

<b>Title</b>	<b>Demonstrate knowledge of the operation and servicing of open and closed cooling systems on trailer boats</b>		
<b>Level</b>	<b>3</b>	<b>Credits</b>	<b>4</b>

<b>Purpose</b>	People credited with this unit standard are able to demonstrate knowledge of open and closed engine cooling system operation, and cooling system servicing.
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<b>Classification</b>	Motor Industry > Engines
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<b>Available grade</b>	Achieved
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**Guidance Information**

**Definition**

*Service information* may include but is not limited to – technical information of a vehicle, machine, or product detailing operation; installation and servicing procedures; manufacturer instructions and specifications; technical terms and descriptions; and detailed illustrations. This can be accessed in hard copy or electronic format and is normally sourced from the manufacturer.

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**Outcomes and performance criteria**

**Outcome 1**

Demonstrate knowledge of open and closed engine cooling system operation.

**Performance criteria**

- 1.1 Operating principles of marine engine raw water and twin circuit cooling systems are described in accordance with service information.
  - Range identifying components, describing component functions, plotting water flow through system when engine cold and at normal operating temperature.
- 1.2 Operating principles and applications of accessory coolers are described in accordance with service information.
  - Range oil coolers, heat exchangers, intercoolers and aftercoolers, fuel coolers.
- 1.3 Types and functions of cooling system inhibitors and anti-freezes are described in accordance with service information.

- 1.4 Types of corrosion in a cooling system are identified.  
Range erosion, rust and scale, cavitation, galvanic (electrolytic).
- 1.5 Thermostat operation is described in accordance with service information.  
Range when engine is cold, when engine is hot.
- 1.6 Water pump operation is described in accordance with service information.  
Range centrifugal circulating pump, raw water impeller pick-up pump.

## Outcome 2

Demonstrate knowledge of cooling system servicing.

### Performance criteria

- 2.1 Safety precautions necessary when servicing cooling systems are identified.  
Range familiarisation with the engine manufacturer safety instructions, wearing protective clothing, releasing pressure caps, working around a hot engine and hot pressurised coolant, keeping clear of moving parts, being aware of sharp edges.
- 2.2 Testing procedures to diagnose cooling system faults are described in accordance with service information.  
Range outboard open cooling system, inboard closed (indirect) system.
- 2.3 The use of temperature sensitive crayons and temperature sensor probes to determine engine temperature is described in accordance with service information.
- 2.4 The importance of engine compartment ventilation requirements is identified.  
Range air flow around the engine, engine operating performance.
- 2.5 Servicing requirements of engine cooling systems are described in accordance with service information.  
Range flushing and adding coolant, visual inspection, replacing components, repairing pumps.

<b>Planned review date</b>	31 December 2023
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**Status information and last date for assessment for superseded versions**

Process	Version	Date	Last Date for Assessment
Registration	1	23 February 1999	31 December 2020
Revision	2	16 April 2003	31 December 2020
Review	3	21 September 2007	31 December 2020
Review	4	30 August 2018	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 MITO New Zealand Incorporated [info@mito.org.nz](mailto:info@mito.org.nz) if you wish to suggest changes to the content of this unit standard.