

Describe light four wheel drive (4WD) vehicle design features that affect performance and handling

Level 4

Credits 6

Purpose People credited with this unit standard are able to:

- describe light 4WD vehicles in terms of design and function;
- describe light 4WD vehicle capabilities, and implications for operating off-road;
- demonstrate knowledge of light 4WD vehicle handling characteristics on roads.

Subfield Driving

Domain Driver Educator

Status Registered

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Entry information Prerequisite: Unit 20179, *Describe light motor vehicle components, systems, dynamics, and handling characteristics*, or demonstrate equivalent knowledge and skills.

Accreditation Evaluation of documentation and visit by NZQA and industry.

Standard setting body (SSB) NZ Motor Industry Training Organisation (Incorporated)

Accreditation and Moderation Action Plan (AMAP) reference 0092

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

Special notes

1 References are available from the Accident Compensation Corporation, the Ministry of Transport, the NZ Transport Agency (NZTA), and other transport agencies.

2 Definitions

Ditches and *drains* are those that the vehicle is able to be driven over as opposed to driving through.

Handling characteristics for the purposes of this unit standard refer to how a light 4WD vehicle behaves as the result of the interaction of its design and the dynamics present at the time.

A *light 4WD vehicle* for the purposes of this unit standard is a Class 'MC' vehicle (as defined in the Land Transport Rule: Vehicle Standards Compliance 2002) which is also a light motor vehicle.

A *light motor vehicle* means a motor vehicle that has a gross vehicle mass of 3500kg or less.

Off-road means an area that is not a formed road. It includes undulating terrain, bush tracks, beaches, river-beds, and open paddocks. It may or may not be a legal road. The legal definition of a *road* (as per the Land Transport Act 1998 s2(1)) is:

Road includes—

(a) *A street; and*

(b) *A motorway; and*

(c) *A beach; and*

(d) *A place to which the public have access, whether as of right or not; and*

(e) *All bridges, culverts, ferries, and fords forming part of a road or street or motorway, or a place referred to in paragraph (d);*

(f) *All sites at which vehicles may be weighed for the purposes of this Act or any other enactment.*

Elements and performance criteria

Element 1

Describe light 4WD vehicles in terms of design and function.

Performance criteria

1.1 Light 4WD vehicles are described in terms of their characteristics.

Range includes but is not limited to – length, height, weight, ground clearance, wheel base.

1.2 Description includes design and features of light 4WD suspension systems.

Range live axles, independent suspension, wheel travel, axle articulation, rebound and damping, centre of gravity.

1.3 Fixture clearances, approach angles, break over angles, and departure angles are described in terms of their effectiveness in avoiding body damage and fouling ground obstructions.

Range fixtures include – towbars, bush bars, spare wheel carriers, winches, running boards.

1.4 Factors in determining the selection of wheels and tyres for a light 4WD vehicle are described in terms of intended vehicle usage and the type of vehicle.

Element 2

Describe light 4WD vehicle capabilities and implications for operating off-road.

Range part-time 4WD vehicles, full-time 4WD vehicles;
manual transmission, automatic transmission.

Performance criteria

2.1 Description of a light 4WD vehicle's capability to negotiate obstacles takes into consideration the design of the vehicle.

Range five different obstacles.

2.2 The effects of driving light 4WD vehicles on a side slope are described in terms of traction and centre of gravity.

2.3 The effects on light 4WD vehicles climbing and descending steep slopes or access tracks are described in terms of weight transfer and gravity.

2.4 Light 4WD vehicle capability to negotiate water obstacles is described.

Range relationship between buoyancy and traction;
the effects of water on engine air intakes, brakes, clutch, electrical systems, exhaust, engine and transmission breathers.

2.5 Considerations for light 4WD vehicle drivers when negotiating water obstacles are described in terms of vehicle motion and handling, implications of striking submerged objects, and the force of moving water.

2.6 Light 4WD vehicle capability to cross low traction surfaces is described in terms of off-road tyre tread design and handling characteristics.

Range low traction surfaces include but are not limited to – wet grass, muddy areas, ice, sand, gravel.

2.7 Light 4WD vehicle capability to cross rough and broken ground, including ditches and drains, is described in terms of design and handling characteristics.

Range tyre tread design, suspension, ground clearance, wheel base.

2.8 Performance capability of light 4WD vehicles in soft ground conditions is described in terms of engine speed, steering, tyre type and pressure, and means of recovery from immobilisation.

2.9 The description includes the selection of correct gear and drive-train option for soft ground conditions.

Range two wheel drive (2WD)/4WD, high or low ratio, differential lock(s), manual or automatic free wheeling hubs.

Element 3

Demonstrate knowledge of light 4WD vehicle handling characteristics on roads.

Performance criteria

- 3.1 The handling characteristics of light 4WD vehicles and conventional light motor vehicles are compared in terms of on-road usage.
- 3.2 Factors affecting light 4WD vehicle stability when travelling on sealed roads are described in terms of impact on vehicle stability.
- Range centre of gravity, suspension movement, effect of wind.
- 3.3 Road and vehicle risk factors affecting light 4WD vehicles when being driven on unsealed roads are described in terms of their contribution to loss of control.
- Range risk factors include but are not limited to – nature of road surface; effect of camber, banking and road shape changes; use of unsuitable tyre type; speed.
- 3.4 Selection of light 4WD vehicle gear and drive-train configuration is explained in relation to extended on-road use.
- Range 2WD/4WD, high or low ratio, manual or automatic free wheeling hubs, traction control devices.

Please note

Providers must be accredited by NZQA, or an inter-institutional body with delegated authority for quality assurance, before they can report credits from assessment against unit standards or deliver courses of study leading to that assessment.

Industry Training Organisations must be accredited by NZQA before they can register credits from assessment against unit standards.

Accredited providers and Industry Training Organisations assessing against unit standards must engage with the moderation system that applies to those standards.

Accreditation requirements and an outline of the moderation system that applies to this standard are outlined in the Accreditation and Moderation Action Plan (AMAP). The AMAP also includes useful information about special requirements for organisations wishing to develop education and training programmes, such as minimum qualifications for tutors and assessors, and special resource requirements.

Comments on this unit standard

Please contact NZ Motor Industry Training Organisation (Incorporated) info@mito.org.nz if you wish to suggest changes to the content of this unit standard.