

Title	Describe and analyse hybrid electric vehicle technology, and service requirements		
Level	5	Credits	6

Purpose	People credited with this unit standard are able to describe HEV systems and components; describe and analyse technology design and operational challenges for HEVs; and describe and analyse service requirements for HEVs.
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Classification	Motor Industry > Automotive Electrical and Electronics
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Available grade	Achieved
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Guidance Information

- 1 Evidence presented for assessment against this unit standard must be consistent with safe working practices and be in accordance with applicable service information, and company requirements and legislative requirements. This includes the knowledge and use of suitable tools and equipment.
- 2 Performance of the outcomes of this unit standard must comply with the following: Health and Safety at Work Act 2015.
- 3 Any new, amended or replacement Acts, regulations, standards, codes of practice, guidelines, or authority requirements or conditions affecting this unit standard will take precedence for assessment purposes, pending review of this unit standard.
- 4 **Definitions**
Company requirements refer to instructions to staff on policy and procedures that are available in the workplace. These requirements may include – company policies and procedures, work instructions, product quality specifications and legislative requirements.
HEV refers to Hybrid electric vehicles which are those that combine the internal combustion engine of a conventional vehicle with a battery and electric motor of an electric vehicle.
Service information refers to technical information for a vehicle, machine, or product detailing operation; installation and servicing procedures; manufacturer instructions; technical terms and descriptions; and detailed illustrations.
Suitable tools and equipment means industry approved tools and equipment that are recognised within the industry as being the most suited to complete the task in a professional and competent manner with due regard to safe working practices.

Outcomes and performance criteria

Outcome 1

Describe HEV systems and components.

Performance criteria

- 1.1 The main components of an HEV drive train are described.
- Range may include – electric traction motors or controllers, electric energy storage systems, hybrid power units, fuel systems, transmissions.
- 1.2 The layout of components of a HEV propulsion system are described.
- Range series hybrid configuration, parallel hybrid configuration.
- 1.3 Nickel-metal hydride (NiMH) batteries are described.
- Range life cycle, chemical make-up, self-discharge properties, heat generation, recharging, servicing.
- 1.4 Energy management and system control operation is described.
- Range series design, parallel design, combined (series/parallel) design.
- 1.5 The function and characteristics of an electric traction motor are described, in relation to HEVs.
- Range characteristics include – full torque at low speeds, drive control and fault tolerance, low noise, high efficiency, flexibility in relation to voltage fluctuations.
- 1.6 Regenerative braking features are described in relation to HEV operation.
- Range may include – recapturing braking energy, lower emissions, higher efficiency.
- 1.7 Idle-off (idle-stop) capability for HEVs is described in terms of environmental performance and vehicle heating requirements.

Outcome 2

Describe and analyse technology design and operational challenges for HEVs.

Performance criteria

2.1 The primary importance of hybrid technology for cars, sport utility vehicles (SUVs), and trucks is described and analysed.

Range fuel economy standards; vehicle emission standards; energy security and oil dependence; global warming emissions and healthier environment; improving technology of motors, electronics, and batteries; consumer and manufacturer choice; step to future fuel cell technology.

2.2 Options for alternative energy storage systems are described.

Range ultra-capacitors, flywheels.

2.3 Hybrid engine technology is described and analysed.

Range down-sizing, functions and shared power responsibilities, frequency of stop-start cycles and impact on driven accessories, emission control, use of alternative fuels.

Outcome 3

Describe and analyse service requirements for HEVs.

Performance criteria

3.1 Safety requirements and precautions when servicing and/or testing HEVs are described.

Range working with high voltage and high current systems, electronics.

3.2 Driving characteristics and consumer benefits of HEVs are described and analysed as an aid to providing technical advice.

Range how and when the electric motor assists, low-end torque, smooth acceleration, reduced noise and vibration, added electrical capacity, reduced engine and brake maintenance, fuel economy.

3.3 Performance challenges of HEVs are described and analysed as an aid to providing advice to consumers.

Range reduced high-end torque, sustained high-speed grade ability, reduced high-speed towing capacity.

3.4 Diagnostic testing procedures are described.

Range electronic and electronic failures, mechanical components.

Planned review date	31 December 2025
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Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1	16 December 2004	31 December 2022
Review	2	25 March 2021	N/A

Consent and Moderation Requirements (CMR) reference	0014
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This CMR can be accessed at <http://www.nzqa.govt.nz/framework/search/index.do>.

Comments on this unit standard

Please contact MITO New Zealand Incorporated info@mito.org.nz if you wish to suggest changes to the content of this unit standard.