



Australian Government

UEPOPL001 Licence to operate a steam turbine

Release: 1

UEPOPL001 Licence to operate a steam turbine

Modification History

Release 1. This is the first release of this unit of competency in the UEP Generation Training Package.

Application

This unit specifies the outcomes required to operate a steam turbine for licensing purposes, steam turbine means equipment that is driven by steam acting on a turbine or rotor to cause a rotary motion.

It 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.

This unit requires the operator to plan the work, carry out preoperational safety checks, start the steam turbine, monitor steam turbine operation and shutdown the steam turbine.

A person performing this work is required to hold a turbine operation high risk work (HRW) licence.

Licensing/Regulatory information

This unit is based on the licensing requirements of Part 4.5 of the Model Work Health and Safety (WHS) Regulations, HRW and meets Commonwealth, state and territory HRW licensing requirements.

Any alteration to this unit would result in a unit that would not be acceptable to Work, Health and Safety (WHS)/Occupational Health and Safety (OHS) regulators for the purpose of licensing.

Pre-requisite Unit

There are no prerequisite units

Competency Field

Licensing

Unit Sector

Electricity generation

Elements and Performance Criteria

ELEMENTS

Elements describe the essential outcomes.

1 Plan work

PERFORMANCE CRITERIA

Performance criteria describe the performance needed to demonstrate achievement of the element.

1.1 Type of operations to be conducted for steam turbine are assessed and prepared

1.2 Steam turbine operations are planned, in accordance with procedures

1.3 Personal Protective Equipment (PPE) is selected for use, ensuring statutory requirements and procedures are followed

1.4 Hazards and potential hazards in work area are identified and assessed for risk, and controls recommended are consistent with appropriate standards

1.5 Appropriate communication methods are identified, in accordance with procedures

2 Start-up steam turbine

2.1 Downstream user of output power from steam turbine is advised of start up

2.2 Controls are implemented for identified hazards and potential hazards in work area consistent with appropriate standards

2.3 Availability of quality steam from upstream provider is confirmed

2.4 Preoperational safety checks of steam turbine are conducted, in accordance with procedures

2.5 Start-up checks are performed upon ancillary plant

2.6 Maintenance requirements are identified and reported, in accordance with procedures

2.7 Steam turbine is started and brought up to speed and placed on line safely, in accordance with procedures, including performance of start-up checks

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| 3 Monitor steam turbine operation | 3.1 Steam turbine is monitored, in accordance with required procedures, including performing of operational checks and fault finding |
| | 3.2 Operating log is maintained clearly and accurately, in accordance with established procedures |
| | 3.3 Operating status of steam turbine is diagnosed and verified |
| | 3.4 Status of steam turbine is communicated to other operational personnel, including downstream users of steam turbine output power |
| | 3.5 Steam turbine emergencies and contingencies are dealt with, in accordance with local workplace procedures, manufacturers' specifications and environmental requirements |
| 4 Shut down steam turbine | 4.1 Energy isolation procedures are followed |
| | 4.2 Routine shutdown of steam turbine is performed, in accordance with operational and manufacturers' requirements and procedures, including performing shut down checks |
| | 4.3 Maintenance requirements are identified, recorded and reported, in accordance with procedures |

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the Companion Volume Implementation Guide.

appropriate standards must include

but not be limited to:

- codes of practice
- state, territory and federal legislation
- Australian standards
- manufacturers' specifications

communicated and communication must include

- but not be limited to:
 - verbal
 - written
 - telephone
 - two-way radio
 - log records
 - computer record systems

emergencies must include

- but not be limited to:
 - fire
 - bomb threat
 - terrorism
 - personal accidents
 - chemical spills
 - major steam leaks
 - major water leaks
 - and flooding
 - natural disasters

faults must 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 and/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 malfunction
 - actuator, valve, mechanical and electrical faults or failure
 - instrument failure
 - steam turbine protection

hazards must 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 must 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 and steam reticulation line pressure
 - operation of control or safety devices

Personal Protective Equipment (PPE) must include

- but not be limited to:
 - prescribed under legislation, regulations, codes of practice and workplace policies and procedures
 - hard hat, safety boots, gloves and high visibility clothing
 - breathing, hearing, sight, skin and sun protection
 - fall arrest equipment such as harnesses and lanyards, horizontal lines and inertia reel

preoperational safety checks must include

- but not be limited to:
 - steam supply system
 - position and operation of steam turbine valves
 - safety devices

