



Australian Government

AURMTE4001 Test engines using a dynamometer

Release 1

AURMTE4001 Test engines using a dynamometer

Modification History

Release	Comment
Release 1	Replaces AURM441976B Test engines using a dynamometer Unit code updated to meet policy requirements Reference to OHS legislation replaced with new WHS legislation

Unit Descriptor

Unit descriptor	This unit of competency describes the skills and knowledge required to test engines using a dynamometer. It requires the technical ability to use a dynamometer to test engine performance and to analyse and interpret test results in order to maximise engine performance in the motorsport and performance enhancement environments. No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.
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Application of the Unit

Application of the unit	This unit applies to individuals who set up, conduct dynamometer tests on engines and log, analyse and report the test data in order to maximise engine performance in motorsport and performance enhancement environments.
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Licensing/Regulatory Information

Not applicable.

Pre-Requisites

Not applicable.

Employability Skills Information

Employability skills	This unit contains employability skills.
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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. Assessment of performance is to be consistent with the evidence guide.
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Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1. Prepare for dynamometer operation	1.1. Use team instructions, controlling body rules, category rules and component supplier specifications to specify job requirements, including design, quality, materials, equipment and specifications 1.2. Observe workplace health and safety (WHS) requirements, including regulatory requirements, equipment and system isolation requirements, extraction, fire hazard, fuel storage, scatter shields, noise regulations, environmental regulations and personal protection needs, throughout the work 1.3. Check dynamometer for calibration and serviceability and prepare for operation 1.4. Connect engine to dynamometer, including ancillary systems and monitoring/control systems 1.5. Connect exhaust extraction and check for serviceability 1.6. Prepare engine for dynamometer testing, including checking oil and water levels, and confirm engine tune and condition
2. Conduct dynamometer testing	2.1. Identify load and run sequence, including run-in period for new engines 2.2. Calculate correction factors and apply to results 2.3. Check engine connections to the dynamometer 2.4. Perform selected dynamometer testing sequence in accordance with technical specifications and directions and/or the locally authorised method 2.5. Analyse dynamometer test data and make valid conclusions about engine and sub-system condition and performance 2.6. Report findings, including recommendations for engine configuration and/or modifications to improve performance based on dynamometer data, to appropriate persons 2.7. Test approved modifications with confirmation runs 2.8. Present data to team members as information to complement engine/vehicle set-up
3. Clean up work area and log test results	3.1. Perform dynamometer shutdown procedure in accordance with manufacturer/component supplier requirements 3.2. Disconnect engine from dynamometer

ELEMENT	PERFORMANCE CRITERIA
	3.3.Clean and refurbish dynamometer and associated tooling and equipment 3.4.Conduct operator maintenance of dynamometer 3.5.Log dynamometer test results to create/add to engine history

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

Required skills

Required skills include:

- technical skills to the level required to use workplace technology related to dynamometers, including tooling, equipment, calculators and measuring devices
- communication skills to the level required to communicate ideas and information to enable confirmation of work requirements, coordination of work with technical supervisors, other technicians and team members, and to report work outcomes and problems
- literacy skills to the level required to collect, organise, understand and analyse information related to dynamometer test results, team requirements and safety procedures
- numeracy skills to the level required to use mathematical ideas and techniques to correctly complete measurement of engine performance required for the team
- problem-solving skills to the level required to use dynamometer testing to solve problems with engine performance
- team skills to the level required to work with others and in a team by recognising dependencies and using cooperative approaches to optimise workflow and productivity
- planning skills to the level required to plan and organise activities, including the preparation and layout of the work area, and the obtaining of equipment and material to avoid backtracking, workflow interruptions or wastage

Required knowledge

Required knowledge includes:

- engine performance and dynamometer terminology
- preparation procedure for dynamometer testing
- dynamometer operation and use of associated hardware and software
- test environment correction factors
- dynamometer data interpretation and analysis
- operator dynamometer maintenance
- procedures for reporting task completion
- metric and imperial units of measurement
- WHS policies and procedures
- applicable commonwealth, state or territory legislation, regulations, standards and codes of practice, including WHS, personal safety and environment, relevant to testing engines using a dynamometer

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

Critical aspects for assessment and evidence required to demonstrate competency in this unit

Assessors must be satisfied that the candidate can competently and consistently:

