# Specification of Competency Standards
# for the Automotive
# Unit of Competency

**Functional Area - Vehicle Servicing**

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| **Title** | Evaluate the performance of high-voltage operating systems and execute the maintenance procedures for the rechargeable energy storage system of electric motorcycles |
| **Code** | 111741L3 |
| **Range** | This unit of competency is applicable in electric motorcycle service workshops. Practitioners should be able to evaluate the performance of high-voltage operating systems and safely execute the maintenance procedures of the rechargeable energy storage system (REESS) with the application of suitable gears, according to the instructions in the corresponding motorcycle manufacturer's service manual and the relevant requirements on environmental protection, occupational safety and health regulations. They should also be able to provide a written report upon completion of work. |
| **Level** | 3 |
| **Credit** | 3 *(For Reference Only)* |
| **Competency** | **Performance Requirements** |

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| | 1. Knowledge (Principles of various high-voltage operating systems and associated safety precautions)<br>• Conversant with the functions, working principles and controls of various high-voltage operating systems of electric motorcycles, the locations of major components, including the application of different cable and wire harness types, and their protection and connection means.<br>• Explain the principles of whole-vehicle control logic and communication protocols of electric motorcycles, and the application of controller area network (CAN) for signal transmission.<br>• Identify the normal operating conditions of various electric motorcycle systems, accurately differentiate the voltage levels of their components and cables, such as the REESS, onboard charging unit, powertrain, etc., and master the associated safety precautions in maintenance.<br>• Familiar with the potential hazards, preventive and protective measures for live high-voltage electrical system servicing and diagnosing, such as the setting-up of workplace, application of personal protection and first-aid equipment, special tools and equipment, competency of operators, etc., according to the instructions in the corresponding motorcycle manufacturer's service manual and safety guidelines.<br>• Master the requirements for electric motorcycle service workplace setup, functions and applications of various special tools and equipment for electric motorcycle maintenance and diagnosis, as well as the personal protection and first-aid equipment for relevant tasks.<br>• Familiar with the common faults of high-voltage operating systems onboard, and the diagnostic procedures for the faulty functions, including but not limited to, the powertrain and REESS of the electric motorcycle, with reference to the instructions in the corresponding motorcycle manufacturer's service manual and safety rules.<br>• Master the features of various battery types equipped on an electric motorcycle, such as the basic working principles, characteristics, performance, handling safety, etc.<br>• Master the principle of high-voltage system power down to isolate the electrical circuit connection between the high-voltage battery pack and the vehicle system components, and the criteria for power reinstatement.<br>• Understanding of the relevant legal requirements on road and vehicle safety, and environmental protection. |
| **Assessment Criteria** | The integrated outcome requirements of this unit of competency are that the practitioner being assessed shall prove that he/she is:<br>• Capable of illustrating the working principles and architecture of the whole-vehicle logic control and communication protocols for signal transmission, and the application in electric motorcycles;<br>• Capable of explicating the potential hazards of live high-voltage electrical system servicing and diagnosing, and executing relevant protective and preventive measures according to the instructions in the corresponding motorcycle manufacturer's service manual and the guidelines in occupational safety and health;<br>• Capable of differentiating the voltage levels of various operating systems, the wire harness, cables and the connector / adaptor protection, as well as mastering the associated safety precautions;<br>• Capable of examining the normal operation of high-voltage electrical systems under live working conditions safely, including but not limited to, powertrain, onboard charging unit and REESS, with the application of effective personal protective equipment, and proper special service tools and equipment according to the instructions in the corresponding motorcycle manufacturer's service manual and associated safety guidelines;<br>• Capable of identifying the causes of defective high-voltage operating systems, such as the powertrain, REESS, etc., to locate the faulty components leading to the substandard system performance and conduct rectification, with reference to the instructions in the corresponding motorcycle manufacturer's service manual and the guidelines in occupational safety and health;<br>• Capable of conducting the removal and one-for-one replacement procedures of the fixed type and swappable type high-voltage battery pack properly, including the cables and harness, according to the instructions in the manufacturer's service manual and the relevant requirements on environmental protection, occupational safety and health regulations, after the system power-down is confirmed by the result of special service tools / authorised competent person; |

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| | • Capable of executing the coding procedures for the fixed type high-voltage battery pack correctly, after the high-voltage power system is reinstated; and<br>• Capable of executing safety and functional tests, and providing working reports upon completion of replacement work. |
| **Remark** | The credit value of this unit of competency is set on the presumption that the practitioner concerned has already possessed good knowledge of the high-voltage operating system and battery pack on electric motorcycles.<br>The major ordinance involved in this unit of competency is as follows:<br>• Relevant ordinances to the Road Traffic (Construction and Maintenance of vehicles) Regulations<br>• Occupational Safety and Health |