



Australian Government

UEGNSG139A Repair and maintain stationary gas fuelled turbine engines

Release 1

UEGNSG139A Repair and maintain stationary gas fuelled turbine engines

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor 1) Scope

1.1) Descriptor

This unit covers the isolation, disconnecting, repairing, reconnecting and maintenance of stationary gas fuelled turbine engines up to a capacity of 5GJ/hr (1300kw), for approval where required.

It encompasses working safely and to relevant standards disconnecting, carry out repairs and replacement of fuel train components to given specifications. Reconnecting the engine including: pre start tests, start up, adjusting components and controls to safe and efficient operation. Completing all required documentation.

Note: 500kw equates to a gas input of approximately 6Gj/hr.

Application of the Unit

Application of the Unit 2)

2.1) General Application

This competency standard unit is suitable for employment-based programs under an approved contract of training at the AQF level of the qualification in which the unit is first packaged or higher.

The unit may be selected as an elective unit (see qualification packaging rules) provided that all prerequisite units are undertaken or addressed through recognition processes.

This unit may be included in a skill set.

2.2) Importation

RTOs wishing to import this unit into any qualification under the flexibility provisions of NQC/NSSC Training Package Policy should ensure all pre-requisite units are also imported into the relevant Training Package and qualification.

Licensing/Regulatory Information

License to practice 3)

During Training:

Competency development activities are subject to regulations directly related to licensing, occupational health and safety and where applicable contracts of training such as apprenticeships.

In the workplace:

The application of the skills and knowledge described in this unit in some States/Territories requires an authority to practice in the workplace. Other conditions may apply under State and Territory legislative and regulatory requirements.

Pre-Requisites

Prerequisite unit(s) 4.1) Competencies

Granting competency in this unit shall be made only after

competency in the following unit(s) has/have been confirmed

Common Unit Group

UEGNSG005A Prepare to work in the Australian gas industry

WHS/OHS Unit Group

UEGNSG141A Apply Workplace Health and Safety regulations, codes and practices in the gas industry

Or

CPCCOHS1001A Work safely in the construction industry

and

HLTAID001 Perform cardiopulmonary resuscitation

4.2) Literacy and numeracy skills

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	4	Writin	4	Numer	4
		g		cy	

Employability Skills Information

Employability Skills

5)

This unit contains Employability Skills

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit *Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.*

Elements and Performance Criteria

ELEMENT

PERFORMANCE CRITERIA

1 Prepare to repair and maintain gas fuelled turbine engines	1.1	WHS/OHS procedures for a given work area are identified, obtained and understood.
	1.2	Health and safety risks are identified and established risk control measures and procedures in preparation for the work are followed.
	1.3	Safety hazards that have not previously been identified are noted and established risk control measures are implemented.
	1.4	Formal authority to proceed with repair and maintenance is obtained before commencing work, in accordance with regulatory and code of practice requirements
	1.5	Repair and maintenance is prepared in consultation with others affected by the work

ELEMENT**PERFORMANCE CRITERIA**

and sequenced appropriately.

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|----------|---|
| 1.6 | The nature and location of the work is determined from documentation or appropriate person to establish the scope of work to be undertaken. |
| 1.7 | Plant, equipment and component specifications and manufacturer manuals are obtained for planned work activity |
| 1.8 | Material needed for the repair and maintenance work is obtained in accordance with established procedures and checked against job requirements. |
| 1.9 | Tools, equipment, including personal protective equipment, and testing devices needed to for the repair and maintenance work are obtained in accordance with established procedures and checked for correct operation and safety. |
| 1.10 | Preparatory work is checked to ensure no damage has occurred and complies with requirements. |
| 2 | Repair and maintain gas fuelled turbine engines |
| 2.1 | WHS/OHS risk control measures and procedures for carrying out the work are followed. |
| 2.2 | Regulatory and code of practice recording and reporting requirements are satisfied at appropriate times throughout the work sequence. |
| 2.3 | Gas and electrical circuits/machines/plant are checked and recorded as being isolated and safe where necessary in strict accordance authority and WHS/OHS requirements and procedures before work is commenced. |
| 2.4 | Nature and possible cause of faults or out of specification performance are identified from defect reports or operational records. |

ELEMENT**PERFORMANCE CRITERIA**

- 2.5 Fault finding is approached methodically drawing on knowledge of gas fuelled turbine engines using observation, measurement, calculations and comparison with normal system and component parameters/values.
- 2.6 Faults beyond the scope of gas fuel train, ignition or fume exhaust work are identified and arrangements are made for appropriately competent and authorised person to rectify faults
- 2.7 Engine is disconnected where necessary to carry out maintenance and repairs in strict accordance authority and WHS/OHS requirements and procedures. Note: No modifications are permitted.
- 2.8 Components are removed/dismantled where necessary and parts stored to protect them against loss or damage
- 2.9 Faulty components are rechecked and their fault status confirmed.
- 2.10 Materials required to rectify faults are sourced and obtained in accordance with established procedures
- 2.11 Repair and maintenance work is carried out efficiently without unnecessary waste of materials or damage to apparatus, circuits, the surrounding environment or services and using sustainable energy principles.
- 2.12 Effectiveness of the repair is tested in accordance with established procedures.
- 2.13 System is reassembled, reconnected and finally tested to ensure it is operating safely, effectively and complies with relevant requirements.
- 2.14 Unexpected situations are dealt with safely and with the approval of an authorised person.

