



Australian Government

UEPOPL004 Licence to operate a steam turbine

Release: 1

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Modification History

Release 1. This is the first release of this unit of competency in the UEP Electricity Supply Industry – Generation Sector Training Package Release 2.0.

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 r.p.m., 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 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 in accordance with workplace procedures
- 1.2 WHS/OHS regulations, legislative requirements, codes of practice, manufacturers' recommendations and specifications, environmental requirements and workplace procedures are identified, applied and monitored
- 1.3 Steam turbine operations are planned in accordance with workplace procedures
- 1.4 Personal protective equipment (PPE) is selected for use in accordance with workplace procedures
- 1.5 Hazards and potential hazards in work area are identified and assessed for risk, and controls recommended are in accordance with workplace procedures
- 1.6 Relevant communication methods are identified in accordance with workplace 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 in accordance with workplace procedures
- 2.3 Availability of quality steam from upstream provider is confirmed
- 2.4 Preoperational safety checks of steam turbine are conducted in accordance with workplace procedures
- 2.5 Start-up checks are performed upon ancillary plant

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| | 2.6 | Maintenance requirements are identified and reported in accordance with workplace procedures |
| | 2.7 | Steam turbine is started and brought up to speed and placed online safely, including performance of start-up checks, in accordance with workplace procedures |
| 3 Monitor steam turbine operation | 3.1 | Steam turbine is monitored, including performing of operational checks and fault finding, in accordance with workplace procedures |
| | 3.2 | Operating log is maintained clearly and accurately in accordance with workplace procedures |
| | 3.3 | Operating status of steam turbine is diagnosed and verified in accordance with workplace procedures |
| | 3.4 | Status of steam turbine is communicated to other operational personnel, including downstream users of steam turbine output power, in accordance with workplace procedures |
| | 3.5 | Steam turbine emergencies and contingencies are dealt with in accordance with manufacturers' recommendations and specifications, environmental regulations and workplace procedures |
| 4 Shut down steam turbine | 4.1 | Energy isolation procedures are followed |
| | 4.2 | Routine shutdown of steam turbine is performed, including performing shutdown checks in accordance with operational and manufacturers' recommendations and specifications, and workplace procedures |
| | 4.3 | Maintenance requirements are identified, recorded and reported in accordance with workplace 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 UEP Electricity Supply Industry - Generation

Sector Training Package Companion Volume Implementation Guide.

relevant standards may include

but not be limited to:

- codes of practice
- legislation
- Australian Standards
- manufacturers' specifications

communicated and communication may include

• but not be limited to:

- verbal
- written
- telephone
- two-way radio
- log records
- 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
- flooding
- natural disasters

faults 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 and differentials
- loss of condenser vacuum
- condenser tube leak
- conductivity
- high steam turbine bearing temperatures or vibration
- high or low bearing oil temperatures
- loss of steam turbine bearing oil flow or pressure

hazards may include

- low or high-pressure heater malfunction
- actuator, valve, mechanical and electrical faults or failure
- instrument failure
- steam turbine protection
- 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 oil
 - 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
 - operation of control or safety devices

personal protective equipment (PPE) may include

- but not be limited to:
 - prescribed under, regulations, codes of practice and workplace policies and procedures

preoperational safety checks may 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 may include
- but not be limited to:
 - manufacturers' instructions, specifications or checklists
 - industry operating procedures
 - workplace procedures, including instructions, operating procedures and checklists
- recorded information 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
 - logbook and proformas
 - production reports and maintenance records
- simulated training may include
- reproduction of conditions in working situation
 - enabling tasks to be learned and practised safely and economically
- shutdown checks may 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

	- 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
equipment must include	- 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 r.p.m. may include: - axial flow - back pressure - condensing - non-condensing pass-out - radial flow - steam turbines with a power output of greater than 500 kw - 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 relevant firefighting equipment - notification of upstream steam supplier - 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
- 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 UEPOPL001 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 UEOPL004 Licence to operate a steam turbine

Modification History

Release 1. This is the first release of this unit of competency in the UEP Electricity Supply Industry - Generation Sector Training Package Release 2.0.

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 include:

- applying work health and safety (WHS)/occupational health and safety (OHS) regulations, including:
 - emergency procedures
 - risk control measures
 - safe working practices
- communicating effectively and working safely with others in the work area
- completing verification of problems and steam turbine equipment faults and demonstrating relevant response procedures
- complying with Commonwealth, state or territory regulations for the acquisition of a high-risk work (HRW) licence for steam turbine operation
- complying with organisational and site policies and procedures, including quality requirements and state or territory legislation applicable to workplace operations
- complying with WHS/OHS regulations, legislative requirements, codes of practice, manufacturers' recommendations and specifications, and environmental requirements
- controlling and monitoring any ancillary equipment connected or interfaced to the steam turbine recording accurately and maintaining information related to operation of a steam turbine
- establishing safe practices and procedures for starting, operating, shutting down and maintaining a steam turbine
- identifying hazards associated with the operation of the steam turbine and putting 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 relevant 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 include knowledge of:

- communication channels and protocols in the workplace
- 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
- organisational and workplace standards, requirements, policies and procedures for starting, operating, shutting down and maintaining a steam turbine
- principles of heat transfer and thermodynamics
- procedures for the recording, reporting and maintenance of workplace records and information
- regulations, legislative requirements, codes of practice, manufacturers' recommendations and specifications, and environmental requirements relevant to the full range of techniques for operating steam turbines
- routine problems encountered in the process and equipment and adjustments required for correction
- safety data sheets (SDS) 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 interaction with other plant and equipment
- understanding of the hierarchy of hazard identification and control
- WHS/OHS requirements, including:
 - emergency procedures
 - risk control measures
 - safe working practices.

Assessment Conditions

Assessments must be conducted by an assessor accredited for this 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).

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

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 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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