Title	**Diagnose complex faults in vehicle or machine high voltage systems and reflect on diagnostic procedures**		
Level	**5**	**Credits**	**10**

Purpose	People credited with this unit standard are able to: explain high voltage system operation to enable complex fault diagnosis; diagnose the cause of complex faults in a vehicle or machine high voltage system; and reflect on learning experience in response to diagnosing complex faults in a vehicle or machine high voltage system.

Classification	Motor Industry > Automotive Electrical and Electronics

Available grade	Achieved

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 and legislative requirements. This includes the knowledge and use of suitable tools and equipment.

2 Legislation relevant to this unit standard includes but is not limited to the:
Health and Safety at Work Act 2015;
Electricity Act 1992.

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.

3 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.
High voltage refers to voltages above 60 V.
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.

4 Competency under this unit standard does not entitle the learner to legally perform prescribed electrical work. Any prescribed electrical work must be undertaken by a person who has been registered and licensed under the Electricity Act 1992. Prescribed electrical work is defined in Schedule 1 of the Electricity (Safety) Regulations 2010.

5 Range
Complex faults may include faults within multiple systems, intermittent faults, faults caused indirectly by the effect of external systems or caused through system repairs. *Fault diagnosis* would require applying a complex investigative diagnostic process to rectify them.
Learning experience involves a reflection on the overall process to form a holistic viewpoint. This may refer to one or more learning experiences.
Machines may include – forklifts, earth moving equipment, grader equipment, loaders, dozers, tractors, agricultural equipment, dump trucks, prime movers; electric machines including – forklift, walk-behind pallet, ride-on pallet, reach truck, order picker, counterbalance truck, turret truck.

6 It is recommended that people hold credit for Unit 31807, *Demonstrate knowledge of hybrid and battery electric vehicle or machine high voltage systems operation and safety*, Unit 31808, *Describe hybrid and battery electric vehicle or machine high voltage system fault diagnosis and rectification methods* and Unit 30875, *Diagnose and rectify faults in hybrid electric and battery electric vehicle or machine high voltage systems*, before being assessed against this unit standard.

Outcomes and performance criteria

Outcome 1

Explain high voltage system operation to enable complex fault diagnosis.

Performance criteria

1.1 Comprehensive operation of the vehicle or machine high voltage system, to enable system complex fault diagnosis, is explained.

Range interaction of components; sensors, control unit, actuators; comprehensive operation may include – communication protocol, signal type; pulse width modulation, digital, analogue.

Outcome 2

Diagnose the cause of complex faults in a vehicle or machine high voltage system.

Range evidence of two different system faults, each on a different vehicle or machine, is required.

Performance criteria

2.1 Complex high voltage system fault is analysed.

Range operator description, diagnostic testing.

2.2 Cause of complex high voltage system faults is determined

Outcome 3

Reflect on learning experience in response to diagnosing complex faults in a vehicle or machine high voltage system.

Performance criteria

3.1 Experience of diagnosing complex faults in a high voltage system is reflected on and described in relation to the knowledge and analytical skills acquired.

3.2 Improvements to future diagnostic procedures are identified based on own reflection.

Planned review date	31 December 2027

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1	26 January 2023	N/A

Consent and Moderation Requirements (CMR) reference	0014

This CMR can be accessed at http://www.nzqa.govt.nz/framework/search/index.do.

Comments on this unit standard

Please contact Hanga-Aro-Rau Manufacturing, Engineering, and Logistics Workforce Development Council qualifications@hangaarorau.nz if you wish to suggest changes to the content of this unit standard.