Specification of Competency Standards
for the Automotive
Unit of Competency

Functional Area - Vehicle Servicing

Title	Identify the structure and operating principles of the high-voltage systems of electric motorcycles and the associated safety awareness
Code	111694L2
Range	This unit of competency is applicable in electric motorcycle service workshops. Practitioners should be able to identify the structure and operating principles of electric motorcycle systems and safety awareness in relation to the operation and associated servicing activities, with reference to the instructions in the corresponding motorcycle manufacturer's service manual and the relevant requirements on environmental protection, occupational safety and health regulations.
Level	2
Credit	2 *(For Reference Only)*
Competency	**Performance Requirements** 1. Knowledge (Electric motorcycle technology and associated safety awareness) • Differentiate the features, powertrain basics, operating and system service concepts between internal combustion engine and electric motorcycles. • Conversant with the basic principles of electrical and electronics, including but not limited to electromagnetism, power switching and inversion. • Acquainted with the operating principles and output characteristics of power transmission, modulation and control, electromotive machines and power inverters. • Good understanding of the system layout of a typical electric motorcycle and the locations of major components, including but not limited to the rider safety system, powertrain, rechargeable energy storage system (REESS), onboard charging unit, thermo control, power control and modulation units, their functions and effects on motorcycle performance and safety. • Good understanding of the structure and operating principles of various electric motorcycle systems and associated components, as well as the principles and application of various types of electronic control systems, such as traction motor power control, onboard charging, battery power management, etc. • Familiar with the interpretation of wiring circuit diagrams of various low-voltage and high-voltage electrical systems onboard, and the application of specific cables and wire harnesses, their means of protection and connection. • Appreciate the potential risks and hazards associated with electric motorcycle operation and servicing, as well as corresponding safety awareness of dealing with defective electric motorcycles when live working. • Understanding of the relevant legal requirements on road and vehicle safety, and environmental protection.

	2. Performance (Operating principles and safety awareness of motorcycle systems) • Explain the basic principles of electrical and electronics, such as electromagnetism, power switching and inversion, etc. adopted for the operation and control of electric motorcycles. • Discern the structure and types of electric motorcycles. • Explain the features, control and operating concepts of various electrical operating systems on electric motorcycles, and correctly interpret the voltage levels and operation of components from the wiring circuit diagrams, such as the powertrain, REESS, braking, cooling and lighting systems, etc., and the safety awareness in operation and service. • Explicate the locations, structure and working principles of the high-voltage operating systems onboard, including but not limited to the powertrain, REESS and associated controls, their effects on performance and operational safety, as well as the colour coding and protection of cables, harnesses and connectors. • Correctly differentiate the voltage levels of various electrical operating systems, including cables. • Identify the potential risks and hazards associated with electric motorcycle operation and servicing, and the actions taken safely in an emergency, including safety awareness of dealing with defective electric motorcycles when live working, according to the instructions in the corresponding motorcycle manufacturer's service manual and the requirements of occupational safety and health 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: • Capable of explicating the principles of electrical and electronics, such as electromagnetism, power switching and inversion, etc. adopted in the powertrain and energy management systems of electric motorcycles; • Capable of describing the types of electric motorcycles, their features, operating concepts and system voltage levels, as well as related safety awareness in operations and services; • Capable of identifying the voltage levels of various electrical operating systems, including the harnesses and cables, from both the wiring circuit diagrams and real objects; • Capable of explicating the structure and working principles of high-voltage operating systems onboard, including but not limited to the powertrain, onboard charging unit and REESS, as well as associated controls, their effects on performance and operational safety, the colour coding and protection of cables, harnesses and connectors; and • Capable of identifying the potential risks and hazards associated with electric motorcycle operation and servicing, and explaining the safety awareness of dealing with faulty motorcycle systems, including but not limited to cable intact, control functions, REESS, as well as the working environment, in live working condition, according to the instructions in the corresponding motorcycle manufacturer's service manual and the requirements of occupational safety and health and environmental protection.
Remark	The credit value of this unit of competency is set on the presumption that the practitioner concerned has already possessed a good understanding of motorcycles. The major ordinance involved in this unit of competency is as follows: • Relevant ordinances to the Road Traffic (Construction and Maintenance of vehicles) Regulations • Occupational Safety and Health