- overspeed shutdown
 - pressure relieve devices
 - speed governor
 - exhaust system
 - auxiliary equipment
 - lubrication system
- procedures must include
- but not be limited to:
 - manufacturers' instructions, specifications or checklists
 - industry operating procedures
 - workplace procedures including instructions, operating procedures and checklists
- recorded information must 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
 - log book and proformas
 - production reports and maintenance records
- simulated training must include
- reproduction of conditions in working situation
 - enabling tasks to be learned and practised safely and economically
- shut down checks must include
- but not be limited to:
 - checks of cooling down process
 - steam supply isolated
 - load on steam turbine
 - auxiliary equipment shutdown
 - cylinder drain system
 - isolation from any common connection
- start-up checks must include
- but not be limited to:
 - position and operation of valves and

- industrial equipment must include
- steam turbine emergencies and contingencies must include
- 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 warmup
 - operation of steam traps and steam line purge systems
 - warm up of reticulation system
 - reticulation line pressure
 - where steam acts on a steam turbine or rotor to cause a rotary motion with any or all the following features:
 - attached condensers
 - multi-wheeled
 - multi-staged heat exchange extraction process at 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
 - 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
 - operation of steam turbine only when safe to do so

testing must include

- but not be limited to:
 - loss of a major auxiliary controls response checks
 - standby plant tests
 - valves operating checks
 - emergency governor operation test
 - performance tests
 - alarm and protection tests

Unit Mapping Information

This unit replaces and is equivalent to UEPOPL001A Licence to operate a steam turbine.

Links

Companion Volume implementation guides are found in VETNet -

<https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=1715b9fa-e7bd-441c-bb8d-cf22c9c825a8>

Assessment Requirements for UEPOPL001 Licence to operate a steam turbine

Modification History

Release 1. This is the first release of this unit of competency in the UEP Generation Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all the requirements of the elements, performance criteria and range of conditions on at least one occasion and includes:

- communicating effectively and working safely with others in the work area
- completing verification of problems and steam turbine equipment faults and demonstrating appropriate response procedures
- compliance with Commonwealth, state or territory regulations for the acquisition of a high risk work licence for steam turbine operation
- compliance with legislation, regulations, standards, codes of practice and established safe practices and procedures for starting, operating, shutting down and maintaining a steam turbine
- 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
- controlling and monitoring any ancillary equipment which may be connected or interfaced to the steam turbine recording accurately and maintaining information related to operation of a steam turbine
- identifying hazards associated with the operation of the steam turbine and put in place effective hazard controls for those hazards identified
- performing efficiently and safely when starting, operating, shutting down and maintaining a steam turbine
- starting up, monitoring and shutting down a steam turbine effectively which meets the definition of this licence class
- undertaking diagnostic and testing techniques as applied to steam turbines
- using appropriate communication techniques with colleagues and others
- utilising relevant tools and equipment

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all the requirements of the elements, performance criteria and range of conditions and includes knowledge of:

- 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
- 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
- safety data sheets and material handling methods
- 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
- steam turbine speed control equipment
- system components and their interaction with other plant and equipment.
- typical routine problems encountered in the process and with equipment and adjustments required for correction
- understanding of the hierarchy of hazard identification and control

Assessment Conditions

Assessments must be conducted by an assessor accredited for this High Risk Work (HRW) licence class in the Commonwealth, state or territory where the licence will be obtained (i.e. an assessor authorised by a Commonwealth, state or territory WHS/OHS regulator).

As a minimum, assessors must satisfy applicable regulatory requirements, which include requirements in the Standards for Registered Training Organisations current at the time of assessment.

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Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Assessment of performance must be undertaken in the workplace and/or under realistic workplace conditions which typically reflect:

- performing tasks and activities within timelines that would be expected in a workplace
- standard and authorised work practices, safety requirements and environmental constraints
- using full scale equipment

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

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools and equipment used in industry including:
 - Personal Protective Equipment (PPE) for performance assessment
 - appropriate safety equipment in safe condition
 - appropriate steam turbine and associated equipment in safe condition
- communication equipment, as required, applicable documentation including workplace procedures, industry standards, equipment specifications, regulations, codes of practice and operation manuals.

Links

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