Australian Government

UEPOPL001 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 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	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Plan work	**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

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

	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
industrial 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 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 must 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 • 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.education.gov.au/Pages/TrainingDocs.aspx?q=1715b9fa-e7bd-441c-bb8d-cf22c9c825a8