INSTITUTE OF THE MOTOR INDUSTRY

Assessment Criteria

IMI Level 4 Award in the Diagnosis, Testing and Repair of Electric/Hybrid Vehicles and Components
Qualification ID No: 610/0975/1

Contents

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Centre Information

Please be aware that any legislation referred to in this qualification may be subject to amendment/s during the life of this qualification. Therefore IMI Approved Centres must ensure they are aware of and comply with any amendments, e.g. to health and safety legislation and employment practices.

Please be aware that vehicle technologies referred to in this qualification reflect current practice, but may be subject to amendment/s, updates, and replacements during the life of this qualification. Therefore IMI Approved Centres must ensure they are aware of the latest developments and emerging technologies to ensure the currency of this qualification.

Learner Entry Requirements

Learner entry for this qualification should be assessed on an individual basis. Selection criteria for entry should take into account each applicant's existing academic/vocational qualifications and experience in working in the retail automotive industry.

Although not mandatory, it is recommended that learners will have 3 GCSEs, or Scottish Standard Grade/Intermediate in Maths, English, and a Science-based subject.

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Individuals will already have appropriate vehicle maintenance and repair knowledge and skills at level 3, successful completion of Unit EV3 Electric/Hybrid Vehicle System Repair and Replacement and a recommended minimum of 6 months of related experience.

Total TQT = 33

Total GLH = 21

Mandatory unit must be completed to achieve the qualification.

Unit Ref	Unit Title and ID Number	Level	GLH	TQT
EV4	Diagnosis, Testing and Repair of Electric/Hybrid Vehicle and Components (D/650/2717)	4	21	33

Unit EV4: Diagnosis, Testing and Repair of Electric/Hybrid Vehicles and Components

Rationale: This unit enables learners to demonstrate, in a practical way, their knowledge of high voltage vehicle systems including diagnostic, testing and repair procedures. The unit also ensures that the learner is aware of the effect that electric/hybrid vehicle technology has on other vehicle systems.

Note: This unit provides the knowledge and skills required to work on live high voltage vehicle electrical components and associated systems. A good level of electrical understanding is required prior to the completion of this unit. The content of this unit should always be used in conjunction with manufacturers' specific safety data. The live-work on high voltage (HV) vehicle systems in this document relates to any work on the HV vehicle systems during which a person's body or items (tools, devices, equipment or apparatus) may come into contact with live parts, or work where the non-live state of the vehicle is not confirmed.

This unit can only be undertaken after successful completion of Unit EV3 Electric/Hybrid Vehicle System Repair and Replacement and a recommended minimum of 6 months of related experience.
This unit does not cover commercial or domestic electrical installations including charging equipment and cables.

Learning Outcomes	Assessment Criteria
The learner will:	The learner can:
1. Understand electrical principles relating to low and high voltage vehicle systems	1.1 Explain the principles of voltage, current and resistance in series and parallel circuits 1.2 Describe the difference between Alternating Current (AC); Direct Current (DC) and Three Phase Current 1.3 Explain the terminology used within electrical systems including: i. Vehicle High Voltage ii. High Energy iii. Hazardous Voltage iv. Vehicle Low Voltage v. Domestic Low Voltage vi. Commercial High Voltage 1.4 Calculate current, resistance, voltage and power in series and parallel circuits using Ohm's Law 1.5 Explain the construction, function and operation of electrical components and cables including insulation 1.6 Identify different sources of power supply 1.7 Describe how to take and interpret readings using electrical measuring devices and instruments. 1.8 Identify how to read and interpret circuit diagrams and how to follow current paths through a circuit 1.9 Explain the importance of discharge times relating to components that store energy i.e. capacitor

2. Know the hazards and first aid associated with working on live high voltage vehicle systems	2.1 Describe the hazards associated with working on high voltage vehicle systems 2.2 State the levels of current and voltage that present a hazard for both alternating and direct current systems 2.3 Explain the terms: i. Stimulus Threshold ii. Let-Go Threshold iii. Maximum Touch Voltage 2.4 Describe the effects of alternating and direct current on humans 2.5 Identify the injuries associated with electric shock 2.6 Describe the first aid to be carried out in the event of an injury caused by electric shock 2.7 State the procedure to be taken when reporting accidents involving electric shock 2.8 Explain the appropriate procedure/s to be taken in the event of a fire when working on a high voltage vehicle system
3. Know how to reduce the risks to yourself and others when working on live high voltage vehicle systems	3.1 Identify the relevant legislation and regulations associated with working on high voltage vehicle systems 3.2 Identify the relevant manufacturer's repair procedures associated with working on high voltage vehicle systems 3.3 State who is permitted to carry out work on high voltage vehicle systems 3.4 Describe the responsibilities of management and skilled workers when considering the work to be carried out on high voltage vehicle systems 3.5 Describe any safety precautions to be taken to reduce risks to self and others prior to carrying out work on high voltage systems on vehicles, including unexpected start-ups and associated operational systems 3.6 Describe the measures used for protection against electric shock when working on high voltage vehicle systems 3.7 State the correct method of communication when identifying risks and/or procedures to be carried out on high voltage vehicle systems 3.8 Explain the operation of overload protection devices and residual current devices 3.9 Describe the specific personal protective equipment required to work on high voltage vehicle systems 3.10 Describe the correct procedure for disposal of high voltage vehicle system components

4. Understand high voltage (HV) vehicle systems and components	4.1 Identify the different types of alternative drives 4.2 Identify HV components 4.3 Describe the mode of operation for the different types of alternative drives 4.4 Describe the energy flows during the operation of the hybrid system in various modes 4.5 Identify the relevant vehicle safety standards for working on high voltage systems on vehicles 4.6 Explain the safety concepts within the high voltage systems used in vehicles
5. Be able to carry out repairs on live high voltage vehicle systems safely	5.1 Explain the criteria for authorisation to allow an individual to work on a live high voltage vehicle system 5.2 Carry out a dynamic risk assessment of the work to be carried out 5.3 Carry out a risk assessment of the vehicle condition prior to commencing work 5.4 Make the high voltage vehicle system safe to work on prior to carrying out any work where practicable 5.5 Use the correct procedure to isolate the high voltage vehicle system where practicable 5.6 Use the correct procedure to remove and refit live high voltage vehicle system components 5.7 Use electrical tests and measuring equipment to diagnose high voltage system faults 5.8 Carry out the relevant pre-installation procedure of a high voltage component prior to installation 5.9 Use the correct procedure to reinstate the vehicle after successful completion of repairs 5.10 Carry out a functional check on the high voltage systems to confirm successful completion of repairs 5.11 Complete work records accurately

Evidence requirements

You must be observed by your assessor completing all of the following tasks:
Prepare the high voltage battery to be removed from the vehicle
Remove and replace a high voltage battery module from the vehicle high voltage battery
Balance high voltage battery modules
Refit the high voltage battery to the vehicle
Carry out a functional check on the high voltage vehicle systems following successful completion of repair