

<b>Title</b>	<b>Demonstrate knowledge of engine performance testing, and tune and test a 4 stroke diesel engine</b>		
<b>Level</b>	<b>4</b>	<b>Credits</b>	<b>7</b>

<b>Purpose</b>	This unit standard is for people in the automotive repair industry. People credited with this unit standard are able to: demonstrate knowledge of engine performance testing; carry out an engine inspection and rectify defects prior to tuning; carry out 4 stroke diesel engine tuning procedures; and test engine performance.
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<b>Classification</b>	Motor Industry > Engine Repairs
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<b>Available grade</b>	Achieved
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<b>Entry information</b>	
<b>Critical health and safety prerequisites</b>	Unit 15403, <i>Describe, test and diagnose diesel fuel injection systems, and repair fuel delivery systems</i> ; and Unit 15404, <i>Demonstrate knowledge of diesel engine air intake and exhaust systems, and inspect and test them</i> ; or demonstrate equivalent knowledge and skills.

**Explanatory notes**

- 1 The following legislation, publication, and their amendments are required to be consulted and followed where applicable:  
Health and Safety in Employment Act, 1992;  
New Zealand Road Code, Land Transport Safety Authority.
- 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.

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## Outcomes and evidence requirements

### Outcome 1

Demonstrate knowledge of engine performance testing.

#### Evidence requirements

1.1 Engine efficiency and performance ratings are described according to engine manufacturer's specifications.

Range in relation to two stroke engines – volumetric efficiency, mechanical efficiency, thermal efficiency, scavenging, power output, engine torque;  
in relation to four stroke engines – volumetric efficiency, mechanical efficiency, thermal efficiency, power output, engine torque.

1.2 Engine duty cycle characteristics are identified.

Range two stroke, four stroke;  
automotive, industrial, marine.

1.3 The use of an engine and a chassis dynamometer is described according to machine equipment manual instructions.

Range engine testing, running-in, engine performance assessment, transmission losses.

### Outcome 2

Carry out an engine inspection and rectify defects prior to tuning.

#### Evidence requirements

2.1 Safe working practices are observed throughout the task.

Range personal safety, safety of others, equipment and vehicle and machine safety.

2.2 Suitable tools and test equipment are selected and used to enable the engine to be inspected and defects rectified.

2.3 Engine and the cooling system are inspected according to workshop manual instructions, and any oil, coolant, and fuel leaks, and signs of overheating are reported to the supervisor.

2.4 Driving belts are checked for condition and tension according to workshop manual instructions, and are replaced and adjusted according to manufacturer's specifications.

- 2.5 Loose and disconnected wires and connectors are connected and secured so that full electrical conductivity is restored.
- 2.6 Oil, coolant, and electrolyte levels are topped up according to manufacturer's specifications.
- 2.7 Hoses and clamps are checked for condition and security, and are repaired and/or replaced to restore full serviceability.
- 2.8 Rods and linkages are checked for wear and security, and are repaired and/or replaced to restore full serviceability.
- 2.9 Air and fuel filters are checked for condition, and are replaced and cleaned according to manufacturer's specifications and workshop manual instructions.
- 2.10 Air pressure readings are measured according to manufacturer's workshop manual instructions, and the results are recorded.
- Range          crankcase pressure, exhaust back pressure, air intake restrictions.
- 2.11 Air inlet is checked, and restrictions are remedied to restore full serviceability of the system.
- 2.12 Exhaust back pressure is checked, and faults are remedied to comply with manufacturer's specifications.
- 2.13 Fuel pressure is checked and compared to manufacturer's specifications, and any faults are rectified to comply with manufacturer's specifications.

### **Outcome 3**

Carry out 4 stroke diesel engine tuning procedures.

#### **Evidence requirements**

- 3.1 Safe working practices are observed throughout the task.
- Range          personal safety, safety of others, equipment and vehicle and machine safety.
- 3.2 Suitable tools and equipment are selected and used to enable the engine tune to be carried out.
- 3.3 Fuel primary and secondary filters are changed according to manufacturer's specifications, and are assembled with new seals ensuring no air can enter or leak from the system.
- 3.4 Area around the injection pump drive is cleaned so that any pump timing marks are identified.

- 3.5 The type of pump coupling is identified from the manufacturer's workshop manual.
- Range adjustable, non-adjustable, automatic advance.
- 3.6 Pump coupling and drive train are checked for security and alignment, any discrepancies are rectified.
- 3.7 Backlash in the drive train is checked and any excess beyond the manufacturer's permitted maximum is removed by adjustment and/or replacement of worn parts.
- 3.8 A diesel fuel injection pump is timed to the engine according to manufacturer's workshop manual instructions and specifications.
- 3.9 The engine is run to ensure the injection pump operates according to manufacturer's specifications.
- Range security, performance, no leaks, drive train aligned, pipes and fittings secure, no air in system.
- 3.10 Low and high idle governed speed are set according to manufacturer's specifications.
- 3.11 Engine idle speed is set according to manufacturer's specifications.
- 3.12 Supplementary governing device (if fitted) is adjusted according to manufacturer's specifications.

#### **Outcome 4**

Test engine performance.

#### **Evidence requirements**

- 4.1 Safe working practices are observed throughout the task.
- Range personal safety, safety of others, equipment and vehicle and machine safety.
- 4.2 Suitable tools and equipment are selected and used to enable engine performance tests to be carried out.
- 4.3 The engine is operated until the optimum operating temperature is reached as prescribed by the engine manufacturer before any tests are carried out.
- 4.4 Engine is tested relevant to the application, and the test results are recorded and reported to the supervisor.

<b>Replacement information</b>	<p>This unit standard, unit standard 967, and unit standard 15449 have been replaced by unit standard 24278, unit standard 24279, and unit standard 24280.</p> <p>This unit standard replaced unit standard 885 and unit standard 908.</p>
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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	26 February 1999	31 December 2016
Review	2	25 January 2008	31 December 2020
Rollover	3	19 November 2010	31 December 2020
Rollover	4	22 August 2014	31 December 2020

<b>Consent and Moderation Requirements (CMR) reference</b>	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.