Specification of Competency Standards
for the Automotive
Unit of Competency

Functional Area - Vehicle Servicing

Title	Execute the maintenance and diagnostic procedures for electric motorcycle systems
Code	111740L3
Range	This unit of competency is applicable in electric motorcycle service workshops. Practitioners should be able to masterly conduct the maintenance and diagnostic procedures for the electric motorcycle systems safely 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	5 *(For Reference Only)*
Competency	**Performance Requirements** 1. Knowledge (Electric motorcycle technology and fault-finding basics, and associated safety precautions) • Conversant with the operating principles of various electric motorcycle systems, the locations of major components and the interpretation of wiring circuit diagrams of electrical operating systems, the application of different cable and wire harness types, their protection and connection means. • Identify the normal operating conditions of various electric motorcycle systems, and accurately differentiate the voltage levels of their components and cables, such as the rechargeable energy storage system (REESS), onboard charging unit, powertrain, lighting and braking systems, etc., as well as safety awareness. • Understand the potential hazards associated with high-voltage electrical operating system servicing according to the instructions in the corresponding motorcycle manufacturer's service manual. • Master the necessary preventive and protective measures for the general services and diagnosis of various high-voltage electrical operating systems. • Acquainted with the requirements for motorcycle service workplace setup according to the instructions in the corresponding motorcycle manufacturer's service manual and the guidelines for occupational safety and health. • Identify the 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. • Differentiate the battery pack types (swappable and fixed), equipped on an electric motorcycle, their features on performance, handling safety, etc. • Master the principle of high-voltage system power down for isolating the electrical circuit connection between the high-voltage battery pack and the vehicle system components, and the criteria for power reinstatement. • Familiar with the requirements and procedures for the maintenance and diagnosis of the low-voltage and high-voltage operating systems onboard, such as the lighting, braking and rider safety systems, powertrain, onboard charging unit, REESS, etc. • Understanding of the relevant legal requirements on road and vehicle safety, and environmental protection.

	2. Performance (Maintenance and diagnosis of the high-voltage electrical operating systems of electric motorcycles) • Correctly differentiate the voltage levels of various operating systems, including cables. • Identify the applications of different wire harness and cable types, and the protection of various connectors / adaptors for the high-voltage operating systems. • Correctly master the general work scope of electrical system maintenance under non-isolated high-voltage circuit power conditions. • Masterly set up an isolated servicing area with barricade and warning signage for electric motorcycle services, with reference to the instructions in the corresponding motorcycle manufacturer's service manual and the legal requirements of occupational safety and health, road and vehicle safety, and environmental protection, for relevant electric motorcycle system maintenance and diagnosis. • Execute the proper maintenance procedures safely for the normal operating conditions of low-voltage electrical systems, including but not limited to, rider safety, braking and lighting, according to the instructions in the corresponding motorcycle manufacturer's service manual and associated safety guidelines, with the application of proper personal protection equipment and special service tools. • According to the instructions in the corresponding vehicle manufacturer's service manual and associated safety guidelines, with the application of proper personal protection equipment and special service tools, safely execute the correct isolation and reinstatement procedures for the high-voltage electrical system of an electric motorcycle, including the identification of the correct location of breaker and intact components. • Determine the effectiveness of isolation / reinstatement processes with the application of special service tools such as onboard diagnostic tester and insulation tester, and provide a written report focusing on the abnormalities and corresponding actions taken. • Conduct the diagnostic procedures to locate faulty functions that do not satisfy the criteria for system circuit reinstatement, such as high-voltage system failure, low isolation resistance, malfunctioning operating systems, defective adaptors, etc., and rectify the problem effectively. • According to the instructions in the corresponding motorcycle manufacturer's service manual and the requirements of occupational safety and health as well as that of environmental protection, execute the typical maintenance procedures safely for the proper functions of high-voltage operating systems under isolation status that has been confirmed by the result of special service tools / authorised competent person, including the powertrain and associated cables, with the application of the correct special service tools and equipment. • According to the instructions in the corresponding vehicle manufacturer's service manual and the requirements of occupational safety and health as well as that of environmental protection, apply the correct special service tools and equipment to safely locate the faulty functions of the high-voltage systems and components, such as the power charging and distribution, modulation and inversion units, powertrain, etc., under isolation status, and conduct the rectification or replacement processes to rehabilitate their normal operating conditions. • Conduct the coding procedures where necessary, safety and functional tests after rectification or parts replacement. • Provide a written report on the system maintenance and inspection, focusing on the abnormalities, measurement results, actions taken and the effectiveness.
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 potential hazards associated with high-voltage electrical operating system servicing and executing corresponding protective and preventive measures according to the instructions in the corresponding motorcycle manufacturer's service manual and the guidelines in occupational safety and health; • Capable of differentiating the voltage levels of various operating systems, the wire harness, cables and the connector / adaptor protection, as well as mastering associated safety awareness; • Capable of identifying the general work scope of electrical system maintenance under non-isolated high-voltage circuit power conditions correctly;

	• Capable of conducting the proper maintenance procedures for the normal operation of low-voltage electrical systems safely, including but not limited to, rider safety, braking and lighting, with the application of effective personal protective equipment, proper special service tools and equipment according to the instructions in the corresponding motorcycle manufacturer's service manual and associated safety guidelines; • Capable of isolating and reinstating the high-voltage electrical system of electric motorcycles equipping either of the battery pack type safely, as well as the effectiveness of the processes, according to the instructions in the corresponding electric motorcycle manufacturer's service manual and the relevant requirements on environmental protection, occupational safety and health regulations; • Capable of conducting the diagnostic procedures to locate the faulty functions that fail to reinstate the system circuit, and rectifying the problem effectively; • Capable of executing the typical maintenance procedures safely for the proper functions of high-voltage operating systems under isolated status with the application of the proper personal protection equipment and correct special service tools and equipment according to the instructions in the corresponding motorcycle manufacturer's service manual and the requirements of occupational safety and health as well as that of environmental protection; • Capable of locating the faulty functions of various high-voltage operating systems and components onboard under isolated status, including but not limited to the powertrain, power distribution, modulation and conversion units, with reference to the instructions in the corresponding motorcycle manufacturer's service manual and safety rules; • Capable of conducting proper remedial actions for the faulty systems / components to rehabilitate the normal operating conditions, with reference to the instructions in the corresponding motorcycle manufacturer's service manual and the requirements of occupational safety and health, and environmental protection; and • Capable of conducting safety and functional tests for the rectified items, and providing working reports upon completion of the inspection and remedial 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 electrical operating systems on 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