



Australian Government

Department of Education, Employment and Workplace Relations

UEPOPL001A Licence to operate a steam turbine

Release: 1

UEPOPL001A Licence to operate a steam turbine

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This unit specifies the outcomes required to operate a steam turbine for licensing purposes, and covers the operation of any steam turbine (except a steam turbine that produces a power output of less than 500 kW) that:

- is multi-wheeled
- is capable of a speed greater than 3600 rpm, or
- uses attached condensers or a multi-staged heat exchange extraction process.

Application of the Unit

Application of the Unit 2)

This unit requires the operator to plan the work, carry out pre-operational safety checks, start the steam turbine, monitor steam turbine operation, and shut-down the steam turbine.

This unit meets the requirements of the state and territory Work Health and Safety (WHS) Regulations, including licensing. Any alteration will result in a unit which is not acceptable to regulators for the purpose of licensing.

Licensing/Regulatory Information

License to practice 3)

Pre-Requisites

Prerequisite Unit(s) 4)

Competencies 4.1)

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed.

Common Unit Group

Unit Code	Unit Title
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Literacy and numeracy skills 4.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following levels. A description of what each level entails is provided in Section 2.3.1 Language, Literacy and Numeracy.

Reading	Writing	Numeracy
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Employability Skills Information

Employability Skills 5)

This unit contains Employability Skills.

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. Plan work	<p>1.1 Type of operations to be conducted for steam turbine are assessed and prepared</p> <p>1.2 Steam turbine operations are planned according to procedures</p> <p>1.3 Personal protective equipment (PPE) is selected for use, ensuring statutory requirements and procedures are followed</p> <p>1.4 Hazards and potential hazards in work area are identified and assessed for risk, and controls recommended consistent with appropriate standards</p> <p>1.5 Appropriate communication methods are identified according to procedures.</p>
2. Start-up steam turbine	<p>2.1 Downstream user of output power from steam turbine is advised of start-up</p> <p>2.2 Controls are implemented for identified hazards and potential hazards in work area consistent with appropriate standards</p> <p>2.3 Availability of quality steam from upstream provider is confirmed</p> <p>2.4 Pre-operational safety checks of steam turbine are conducted according to procedures</p> <p>2.5 Start-up checks are performed upon ancillary plant</p> <p>2.6 Maintenance requirements are identified and reported according to procedures</p> <p>2.7 Steam turbine is started and brought up to speed and placed on line safely, according to procedures, including performance of start-up checks</p>
3. Monitor steam turbine operation	<p>3.1 Steam turbine is monitored according to required procedures, including performing of operational checks and fault finding</p> <p>3.2 Operating log is maintained clearly and accurately, according to established procedures</p> <p>3.3 Operating status of steam turbine is diagnosed and verified</p> <p>3.4 Status of steam turbine is communicated to other operational personnel, including downstream users of steam turbine output power</p> <p>3.5 Steam turbine emergencies and contingencies are dealt with according to local workplace procedures, manufacturer's specifications and environmental requirements</p>

ELEMENT**PERFORMANCE CRITERIA**

4. Shutdown steam turbine
- 4.1 Energy isolation procedures are followed
 - 4.2 Routine shutdown of steam turbine is performed according to operational and manufacturer's requirements and procedures, including performing shutdown checks
 - 4.3 Maintenance requirements are identified, recorded and reported according to procedures

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) This describes the essential skills and knowledge and their level, required for this unit.

T1 Required skills:

- Accurate recording and maintenance of information relating to operation of a steam turbine
- Compliance with legislation, regulations, standards, codes of practice and established safe practices and procedures for starting, operating, shutting down and maintaining a steam turbine
- Diagnostic and testing techniques as applied to steam turbines
- Efficient and safe conduct when starting, operating, shutting down and maintaining a steam turbine
- Use of appropriate communication techniques with colleagues and others.
- Use of relevant tools and equipment
- Verification of problems and steam turbine equipment faults and demonstrate appropriate response procedures

T2 Required knowledge:

- Basic principles of heat transfer and thermodynamics
- Commonwealth, state or territory WHS legislation, regulations, standards and codes of practice relevant to the full range of techniques for operating steam turbines
- Confined space awareness and the limits for entry into a confined space.
- Environmental protection requirements relating to the disposal of waste material and storage of environmentally hazardous materials
- Established communication channels and protocols in the workplace
- Safety data sheets and material handling methods
- Organisational and workplace standards, requirements, policies and procedures for starting, operating, shutting down and maintaining a steam turbine
- Procedures for the recording, reporting and maintenance of workplace records and information
- Understanding of the hierarchy of hazard identification and control
- Steam turbine capabilities and components
- Steam turbine fault finding and problem solving techniques
- Steam turbine operations and operating techniques
- Steam turbine safety devices and testing techniques
- System components and their interaction with other plant and equipment.
- Steam turbine speed control equipment
- Typical routine problems encountered in the process and with equipment and adjustments required for correction

Evidence Guide

EVIDENCE GUIDE

9) The evidence guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment Guidelines for the Training Package.

Overview of Assessment 9.1)

Successful assessment of this unit meets the competency requirement of state and territory WHS Regulations, including licensing.

State/territory WHS regulators have mandated the use of Assessment Instruments and Instructions for Assessment for this unit which have been endorsed by the national body responsible for WHS matters.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Compliance with organisational and site policies and procedures including quality requirements and state or territory legislation applicable to workplace operations.

Compliance with WHS and environmental regulations, policies and procedures.

Effectively communicate and work safely with others in the work area.

Identify hazards associated with the operation of the steam turbine and put in place effective hazard controls for those hazards identified.

Effectively start-up, monitor and shutdown a steam turbine which meets the definition of this licence class.

