditions.

Electrical System

Applies appropriate processes, procedures, and techniques to assemble or maintain a vehicle's electrical systems to ensure systems meet quality assurance and function as specified.

- Applies an understanding of the fundamental electro-mechanical functions of an electric vehicle motor to the repair to work on the vehicle safely and efficiently.
- Uses applicable electrical safety principles when working on electric vehicles to avoid dangerous incidents.
- Applies an understanding of electrical circuits to diagnose and inspect where issues occur.
- Chooses the appropriate testing indicators when testing the vehicle's different electric/electronic components to diagnose any experienced issues.
- Ensures the wiring is all completed safely to avoid short circuits and other electric issues.
- Diagnoses problems in new cars by connecting them to specialized computers to provide an extra layer of protection and catch issues in the vehicle's software
- Make calculations for load requirements for circuits and choose appropriate size and grade components.

Battery Management and Maintenance

Monitors electric vehicle battery systems to maintain their health and charging systems to extend the vehicle's lifecycle and minimize environmental impact.

- Monitors battery health on electric vehicle systems to recommend solutions to prevent performance degradation.
- Replace and dispose of batteries when necessary to manage the total lifecycle duration of electric vehicles and minimize their environmental impact.
- Install and maintain electric vehicle charging systems and infrastructure to facilitate battery charging and ensure consistent electric vehicle battery performance.
- Maintain thermal management systems to regulate battery and component temperature control to ensure the electric vehicle maintains an appropriate lifecycle.

PERSONAL & PROFESSIONAL

Problem-Solving

Identifies problems, uses logic, judgment, and evidence to evaluate alternative scenarios, and recommends solutions to achieve a desired goal.

- Conduct root cause analysis to identify issues or failures and develop innovative solutions.
- Analyze data to evaluate operational challenges to prevent recurrence.
- Considers several possible explanations or alternatives for a situation, anticipates potential obstacles, and develops plans to overcome them.
- Applies a balance of logic and creativity to generate novel approaches to produce a comprehensive solution.

Communication

Positively directs outcomes by delivering communication that results in a better understanding of goals and objectives, captures interest, and gains support for immediate action.

- Ask appropriate questions to identify customer needs to fulfill service expectations and product requirements.
- Communicates, coordinates, and consults with engineering departments and other technical team members to facilitate knowledge and problem-solving.
- Articulates complex technical concepts in layperson's terms to customers to explain problems and required vehicle repairs.

Adaptability

To achieve a goal, learn the appropriate skills, behaviours, and processes in response to changing circumstances.

- Identifies ways to incorporate new practices, techniques, and information into workplace tasks.
- Incorporates change in work tasks, situations, and environment so that output is not negatively impacted.
- Participates in relevant professional development training to improve operational performance.

Attention to Detail

Delivers a concentrated concern, including monitoring and checking information, organizing tasks and resources efficiently, or all areas involved towards completing an objective.

- Carries out electrical repairs with precision to mitigate the reoccurrence of issues.
- Document service procedures to facilitate future reference of repairs and ensure service was completed in compliance with best practices.
- Performs detailed inspections of electric vehicles and systems to pre-empt potential electrical faults.
- Configures and calibrates electrical components and systems to exact specifications to ensure optimal functioning.

LEGAL, POLICY, AND REGULATORY

Regulatory Compliance

Adheres to specific regulations, codes, and legislation within a defined jurisdiction to ensure the health and safety of others.

- Consults with different government agencies to secure regulatory approvals and permits.
- Analyzes relevant regulations, legislations, and standards to ensure the project complies with laws, regulations, and standards.
- Participates in developing internal policy and procedures to ensure assessments are conducted per all legal requirements.

Health and Safety Procedure

Adheres to and advocates specific workplace safe operating procedures and occupational health and safety requirements within a defined jurisdiction to ensure the health and safety of self and others.

- Conducts all operations within the company's established safety management system to prevent workplace incidents.
- Documents all incident/near-miss reports to detail incidents and adhere to safe operating procedures while working.
- Uses appropriate Personal and Protective Equipment (PPE) in all circumstances to protect from injuries and prevent workplace incidents.
- Operates all instruments and workplace equipment within safety standards when repairing or maintaining vehicles to ensure their safety.

This profile is a living document. If you have any feedback or would like to help us improve the profile, please reach out to research@eco.ca.

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