Australian Government

Department of Education, Employment and Workplace Relations

MEM18029B Tune diesel engines

Release: 1

MEM18029B Tune diesel engines

Modification History

Not Applicable

Unit Descriptor

Unit descriptor	This unit covers compression testing and tuning up the engine.

Application of the Unit

Application of the unit	This unit applies to tune up procedures and evaluation of engine performance on compression ignition engines. The person performing these tasks should demonstrate an understanding of theory and be able to carry out procedures associated with servicing, adjusting and evaluating engine performance and be able to perform the following: • remove injectors, install a compression gauge, carry out a compression test and interpret the test results • carry out a machine stall test or engine load test to determine engine condition by measuring air inlet restriction, boost pressure, exhaust back pressure and crankcase pressure • evaluate exhaust smoke and determine corrective action • adjust engine valve clearances • check and adjust injection pump timing on in-line pumps and rotary pumps using either spill, pin, mark or dial gauge methods; time and calibrate unit injectors • adjust governor settings - maximum speed/idle speed • test and adjust injectors • be able to isolate injectors on a running engine to determine cylinder misfire. **Band**: **A** **Unit Weight**: **4**

Licensing/Regulatory Information

Not Applicable

Pre-Requisites

Prerequisite units		
Path 1	MEM09002B	Interpret technical drawing
	MEM12023A	Perform engineering measurements
	MEM18001C	Use hand tools
	MEM18002B	Use power tools/hand held operations
	MEM18026C	Test compression ignition fuel systems
	MEM18055B	Dismantle, replace and assemble engineering components

Employability Skills Information

Employability skills	This unit contains employability skills.

Elements and Performance Criteria Pre-Content

Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where bold italicised text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1. Compression test engine	1.1. Injectors are removed and fuel system for each cylinder is isolated correctly. 1.2. Appropriate adaptors are selected and fitted. 1.3. Readings obtained are accurately recorded and interpreted. 1.4. Compression readings are corrected for adaptor used.
2. Perform tune up	2.1. If applicable, firing pressures are accurately determined and adjusted to specification. 2.2. Engine is started, operated, loaded, and shut down safely. 2.3. Test equipment is correctly applied. 2.4. Air restriction, boost, back pressure and flow tests are performed according to manufacturers' recommendations. 2.5. Readings are recorded and variances from specifications are correctly determined. 2.6. Density of exhaust smoke is correctly determined. 2.7. Valve clearance and/or timing is correctly adjusted. 2.8. Injection pump or injector timing is adjusted to specification. 2.9. Governor rack travel, torque spring load limit, overspeed trips, aneroid or fuel ratio control is adjusted to specification. 2.10. Injector opening pressure is correctly determined and adjusted.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE
This section describes the skills and knowledge required for this unit.
Required skills
Look for evidence that confirms skills in: • reading, interpreting and following information on written job instructions, specifications, standard operating procedures, charts, lists, drawings and other

REQUIRED SKILLS AND KNOWLEDGE
applicable documents • planning and sequencing operations • checking and clarifying task-related information • removing injectors from each cylinder and isolating the fuel system • fitting appropriate adaptors to the cylinders • obtaining and recording compression readings and correcting readings for the adaptor used • where appropriate, adjusting firing pressures • starting, operating, loading and shutting down the engine safely in accordance with standard operating procedures • using test equipment • selecting and conducting appropriate tests • recording test readings • identifying variations from specifications of any test result • determining the density of exhaust smoke • adjusting valve clearance and/or timing • adjusting injector pump or injector timing to specification • adjusting the governor rack travel, torque spring load limit, overspeed trips, aneroid or fuel ratio control to specification • adjusting the injector opening pressure to specification
Required knowledge
Look for evidence that confirms knowledge of: • the procedures for removing injectors from cylinders and reasons for isolating the fuel system • appropriate adaptors and reasons for using adaptors • the procedures for fitting adaptors to the cylinders • the procedures for compression testing diesel engines • the procedures for recording compression readings • the procedures for comparing the compression readings with specifications and identifying any deviations • the likely causes of any detected deviations from specification • the corrections required for compression readings to take account of the adaptor used • the procedures for adjusting firing pressures • the procedures for starting, operating, loading and shutting down diesel engines • hazards and control measures associated with starting, operating, loading and shutting down diesel engines, including housekeeping • the test equipment and procedures to be used in the tuning of diesel engines • the manufacturer's recommended tests and reasons for conducting the tests • the procedures for recording test results

REQUIRED SKILLS AND KNOWLEDGE
• the procedures, equipment and techniques for determining exhaust smoke density • the procedures for adjusting valve clearances and/or timing • the procedures for adjusting injector pump and injector timing • the timing and pressures to be achieved • the procedures for adjusting the governor rack travel, torque spring load limit, overspeed trips, aneroid or fuel ratio control • the governor specifications • the procedures for adjusting injector opening pressure • safe work practices and procedures

Evidence Guide

EVIDENCE GUIDE	
The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.	
Overview of assessment	A person who demonstrates competency in this unit must be able to tune diesel engines. Competency in this unit cannot be claimed until all prerequisites have been satisfied.
Critical aspects for assessment and evidence required to demonstrate competency in this unit	Assessors must be satisfied that the candidate can competently and consistently perform all elements of the unit as specified by the criteria, including required knowledge, and be capable of applying the competency in new and different situations and contexts.
Context of and specific resources for assessment	This unit may be assessed on the job, off the job or a combination of both on and off the job. Where assessment occurs off the job, that is the candidate is not in productive work, then an appropriate simulation must be used where the range of conditions reflects realistic workplace situations. The competencies covered by this unit would be demonstrated by an individual working alone or as part of a team. The assessment environment should not disadvantage the candidate. This unit could be assessed in conjunction with any other units addressing the safety, quality, communication, materials handling, recording and reporting associated with tuning diesel engines, or other units requiring the exercise of the skills and knowledge covered by this unit.
Method of assessment	Assessors should gather a range of evidence that is valid, sufficient, current and authentic. Evidence can be gathered through a variety of ways including direct observation, supervisor's reports, project work, samples and questioning. Questioning techniques should not require language, literacy and numeracy skills beyond those required in this unit of competency. The candidate must have access to all tools, equipment, materials and documentation required. The candidate must be permitted to refer to any relevant workplace procedures, product and manufacturing specifications, codes, standards, manuals and reference materials.
Guidance information for	

EVIDENCE GUIDE	
assessment	

Range Statement

RANGE STATEMENT	
The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. Bold italicised wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.	

Unit Sector(s)

Unit sector	

Co-requisite units

Co-requisite units		

Competency field

Competency field	Maintenance and diagnostics