ELEMENT	PERFORMANCE CRITERIA
3 Completion and report repair and maintenance	3.1 WHS/OHS work completion risk control measures and procedures are followed.
	3.2 Final check of the engine is made to verify that it complies to all requirements, including any certification requirements by local authorities.
	3.3 Work area is cleared and materials disposed of or recycled in accordance with federal, state and territory legislation and workplace procedures.
	3.4 Tools and equipment are cleaned, checked, serviced and stored in accordance with manufacturer recommendations and workplace procedures
	3.5 Work site is cleaned and made safe in accordance with established procedures.
	3.6 Maintenance and repair work is documented and an appropriate person or persons notified in accordance with established procedures.

Required Skills and Knowledge

7) *This describes the skills and knowledge and their level, required for this unit.*

Evidence shall show that knowledge has been acquired of safe working practices and repairing and maintaining gas fuelled turbine engines up to a capacity of 500kW or speeds of 3600RPM.

All knowledge and skills detailed in this unit should be contextualised to current industry standards, technologies and practices. The extent of the required skills and knowledge required is given below. It forms an integral part of this unit.

KS01-G139A Repairing and maintaining gas fuelled turbine engines

Evidence shall show an understanding of repairing and maintaining stationary gas fuelled turbine engines, applying safe working practices and relevant Standards, Codes and Regulations to an extent indicated by the following aspects:

T1. Gas fuel

- Types, properties and applications
- Safety
- Hazards
- Combustion
- Ignition types

T2. Gas fuelled turbine engines

- Types
- Major components
- Operating principles
- Manufacturer's specifications and diagrams

T3. Fuel train requirements

- Pipe-work and connections
- Valves
- Metering devices
- Regulating valves
- Electrical controls

T4. Exhaust/flue requirements

- Materials
- Terminations
- Sizing

T5. Location's ventilation requirements

- Locations
- Materials

- Calculations
- Interlocks

T6. Hazardous area requirements

- Locations
- Housing requirements
- Distances

T7. Codes, regulations and standards

- AS 3814
- AS 5601

T8. Design specifications

- Accessing
- Analysis and interpretation
- Calculations

T9. Required authority to proceed

- Regulatory requirements (Scope and restrictions)
- Standards and code of practice requirements.
- Required documentation and submissions

T10. Site Arrangements

- Location and environment
- Piping requirements for gas fuel train pipe-work
- Suitable equipment/equipment plant locations

T11. Site Safety

- Hazards
- Checklists
- Reports

T12. Engine diagrams

- Mechanical layouts
- Gas pipe-work drawings
- Electrical circuits

T13. Fault finding

- Taking readings and gathering information
- Symptoms and possible faults
- Logical fault diagnosis sequence and flow charts
- Manufacturer's fault diagnosis tables
- Confirming actual fault

T14. Disconnect requirements and procedures

- Regulator, business and customer requirements
- Manufacturers specifications and procedures

T15. Repairs and maintenance requirements and procedures

- Gas train pipe-work and components
- Exhaust/flue system
- Ventilation system
- Oil change
- Oil and air filter replacement

T16. Reconnection requirements and procedures

- Regulator, business and customer requirements
- Manufacturers specifications and procedures
- Inspection of the installed engine, pipe-work, components and accessories
- Pressure testing and purging
- Testing engine operation first without and then with fuel
- Testing and adjusting regulator, operation and safety controls
- Exhaust gases analysis.
- Compliance with design specification, regulations, codes, standards and manufacturers specifications back to Commissioned settings
- Documentation and reports
 - As-installed' plant and equipment components, pipe-work, flue/exhaust systems and accessories are documented and reported

Evidence Guide

8) The Evidence Guide forms an integral part of this Unit and shall be used in conjunction with all components parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment

8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit

8.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEG11'. Evidence shall also comprise:

- A representative body of work performance demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Workplace/Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range statement
 - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
 - Demonstrate an understanding of the required skills and knowledge as described in this unit. It may be required by some jurisdictions that RTOs provide a percentile graded result for the purpose of regulatory or licensing requirements.
 - Demonstrate an appropriate level of skills enabling employment
 - Conduct work observing the relevant Anti-Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated consistent performance across a representative range of contexts from the prescribed items below:
 - Repairing and maintaining gas fuelled turbine engines as described in 9) Range Statement and including:
 - A Conducting maintenance
 - B Finding faults efficiently
 - C Disconnecting engine
 - D Rectifying faults without damage
 - E Reconnecting
 - F Providing written reports on work undertaken
 - H Dealing with unplanned events

Context of and 8.3)**specific
resources for
assessment**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace.

This should include:

- WHS/OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

The resources used for assessment should reflect current industry practices in relation to installing low voltage electrical apparatus and associated equipment.

**Method of
assessment****8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires assessment in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the required skills and knowledge described in this unit.

**Concurrent
assessment
and
relationship
with other
units****8.5)**

There are no concurrent assessment recommendations for this unit.

The critical aspects of occupational health and safety covered in either UEGNSG141A or CPCCOHS1001A and HLTCPR201A and other discipline specific occupational health and safety units shall be incorporated in relation to this unit.

Range Statement

9) *This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.*

This unit shall be demonstrated in relation to repairing and maintaining stationary gas fuelled turbine engines up to a capacity of 5GJ/hr (1300kw), which includes each of the following:

- Gas fuel train pipe-work, regulators, valves, metering and protective devices from gas pipeline to the engine.
- Flue/exhaust system
- Pressure testing and purging gas fuel train
- Disconnecting and reconnecting gas fuelled turbine engines, adjusting components and controls to safe and efficient operation.

It does not include the following:

- Repairs the internal mechanical components of the engine

The gas fuel can be from gas gathering lines, gas transmission pipelines, distribution pipeline, and consumer gas installations. Gas Fuels can be natural gas, LPG, SNG, bio-gas, waste gas or sewage gas, used as a single gas fuel or part of a dual fuel system.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

Unit Sector(s)

Gas Industry

Competency Field

Competency Field 11)

Maintenance