Title	**Demonstrate knowledge of marine petrol and diesel propulsion and auxiliary systems**		
Level	**4**	**Credits**	**5**

Purpose	This unit standard is intended for people studying towards a qualification in vessel operation or crewing with the intention of applying for a Maritime New Zealand license. People credited with this unit standard are able to: describe the basic operation of two stroke and four stroke diesel and petrol marine engines; describe the operation of mechanical systems in marine inboard and outdrive propulsion systems; and demonstrate knowledge of auxiliary vessel systems and outboard engines.

Classification	Maritime > Marine Engineering

Available grade	Achieved

Guidance Information

1 Legislation relevant to this unit standard includes:
Health and Safety at Work Act 2015.
Maritime Transport Act 1994 and subsequent amendments.

2 References
Bartlett, T. *The Adlard Coles Book of Outboard Motors*. London: Adlard Coles Nautical, 2011.
Manley, P. *Diesels Afloat*. Chichester: John Wiley, 2007.
Maritime Rules and advisory circulars. Available at http://www.maritimenz.govt.nz.
Payne, J.C. *Understanding Boat Diesel Engines*. Dobbs Ferry, NY: Sheridan House, 2005.
Peppiatt, N. and Seddon, D. *Hydraulic Troubleshooter*. Bury St Edmunds: Arima, 2007.

3 Definitions
Accepted industry practice refers to standardised practices and procedures accepted by the wider maritime industry as examples of best practice.
Auxiliary vessel systems refers to transmission system, steering system, electrical system, bilge pumping system, and deck machinery.
Mechanical systems refers to air induction system, fuel system, lubrication system, and cooling system.
Vessel refers to any form of commercial or military watercraft; sometimes used in maritime circles interchangeably with the word *ship*.

4 Assessment information
All activities and evidence must be in accordance with accepted industry practice and reference texts.

Outcomes and performance criteria

Outcome 1

Describe the basic operation of two stroke and four stroke diesel and petrol marine engines.

Performance criteria

1.1 The two stroke and four stroke cycles are described.

1.2 Diesel and petrol combustion processes are described.

1.3 Engine parts are named and their basic functions are described.

Outcome 2

Describe the operation of mechanical systems in marine inboard and outdrive propulsion systems.

Performance criteria

2.1 Fluid pathways through the engine are described and the function of associated components stated.

Range pumps, filters, taps, strainers.

2.2 Care of the system, possible faults, fault identification and rectification actions are described.

2.3 The cause and effect of normal operational wear, hazards caused by breakdown and/or failure to conduct scheduled maintenance are described.

2.4 The importance of system cleanliness and safety precautions is described.

2.5 Engine mounting and control systems are identified, and their function is described.

Outcome 3

Demonstrate knowledge of auxiliary vessel systems.

Performance criteria

3.1 The operation, care and maintenance of the gearbox, shaft, stern gland and propeller is described.

3.2 The operation, care, and maintenance of the steering gear and emergency steering gear are described.

3.3 The layout, care, maintenance, fault location, and operation of the electrical system are described.

Range alternators, drive belts, batteries, fuses, circuit breakers, spark ignition system, navigation lights.

3.4 The layout, maintenance, and operation of the bilge pumping system are described.

Range pump types, suction loss, back flooding and emergency arrangements.

3.5 The dangers, safety practices, and maintenance requirements of deck machinery are described.

3.6 The operation, care, and maintenance of the hydraulic systems are described.

Range pumps and motors, piping, control and other valves, filters, header tanks, piping.

Outcome 4

Demonstrate knowledge of outboard engines.

Performance criteria

4.1 The key components of an engine are identified, their function described, and operation and maintenance requirements explained, including winter storage.

Range electrical system, lubrication system, spark plugs, engine controls, air filter, carburettor, gearbox, filler plugs, propeller, anodes, fuel tank, cooling system, water intake and outlet.

Planned review date	31 December 2025

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1	18 March 2011	31 December 2016
Review	2	15 October 2015	31 December 2022
Review	3	24 September 2020	N/A

Consent and Moderation Requirements (CMR) reference	0054

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

Comments on this unit standard

Please contact Competenz qualifications@competenz.org.nz if you wish to suggest changes to the content of this unit standard.