Control and monitor any ancillary equipment which may be connected or interfaced to the steam turbine.

Compliance with Commonwealth, state or territory regulations for the acquisition of a regulatory authority licence.

Context of and specific resources for assessment 9.3)

Assessment of the safe and effective application of knowledge and skill to workplace tasks (performance) must be undertaken using the endorsed Assessment Instrument.

Assessment of performance must be undertaken either in the workplace or in a realistically simulated workplace.

Assessors must ensure that the assessment in the workplace is organised to ensure that all the required equipment and materials and a suitable working area is made available to suit the assessment and the workplace.

Assessment must occur under standard and authorised work practices, safety requirements and environmental constraints. Assessment is to comply with relevant appropriate standard requirements.

- Applicants must have access to:
 - PPE for the purpose of the Performance Assessment.
 - Appropriate safety equipment in safe condition
 - Appropriate steam turbine and associated equipment in safe condition
 - Communication equipment, where applicable.

Method of assessment 9.4)

Assessment must be conducted using the endorsed Assessment Instruments. These Instruments provide advice on their application.

The use of simulators in the assessment of this unit of competency is acceptable.

Assessment may be in conjunction with the assessment of other units of competency.

Assessment methods must confirm consistency and accuracy of performance together with application of underpinning knowledge.

Assessment must confirm a reasonable inference that competency is not only able to be satisfied under the particular circumstances, but is able to be transferred to other circumstances.

Concurrent 9.5) assessment and relationship with other units

Further information about endorsed Assessment Instruments may be obtained from state and territory WHS regulators.

Range Statement

RANGE STATEMENT

10) 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.

Appropriate standards may include, but not be limited to: codes of practice; legislation; Australian standards, and manufacturers' specifications.

Communicated/Communication may include, but not be limited to: verbal; written; telephone; two-way radio; log records and computer record systems.

Emergencies may include, but not be limited to: fire; bomb threat; terrorism; personal accidents; chemical spills; major steam leaks; major water leaks and flooding and Natural disasters.

Fault may include, but not be limited to: abnormal operating conditions; loss of a major auxiliary; steam turbine water ingress; wet steam; excessively high turbine and turbine valves heating or cooling rates or differentials; loss of condenser vacuum; condenser tube leak; high dissolved oxygen; conductivity; high steam turbine bearing temperatures or vibration; high or low bearing oil temperatures; loss of steam turbine bearing oil flow or pressure; low or high pressure heaters malfunctions; actuator or valve mechanical or electrical faults or failure; instrument failure and steam turbine protection.

Hazards may include, but not be limited to: chemical hazards; thermal hazards; manual handling hazards; guarding of machinery requirements; illumination of work area; rubbish and combustibles in area; leakage of steam; leakage of fuel; obstructions in the work area; fire; noise; vibration; water and working at heights.

Operational checks may include, but not be limited to: quality of steam supply; cooling water system; condenser operation; position and operation of valves and fittings; cylinder drainage system; lubrication system, speed control, vibration level, steam reticulation line pressure, and operation of control/safety devices.

Personal Protective Equipment (PPE) may include, but not be limited to: prescribed under legislation, regulation, codes of practice, and workplace policies and practices; hard hat; safety boots; gloves; high visibility clothing; breathing, hearing, sight, skin and sun protection; fall-arrest equipment such as harnesses and lanyards, horizontal lines and inertia reel.

Pre-operational safety checks may include, but not be limited to: steam supply system;

RANGE STATEMENT

position and operation of steam turbine valves; safety devices; overspeed shut-down; pressure relieve devices; speed governor; exhaust system; auxiliary equipment and lubrication system.

Procedures may include, but not be limited to: manufacturer's guidelines (instructions, specifications or checklists); industry operating procedures and workplace procedures (work instructions, operating procedures, checklists).

Recorded may include, but not be limited to: operations and maintenance of steam turbine equipment; difficulties or issues; environmental issues; recommendations for future work; results; costs; hazards; incidents or injuries; dangerous occurrences or equipment malfunctions using log books; proformas; production reports and maintenance records.

A simulator is a device used especially in training to reproduce the conditions of the working situation, enabling tasks to be learned and practised safely and economically.

Shut down checks may include, but not be limited to: checks of cooling down process; steam supply isolated; load on steam turbine; auxiliary equipment shut-down; cylinder drain system and isolation from any common connection.

Start-up checks may include, but not be limited to: position and operation of valves and fittings; operation of lubrication system; operation of drainage system; steam quality; heat input; operation of auxiliary equipment; freedom of rotation of steam turbine; steam turbine warm up; operation of steam traps and steam line purge systems; warm up of reticulation system and reticulation line pressure.

All industrial equipment where steam acts on a steam turbine or rotor to cause a rotary motion with any or all of the following features: attached condensers; multi-wheeled; multi-staged heat exchange extraction process, and speed greater than 3600 rpm may include axial flow, back pressure, condensing, impulse, non-condensing, pass out, radial flow, reaction and velocity compounding steam turbines with a power output of greater than 500kW. The operation may be assisted by remote indicators of plant status and other parameters monitored (e.g. central control stations), in wet, noisy, dusty or hot areas or during continuous operation.

Steam turbine emergencies and contingencies may include, but not be limited to: identification of type of emergency; isolation of steam supply; selection and application of appropriate firefighting equipment; notification of upstream steam supplier and operation of steam turbine only when safe to do so.

Testing may include, but not be limited to: loss of a major auxiliary controls response checks; stand-by plant tests; valves operating checks; emergency governor operation test; performance tests and alarm and protection tests.

Unit Sector(s)

Not applicable.

Competency Field

Competency Field 11)