

Title	Operate a steam turbine in an energy and chemical plant		
Level	4	Credits	20

Purpose	<p>This unit standard is for people working as boiler operators and energy and chemical process operators in an energy or chemical plant.</p> <p>People credited with this unit standard are able to: demonstrate knowledge of steam turbines used in the energy and chemical industry, and operational procedures for a steam turbine; and operate a steam turbine, in an energy and chemical plant.</p>
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Classification	Energy and Chemical Plant > Operation of Energy and Chemical Plant
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Available grade	Achieved
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Guidance Information

- 1 Assessment conditions
All assessment must be carried out at an energy or chemical site.
- 2 Definitions
Energy and chemical plant may be in – petrochemical, agri-nutrient, power generation, dairy processing, meat processing, and wood fibre manufacturing, or other plants that operate with a combination of high temperatures, pressures, steam and/or chemicals in gas, liquid or solid form.
Organisational requirements – documented policies and procedures. These may include: equipment manufacturers' procedures, plant procedures, suppliers' instructions, site signage, codes of practice, company health and safety plans, on site briefings, and supervisor's instructions. This includes all regulatory and legislative obligations that apply to the plant.
Plant – the operational unit, equipment and/or workplace at which the person is working.
- 3 Legislation relevant to this unit standard includes but is not limited to – Hazardous Substances and New Organisms Act 1996, Health and Safety in Employment Act 1992, Resource Management Act 1991.

Outcomes and performance criteria

Outcome 1

Demonstrate knowledge of steam turbines used in the energy and chemical industry.

Performance criteria

- 1.1 Steam turbines are described in terms of type and operating principles.
- Range types include but are not limited to – impulse, reaction, Rateau, compounding, multi stage, single stage, multi cylinder, tandem, compound, reheat, back pressure, extraction, induction, condensing.
- 1.2 Components of steam turbines are described in terms of operating and design concepts.
- Range components include but are not limited to – rotor, casing, blades, shrouding, root, gland sealing, diaphragms, valves, extraction and bleed points, governor, steam-chest, sliding feet, nozzles, bearings, couplings, barring gear, drains; design concepts include but are not limited to – metallurgy, differential expansion.
- 1.3 Steam turbine speed and control systems are described in terms of their purpose and operating principles.
- Range speed and control systems include but are not limited to – trip solenoids, overspeed protection, mechanical governor, hydraulic governor, electronic governor, emergency trip valves.
- 1.4 Auxiliary equipment and systems are described in terms of design and operating concepts.
- Range equipment includes but is not limited to – condensers, air ejectors, feed heaters, barring gear, jacking pumps, gears, clutches, couplings; systems include but are not limited to – condenser subsystems, condensate, gland steam, lube and control oil, drains recovery, bled steam, bled steam reflux.
- 1.5 Supervisory devices used to monitor steam turbine conditions are identified and explained in terms of their purpose.
- Range conditions include but are not limited to – vibration, axial displacement and differential expansion, thrust, critical speeds, balance, resonance and harmonics, thermal stress, uneven heating.
- 1.6 Equipment protection systems for a steam turbine are identified and explained in terms of their purpose and operating principles.
- Range protection systems include but are not limited to – trip systems, vibration monitors, overpressure control, overspeed.

1.7 Control systems are identified for selected steam turbine equipment and auxiliary systems and explained in terms of their operation.

Range control systems include but are not limited to – flow, temperature, speed, back pressure, pressure, level.

Outcome 2

Demonstrate knowledge of operational procedures for a steam turbine in an energy and chemical plant.

Performance criteria

2.1 Start-up procedures are described in terms of organisational requirements.

2.2 Routine shut-down procedures are described in terms of organisational requirements.

2.3 Emergency shut-down procedures are described in terms of organisational procedures.

2.4 Deviations from normal operating parameters that can occur in a steam turbine are identified and described in terms of the operational steps and techniques used to respond to each deviation.

Range deviations include but are not limited to – speed, temperature, pressure, vibration.

2.5 Equipment malfunctions that can occur in a steam turbine are identified and explained in terms of the operational steps and techniques used to respond to each equipment malfunction.

Range evidence is required of four equipment malfunctions.

2.6 Methods of management of water ingress into a steam turbine are explained in terms of their effects.

Outcome 3

Operate a steam turbine in an energy and chemical plant.

Performance criteria

3.1 Safe work practices are used when operating a steam turbine in accordance with organisational requirements.

3.2 The location of steam turbine equipment is identified in accordance with the site specific identification coding system.

3.3 Checks and routine procedures are carried out in accordance with organisational requirements.

- 3.4 All plant documentation related to the process and equipment operation is completed in accordance with organisational requirements.

Replacement information	This unit standard was replaced by unit standard 32061.
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This unit standard is expiring. Assessment against the standard must take place by the last date for assessment set out below.

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1	27 June 2005	31 December 2014
Rollover and Revision	2	25 July 2006	31 December 2014
Review	3	22 May 2009	31 December 2016
Review	4	24 October 2014	31 December 2022
Review	5	27 February 2020	31 December 2022

Consent and Moderation Requirements (CMR) reference	0079
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This CMR can be accessed at <http://www.nzqa.govt.nz/framework/search/index.do>.