Australian Government

UEGNSG138A Install and commission stationary gas fuelled turbine engines

Release 1

INDUSTRY SKILLS COUNCILS
Creating Australia's Future

UEGNSG138A Install and commission stationary gas fuelled turbine engines

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope

1.1) Descriptor

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

It encompasses working safely and to installation standards matching the plant/equipment, location, components and fuel train pipe-work to given specifications. Commissioning the plant and equipment including: pre commissioning tests, start up, adjusting components and controls to safe and efficient operation. Completing all necessary installation and commissioning 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 (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

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	Writing	4	Numeracy	4

Employability Skills Information

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 unit of competency*

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 install and commission stationary gas fuelled turbine engine	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 Design specification for gas fuelled turbine engines to be installed and commissioned is accessed, analysed, interpreted and confirmed through a detailed site inspection. 1.5 Design specification matters requiring clarification are resolved through liaison with designer and gas authorities. 1.6 Formal authority to proceed with installation and commissioning is obtained before commencing work, in accordance with regulatory and code of practice requirements. 1.7 Installation is prepared in consultation with others affected by the work and sequenced

ELEMENT	PERFORMANCE CRITERIA	
		appropriately in line with quality assurance requirements.
	1.8	The nature and location of the work is determined from documentation or appropriate person to establish the scope of work to be undertaken.
	1.9	Plant, equipment and component specifications and manufacturer manuals are obtained for planned work activity.
	1.10	Locations of plant, equipment, fuel train pipe-work and components are planned within the constraints of work site, significants and requirements.
	1.11	Materials needed for the installation work are obtained in accordance with design specification and established procedures
	1.12	Tools, equipment, including personal protective equipment, and testing devices needed to for the installation and commissioning work are obtained in accordance with established procedures and checked for correct operation and safety.
	1.13	Work area is prepared to support efficient installation and commissioning of the plant and equipment.
	1.14	Preparatory work is checked to ensure no damage has occurred and complies with requirements.
2 Install stationary gas fuelled turbine engine	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 as being isolated where necessary in strict accordance WHS/OHS requirements and procedures.
	2.4	Stationary gas fuelled turbine engine components, including fuel train and associated pipe-work and flue/exhaust systems are installed in accordance with approved design specification and comply with technical standards and regulatory requirements, with sufficient access to affect terminations, adjustment and maintenance.
	2.5	Ventilation systems are installed in accordance with approved design specifications

ELEMENT	PERFORMANCE CRITERIA	
	2.6	Electrical components, wiring enclosures and wiring, including terminations are installed in accordance with design and manufacturer's specifications, and functional and regulatory requirements.
	2.7	Ongoing compliance and safety inspections of the installed turbine engine , equipment, pipe-work, components and accessories are undertaken and defects are rectified
	2.8	Installation is carried out efficiently without unnecessary waste of materials or damage to plant, equipment, pipe-work, components, accessories, the surrounding environment or services and using sustainable energy principles.
	2.9	Unexpected situations are dealt with safely and with the approval of an authorised person.
3 Commission stationary gas fuelled turbine engine	3.1	WHS/OHS risk control measures and procedures for carrying out the work are followed.
	3.2	Regulatory and code of practice recording and reporting requirements are satisfied at appropriate times throughout the work sequence.
	3.3	Gas and electrical safety checks and isolation procedures, including purging are completed and recorded to manufacturer and other authority requirements before testing and commissioning are commenced.
	3.4	Operational parameters of individual components are tested and adjusted to conform to specifications
	3.5	The turbine engine operations are tested first without and then with fuel, adjustments are completed as necessary and results recorded in accordance with approving authority requirements.
	3.6	Exhaust gases are analysed in accordance with recognised industry practice and other authority requirements.
	3.7	Unexpected situations are dealt with safely and with the approval of an authorised person
	3.8	Commissioning is conducted efficiently without waste of materials or damage to apparatus and the surrounding environment or services and using sustainable energy practices

ELEMENT	PERFORMANCE CRITERIA
4 Completion and report installation and commissioning activities.	4.1 WHS/OHS work completion risk control measures and procedures are followed. 4.2 Final check of the installed turbine engine is made to verify that it complies with all requirements, including any certification required by local authorities. 4.3 Work area is cleared and materials disposed of or recycled in accordance with federal, state and territory legislation and workplace procedures. 4.4 Tools and equipment are cleaned, checked, serviced and stored in accordance with manufacturer recommendations and workplace procedures 4.5 Work site is cleaned and made safe in accordance with established procedures. 4.6 'As-installed' turbine engine equipment components, pipe-work, flue/exhaust systems and accessories are documented, accessed 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 installing and commissioning of 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 is given below. It forms an integral part of this unit.

KS01-G138A Installation and commissioning of gas fuelled turbine engines

Evidence shall show an understanding of installation and commissioning techniques for 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 engine overview

- 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 ventilation requirements

- Materials

- Calculations
- Interlocks
- Locations

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. Plant/equipment diagrams

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

T13. Installation

- Turbine engines plant and equipment
- Gas train pipe-work and components
- Exhaust/flue system
- Ventilation system
- Pressure testing and purging
- Authorisations and certification requirements and procedures

T14. Commissioning

- Inspection of the installed turbine engine s, pipe-work, components and accessories
- Testing turbine engine operation first without and then with fuel
- Testing and adjusting regulator, operation and safety controls
- Exhaust gases analysis throughout operating parameters including bifuel applications
- Compliance with design specification, regulations, codes, standards and manufacturers specifications
- Documentation and reports
    - As-installed' turbine engine 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.

Before the critical aspects **8.2)**

of evidence are considered all prerequisites shall be met.

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, polices and workplace procedures
- Demonstrated consistent performance across a representative range of contexts from the prescribed items below:
  - Install and commission gas turbine engines as described in 9) Range Statement and including:

    A Obtaining formal authority to proceed with installation and commissioning before commencing work, in accordance with regulatory and code of practice requirements.

    B Reading and interpreting drawings related to plant/equipment locations and pipe-work connections

C Installing, securing, aligning and connecting plant, equipment, pipe-work, components and accessories accurately in their planned location and in compliance with codes and standards.

D Undertaking on-going compliance and safety inspections

E Rectifying any defects revealed through on-going inspections

F Pressure testing, repairing leaks and purging the fuel train system entire system to the appropriate design test pressures.

G Commissioning plant and equipment operation as necessary and results recorded in accordance with approving authority requirements

H Correctly documenting 'as-installed' plant, equipment, pipe-work, components and accessories

I Dealing with unplanned events

Context of and specific resources for assessment

8.3)

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 **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 installation and commissioning of stationary gas fuelled turbine engines up to a capacity of 5GJ/hr (1300kw), which includes each of the following:

- Installing and connecting gas fuel train pipe-work, regulators, valves, metering and protective devices from gas pipeline to the turbine engine.
- Installing and connecting flue/exhaust system
- Pressure testing and purging gas fuel train
- Commissioning gas fuelled turbine engine, adjusting components and controls to safe and efficient operation.

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