- interpret and apply team requirements, controlling body and category rules and supplementary regulations
- correctly apply and use safety equipment and personal protective equipment
- follow task instructions, operating procedures and inspection processes to:
 - minimise the risk of injury to self or others
 - prevent damage to competition vehicle or equipment
 - achieve required outcomes within team time and quality standards
- correctly set up and operate an engine dynamometer to test a minimum of two (2) engines to complete the following:
 - determine engine performance
 - analyse engine performance data
 - assess effect of engine and sub-system modifications and present to team members as information to complement engine/vehicle set-up
 - confirm effectiveness of engine and sub-system modifications
- work effectively with others
- modify activities to cater for variations in workplace context and environment.

Context of, and specific resources for assessment

- The application of competency is to be assessed in the workplace or a simulated environment that reflects as far as possible the actual working environment.
- Assessment is to occur using standard and authorised work practices, safety requirements and environmental constraints.
- Assessment is to comply with relevant regulatory requirements, including specified Australian standards.
- Where applicable, reasonable adjustment must be made to work environments and training situations to

EVIDENCE GUIDE	
	accommodate ethnicity, age, gender, demographics and disability. - The following resources should be made available: - access to tooling and equipment - engines - dynamometer and test equipment - technical references or information.
Method of assessment	- Assessment must satisfy the endorsed Assessment Guidelines of this Training Package. - Assessment methods must confirm consistency and accuracy of performance (over time and in a range of workplace relevant contexts) together with application of Required Skills and Knowledge. - Assessment methods must be by direct observation of tasks and include questioning on Required Skills and Knowledge to ensure its correct interpretation and application. - Assessment may be applied under project-related conditions (real or simulated) and require evidence of process. - Assessment must confirm a reasonable inference that competency is able not only to be satisfied under the particular circumstance, but is able to be transferred to other circumstances. - Competence in this unit may be assessed in conjunction with other functional units which together form part of the holistic work role.
Guidance information for assessment	Assessment processes and techniques must be culturally sensitive and appropriate to the language and literacy capacity of the candidate and the work being performed.

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

RANGE STATEMENT

regional contexts) may also be included.

Dynamometers

Dynamometers may include:

- engine and chassis dynamometers
- water loaded dynamometers
- electrically loaded dynamometers

WHS requirements

WHS requirements are to be in accordance with applicable commonwealth, state or territory legislation and regulations, and organisational safety policies and procedures, and may include:

- personal protective equipment and clothing, including closed-in shoes, long trousers, handling gloves and other equipment
- safety equipment
- first aid equipment
- hazard and risk control
- elimination of hazardous materials and substances
- manual handling, including shifting, lifting and carrying
- emergency procedures
- team insurance requirements
- material safety management systems
- controlling body requirements
- manufacturer/component supplier specifications
- local safe operating procedures

Legislative requirements

Legislative requirements are to be in accordance with applicable commonwealth, state or territory legislation, regulations, certification requirements and codes of practice, and may include:

- award and enterprise agreements
- industrial relations
- Australian standards
- Australian Design Rules
- confidentiality and privacy
- WHS
- the environment
- equal opportunity
- anti-discrimination

RANGE STATEMENT	
	• duty of care • health regulations
Tooling and equipment	Tooling and equipment may include: • engine dynamometer • chassis dynamometer • hand and power tooling • engine compression test kit • vacuum/pressure gauges • flow meters • exhaust analysers • engine diagnostic computer hardware and software
Information and procedures	Information and procedures may include: • controlling body rules, category rules and supplementary regulations • event scheduling and location details • team procedures and standards related to: • testing engines using a dynamometer • reporting and communication • use of tooling and equipment • emergency service contacts and team persons emergency contacts • team emergency and event procedures for accidents or injury • work instructions, including worksheets, material safety data sheets (MSDS), assembly procedures, plans, drawings, designs and checklists • manufacturer/component supplier specifications and application procedures for test equipment and material • Australian Design Rules (where applicable) • safety body publications • environmental, hazardous chemicals and dangerous goods legislation and local requirements relating to the disposal and use of fuels, lubricants, coolants and cleaning agents

Unit Sector(s)

Unit sector	Motorsport
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Co-requisite units

Not applicable.

Competency field

Competency field	Technical - Engines
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