

Title	Diagnose and rectify faults in heavy vehicle and/or machine diesel engine cooling systems		
Level	4	Credits	4

Purpose	This unit standard is for people in the automotive repair industry. People credited with this unit standard are able to: demonstrate knowledge of heavy vehicle and machine diesel engine cooling system operation; diagnose faults in a heavy vehicle and/or machine cooling system; and repair heavy vehicle and/or machine cooling system faults.
----------------	--

Classification	Motor Industry > Engine Repairs
-----------------------	---------------------------------

Available grade	Achieved
------------------------	----------

Explanatory notes

- 1 The following legislation and their amendments are required to be consulted and followed where applicable:
 - Health and Safety in Employment Act, 1992
 - Resource Management Act, 1991.
- 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.
- 3 Because of the particular nature of this unit standard, it is essential that the practical assessment evidence is obtained from commercial jobs in the workplace under normal workplace conditions.

This unit standard is expiring

Outcomes and evidence requirements

Outcome 1

Demonstrate knowledge of heavy vehicle and machine diesel engine cooling system operation.

Evidence requirements

- 1.1 The procedure to check diesel engine cooling systems for operation is described according to manufacturer's workshop manual instructions.
- Range direct air, indirect air;
normal operating conditions, abnormal off-road conditions, when an engine has not been operating for some time.
- 1.2 The importance of adhering to heavy vehicle and machine engine specifications regarding coolant type is described according to manufacturer's workshop manual instructions.
- Range engine compatibility, corrosion control, anti-freeze protection, temperature range.
- 1.3 The purpose and procedure for system flushing, bleeding, and pressure testing on heavy vehicles and machines are described according to manufacturer's workshop manual instructions.
- Range preventative maintenance, contamination, corrosion control, aerated coolant, coolant loss.
- 1.4 Engine temperature control methods are identified.
- Range coolant and air circulation, fans, thermostats, ducting, shutters and sensor controls, blinds.
- 1.5 Fan operation for heavy vehicles and machines is described according to manufacturer's workshop manual description.
- Range pneumatic clutch, viscous drive.
- 1.6 Cooling systems considerations when repowering a heavy vehicle and machine are described according to manufacturer's workshop manual instructions.
- Range operating environment, radiator positioning, air flow considerations, coolant capacity, coolant compatibility, temperature control.
- 1.7 De-aeration and water conditioning methods are described according to manufacturer's workshop manual descriptions.
- Range bleeding, inhibitors, filters, pH testing and adjusting alkalinity.

- 1.8 Cooling system afterboil and its effects on a diesel engine are described according to manufacturer's workshop manual descriptions.
- Range symptoms, causes, damage.
- 1.9 Coolant disposal requirements according to the Resource Management Act 1991 and amendments are described according to legislation.
- 1.10 The effects of electrolysis, erosion, corrosion, and cavitation on engine components are described according to engine manufacturer's descriptions.

Outcome 2

Diagnose faults in a heavy vehicle and/or machine cooling system.

Evidence requirements

- 2.1 Safe working practices are observed throughout the task.
- Range personal safety, safety of others, equipment safety, vehicle and machine safety.
- 2.2 Equipment is selected and used that enable the cooling system to be tested according to the heavy vehicle and/or machine manufacturer.
- 2.3 Cowling, shrouds, shutter and blind faults are identified.
- Range damage, operation, security, contamination.
- 2.4 The cooling system is pressure tested for leaks at manufacturer's specified working pressure.
- 2.5 All cooling system faults are located and identified.
- Range coolant concentration, thermostat operation, coolant leakage (internal and external), coolant blockages, corrosion, water pump operation, sensor operation, viscous fan operation.

Outcome 3

Repair heavy vehicle and/or machine cooling system faults.

Evidence requirements

- 3.1 Safe working practices are observed throughout the task.
- Range personal safety, safety of others, equipment safety, vehicle and machine safety.
- 3.2 Tools and equipment are selected and used that enable cooling system faults to be repaired.

- 3.3 The coolant mixture is tested to ensure that it conforms to heavy vehicle and/or machine engine manufacturer's specifications.
- 3.4 Coolant concentration is corrected to ensure conformity with heavy vehicle and/or machine engine manufacturer's specifications.
- 3.5 Coolant leaks, and their causes, are repaired to restore full serviceability of the cooling system.

Range engine internal components (seals, gaskets, plugs, removable jackets and tubes), frost plugs, connections and gaskets, water pump, hoses, housings, valves.
- 3.6 Air in the cooling system is expelled by bleeding the system.
- 3.7 Corroded, eroded, damaged, and worn parts that affect normal cooling system operation are replaced with those meeting heavy vehicle and/or machine engine manufacturer's specifications.
- 3.8 Blockages in any coolant passages are cleared without damage to components.

Range system flush, removal and cleaning of components.
- 3.9 The feasibility of repairing a water pump is determined, based on relevant factors.

Range type and extent of repair required, cost of repair, availability and cost of replacement, parts warranty.
- 3.10 Water pump is replaced to restore full serviceability.
- 3.11 Precautions necessary to prevent personal injury are carried out.

Range handling antifreeze and inhibitor, hot pressurised cooling system, moving parts, sharp edges.

Replacement information	This unit standard, unit standard 878, and unit standard 965 have been replaced by unit standard 24269, unit standard 24270, and unit standard 24271.
--------------------------------	---

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	27 February 1995	31 December 2016
Review	2	21 February 1999	31 December 2016
Review	3	25 January 2008	31 December 2016
Rollover	4	19 November 2010	31 December 2016
Rollover	5	18 February 2016	31 December 2020

Consent and Moderation Requirements (CMR) reference	0014
--	------

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, 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 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.

Consent requirements 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.

This unit standard is expiring