

Title	Service automotive cooling systems		
Level	2	Credits	4

Purpose	This unit standard is for people who wish to enter or are employed in the automotive repair industry. People credited with this unit standard are able to: demonstrate knowledge of engine cooling system operation; service an indirect (coolant filled) cooling system; and determine the condition of the coolant and renew to specifications.
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Classification	Motor Industry > Engine Repairs
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Available grade	Achieved
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Explanatory notes

- 1 The following legislation and amendments are required to be consulted and followed where applicable:
Health and Safety in Employment Act, 1992;
Resource Management Act, 1991 (disposal of coolant).
- 2 Reference to *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 to a professional and competent manner with due regard to safe working practices.

Outcomes and evidence requirements

Outcome 1

Demonstrate knowledge of engine cooling system operation.

Evidence requirements

- 1.1 Method of heat transfer for an engine is described according to text book descriptions.

Range radiation, conduction, convection.
- 1.2 The purpose of a cooling system is described according to text book descriptions.

Range remove heat from the engine, maintain an efficient operating temperature for the engine, prevent damage to components.

1.3 The operation and servicing of a direct air cooling system on an engine is described according to manufacturer's workshop manual instructions.

Range air flow principles, fins, ducting and shrouds, air fan, air blower, thermostat control.

1.4 The operation of an indirect air (coolant filled) cooling system on an engine is described according to manufacturer's workshop manual descriptions.

Range coolant circulation, water jackets, water pump, fan (mechanical, electric), drive belts, radiators, coolers, pressure cap, thermostat, sender units and sensors, coolant reservoir, coolant mixture, hoses, frost plugs.

Outcome 2

Service an indirect (coolant filled) cooling system.

Evidence requirements

2.1 Safe working practices are observed throughout the task.

Range personal safety, safety of others, no damage to equipment, vehicle safety.

2.2 Suitable tools and workshop equipment are selected and used that enable the cooling system to be serviced.

2.3 The coolant level is checked and, if necessary, topped up to the level as indicated by the manufacturer.

2.4 Temperature gauge is checked to ensure reading is indicative of actual engine temperature.

2.5 The cooling system is pressure tested to the manufacturer's specified operating pressure, and pressure loss and leaks are located and reported to the supervisor.

2.6 The hoses are inspected and any faults are located, hose leaks are rectified, and faulty hoses are replaced with new ones of the manufacturer's specification.

2.7 The radiator is inspected visually and any external faults are located and reported to the supervisor.

2.8 Dirt and debris clogging the cooling fins of the radiator are removed without damaging the fins.

2.9 The cooling fan is inspected and damage to the blades and hub is located and reported to the supervisor.

Range mechanical type, electrical type.

- 2.10 The operation of an electric cooling fan is checked in accordance with the manufacturer's instructions, and faults are located and reported to the supervisor.
- 2.11 A fan belt is checked for condition and a faulty one is replaced with a new one of the manufacturer's specification.
- 2.12 Fan belt tension is checked and adjusted to manufacturer's specifications.
- 2.13 A pressure cap is inspected and tested for serviceability.
- 2.14 A thermostat is inspected and tested for serviceability, and a faulty one replaced with a new one that meets the manufacturer's specifications.
- 2.15 The engine is tested to ensure that the cooling system operates efficiently.

Outcome 3

Determine the condition of the coolant and renew to specifications.

Evidence requirements

- 3.1 Safe working practices are observed throughout the task.

Range personal safety, safety of others, no damage to equipment, vehicle safety.
- 3.2 The coolant is inspected visually and tested for specific gravity, and its suitability for further use is determined.
- 3.3 The cooling system is flushed to remove all contaminants and in accordance with manufacturer's instructions and legislation.
- 3.4 The need for antifreeze and inhibitor is determined, and a coolant complying with manufacturer's specifications is selected.
- 3.5 The cooling system is filled with the manufacturer's recommended coolant, to the manufacturer's specified level.
- 3.6 The cooling system is bled of all air.

Replacement information	This unit standard has been replaced by unit standard 21686 and unit standard 21717.
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This unit standard is expiring. Assessment against the standard must take place by the last date for assessment set out below.

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1	28 February 1993	31 December 2016
Review	2	4 August 1995	31 December 2016
Revision	3	30 October 1997	31 December 2016
Revision	4	28 May 1998	31 December 2016
Review	5	20 December 1998	31 December 2016
Revision	6	13 March 2001	31 December 2016
Revision	7	16 October 2003	31 December 2016
Rollover	8	25 July 2006	31 December 2020
Rollover	9	19 November 2010	31 December 2020
Rollover	10	22 August 2014	31 December 2020

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>.

Please note

Providers must be granted consent to assess against standards (accredited) by NZQA, before they can report credits from assessment against unit standards or deliver courses of study leading to that assessment.

Industry Training Organisations must be granted consent to assess against standards by NZQA before they can register credits from assessment against unit standards.

Providers and Industry Training Organisations, which have been granted consent and which are assessing against unit standards must engage with the moderation system that applies to those standards.

Requirements for consent to assess and an outline of the moderation system that applies to this standard are outlined in the Consent and Moderation Requirements (CMR). The CMR 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.

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